

BLOCK 3
HUMAN ECOLOGY: CULTURAL
DIMENSIONS



UNIT 9 UNDERSTANDING THEORIES OF HUMAN-ENVIRONMENT RELATIONSHIP*

Contents

- 9.0 Introduction
- 9.1 Environmental Determinism
- 9.2 Environmental Possibilism
- 9.3 Concept of Culture Area
- 9.4 Cultural Ecology
- 9.5 The concept of ecosystem
- 9.6 Cultural Materialism
- 9.7 Historical Ecology
- 9.8 Summary
- 9.9 References
- 9.10 Answer to Check Your Progress

Learning Objectives

In this unit, you will learn about the:

- Central tenets of human and environment relationship to enable critical thinking and interpretation;
- Contributions of different scholars in the theoretical frameworks of ecological anthropology identifying the weak and strong points of their arguments; and
- Different cases to help in preparing a reflexive account on the contemporary issues as a reality check to engage and apply the theories of human and environment relationship.

9.0 INTRODUCTION

The relations present between human beings and the environment are constructed as binaries featuring human beings as the subject and the environment as an object. In the age of the Anthropocene period, this construction of the human-environment relationship is evident in various discourses. The emergence of different theories about humans and the environment traces back to the scholarship of knowledge from the time of humankind's evolutionary history till date. It is important to note that a remarkable trend is developed in the conception of knowledge and arguments established around this topic. In anthropology, this set of knowledge that studies the relations between humans and the environment is discussed under the branch of ecological anthropology/environmental anthropology. Both the branches are used interchangeably though environmental anthropology is also called new ecological anthropology. Ecological anthropology

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is developed from the approach of cultural ecology in the 1960s. In comparison, environmental anthropology is believed to be progressed as an aspect of ecological anthropology in the 1990s.

The study of human and environmental relations as human ecology is one of the suggestions given by Kay Milton (2002) to meet the environmentalist cause from the standpoint of an anthropological account. The environmental cause includes all kinds of issues and challenges faced by humans and non-human agents. In order to demonstrate the debates and arguments around human and environment interactions, a set of theoretical frameworks and arguments are evolved discipline wise as well as in interdisciplinary ways. Some of the theories are discussed in the following pages.

9.1 ENVIRONMENTAL DETERMINISM

It is the first theoretical approach that defines the relationship between human beings and the environment. In simple words, it is an idea that the “environment shapes human culture.” It shows that the environment and its factors determine the cultural components of humankind in the form of traits and complexes. In other words, the development of human culture and society is dependent on the actions of environmental factors that allow the growth of a specific feasible culture or cultural items. It means that the environment is the prime mover of any forms of cultural development or cultural traits and elements in human society. As a result, it is considered as the determiner of the overall human behavior and attitude culturally and socially. It means that determinism defines human beings’ societal behavior or societies into different categories or groups by shaping a society’s culture and cultural components.

For example, the Inuits’ livelihood aspects are dependent on the harsh climatic conditions or the kinds of environment they inhabit. In the past, their forms of living, such as houses, occupations, tools, and implements, and labor division, indicated that environmental influence is very powerful. However, Inuits had already changed with time. The means of livelihood and ways of living among the contemporary world’s Inuits could notice a drastic change starting from the 19th and early 20th centuries. Today’s Inuit region has various technological and infrastructural development; people live in cities or upcoming small towns, signifying major changes and adaptation in their lifestyle and living. It means that the theory of determinism, which was popular in the 19th century through the Geographer Friedrich Ratzel and his followers, became redundant with the changing climatic conditions, environment, technology, and adaptability. Various claims and counterclaims over this theory of determinism interpreted the idea as a tool for ‘colonialism,’ ‘racism,’ or ‘western thoughts.’ For example, in the past, favorable geographical factors and availability of raw materials particularly for making guns and military armors in Europe enabled a successful western expansion of colonialism (as argued by Jared Diamond in his book ‘Guns, Germs, and Steel’) in different parts of the world. Determinism theory was used from the vantage point of Europeans or the west representing their superiority over the people of tropical climate such as Africa, Asia, etc. Another instance includes the effect of the environment on skin color. Accordingly, scholars opined that the skin color (black/white/brown), physique (short/long; thin/fat), and dietary habits (Vegetarianism/Non-Veg) of different communities were linked to environmental factors such as climate, altitude, soil, food items, etc. The black

skin color in the African population results from hot climatic conditions while genetic factors do not play anything on it (refer to Ibn Khaldun's book 'Muqaddimah' that explains the sociology and philosophy of human cultural history). A new approach to understanding the environment called neo environmental determinism developed, focusing on how environmental factors influence economic and political institutions, including the state formation of human societies rather than directly on culture and cultural behavior only. Such ideas of looking beyond the shaping of culture originated from the instances of the availability of different cultures under similar environmental conditions. It allows inquiring about the cultural variation present in similar environmental settings.

9.2 ENVIRONMENTAL POSSIBILISM

It is going to be our next framework of understanding the relationship between man and the environment. It can be said as the idea resulted from the changes and reactions developed against the theory of environmental determinism mentioned above. The rise of environmental possibilism theory took place during the period between the 1920s and 30s. The French Geographer Paul Vidal de la Blache became the founder of this idea and his famous quote, "Nature sets limits and offers possibilities for human settlement, but the way man reacts and adjusts to these conditions depends on his own traditional way of life (1922)" is always noteworthy. He did not agree with the complete role of the environment in human societies as the environment changes with knowledge and technology development. In contemporary days, any society will not rely entirely on the natural environment; instead, technology offers possible options. Technology is a byproduct of the human mind, and with the help, succeeding generations will act as agents to interact and adjust to the environment. Thus, possibilism is another theory that emerged as antagonistic to determinism, suggesting that environmental factors do not determine but enable or limit culture. So, it is not only food and means of livelihood for which communities depend on their environment; different cultural practices such as art, religion, and other aspects of human life also interact with the environment.

In anthropology, the American anthropologist Franz Boas (1858-1942) strongly reacted against environmental determinism and focused on culture through his historical particularism theory. His theory of historical particularism suggested that all cultures, irrespective of their environmental condition, will have their specific history, and with this, they developed the culture as an ongoing process across generations. Here, the emphasis was on the cultural history and diffusion, in which these factors become the agents in the explanation of human evolution. The possibilism approach was further developed by A.L. Kroeber (1876-1960), the student of Boas taking instances from his environmental classification of North America. Kroeber analyzed and distinguished the relations between the environment and social organization of the region in which culture interacts with the environment. However, the culture of or within the social organization did result from other cultural phenomena present in the region. Kroeber also followed Boas's idea of 'diffusion' in the evolution of cultural traits and elements and the inclusion of migration as another factor. Daryl Forde shared Boas and Kroeber's significance of history in the evolution of human culture and understanding man and environment relations better. Forde understood the restrictive and permissive nature of the physical conditions of the environment present in the development

of human activities. However, Forde also differed from the possibilist ways of generalizations.

From the above anthropological studies of possibilism, it is pertinent that the environment does not necessarily produce a culture; instead, it provides alternative opportunities or stabilizes it. It shows the varieties of human actions and the potentials to overcome or interact with the limitations provided by the environment. Therefore, different human cultures and societies have been appeared and established, including those with shared environmental situations. However, different societies' variation is quite challenging to generalize depending upon the cultural history, diffusion, migration, or technology involved. It is mainly because of the various social norms followed in different institutions of every society. It means that human activities can mold and shape the environment to the extent possible but not complete control over the environmental factors.

If we continue with the example of the Inuits discussed in environmental determinism, harsh cold climatic conditions and physical environment limit various production activities. It may be plantation or gardening, mining where the physical environment in the Arctic region becomes a barrier; however, possibilists argued that some actions and efforts automatically become part of local culture or cultural history with time. Diffusion of cultural traits and elements, migration, and other changes throughout time and space favors better alternatives rather than merely relying on limited occupation or cultural practices. Among the Inuits, the concept of greenhouse technology was introduced in the late 20th century, and currently, plantation is possible in the harsh physical environment of the Inuits. Likewise, using technology and the supply of cheap food items from outside makes a living much comfortable and sustainable. Population in the Inuit pockets have become bigger along with people coming from other parts of the world for different activities such as spreading awareness, volunteers for educating the children of Inuits, visitors or tourists, etc.

Let us take another example to understand the approach of environmental possibilism. Indian societies live on agriculture and agricultural activities. Farmers rely on rain-fed monsoonal agriculture irrespective of the physical conditions of the environment. The agricultural activities performed are widespread across India despite the limitations provided by the environment. Therefore, the limitations, however, do not stop cultivating grains and vegetables across India. Instead, a variant of grains such as wheat, barley, paddy, cotton, high yield hybrid seeds of varieties, etc., are cultivated. For instance, the hill people of north-eastern India do not practice wet paddy cultivation, unlike the plains, as the steepness of the hill slopes limits the process of wet cultivation. However, there is a possibility of paddy plantation through jhuming or shifting cultivation. The terrace cultivation becomes possible if the slopes are favorable for it. It shows that humans can mold and interact with the surrounding environment despite the restrictions available.

Check Your Progress

- 1) “Environmental factors determine human culture and society in the theory of determinism while it is not in the theory of possibilism. In possibilism, there is a possibility of culture to interact with its environment despite the inherent limitations or influences of the environmental factors present.” Find out whether the statement is true or false.

9.3 CONCEPT OF CULTURE AREA

The above discussion on possibilism by the diffusionists developed an offshoot called culture area. It is the result of engaging culture and cultural traits of different societies region-wise, homogenizing the regions or areas from where the similar culture traits and components appear. It helps in the construction and reconstruction of the developmental history of human culture. A culture area is a geographical space of a region or world where similar cultural traits and elements are shared by a group(s) of people. This concept can place a group of communities with similar environments and cultural complexes together.

In anthropogeography, Freidrich Ratzel (1844-1904) was the one who had divided the world into different culture areas. Later, Frobenius (1873-1938) and Graebner (1877-1934), the two German anthropologists, took his idea and developed the concept of Kulturkreise (culture circles) in German to explain the spread of cultural traits from one area to another (Harris, 1968). It provides the theory of similar culture or cultural components in clusters, enabling its spread and distribution through culture contact. In America, ethnographic studies and museum curators' efforts in arranging the data led to the concept of Culture area. Wissler and A.L. Kroeber's work observed the defined areas present in North America by comparing the relations between environment and cultural traits. Kroeber mentioned the overlapping characteristics between the boundaries or fuzziness in the dispersal pattern. The congregation of cultural traits and complexes in a culture area disperses into different directions or peripheries, showing the disappearance of culture's characteristic features from the core or central area of clusters to proximity. Using this idea, analysis of traits or complexes within or between a culture area (s) took place during the mid-20th century. Wissler (1970-1947) used this concept among the Native American communities dividing them into nine different cultural areas by grouping the communities with shared similar cultural traits together. The shared traits include subsistence mechanism, textile, religion, beliefs, and practices, natural environment, distinctive geography, or core-proximal to the cultural components. This study of Wissler led to the rise of research on cultural ecology among the Native Americans.

Let us take an example of the 'Culture area' in India. India's geographical region can be divided into major geographic regions/zones as classified by the geographers. However, it can be divided into different major cultural areas highlighting the similarities in language, culture, physical features, food habits, and environment. For instance, mapping the food habits of around almost shared commonalities or similarities provides four (4) broad cultural areas such as North Indian Food, South Indian Food, North-eastern India Food, and Western India Food. Now, let us take North Indian food; some regions like Punjab, U.P, Haryana, and Delhi constitute a strong essence of the north Indian food culture with the consumption of lots of sweets, milk, and milk products, spices, butter, Ghee, etc.

These cultural traits will disperse in different directions in the border areas where we can count some under the periphery or proximity while understanding the food culture or cluster of items. One can notice less use of milk, spices, or the adoption of other forms of spices, unlike the central core area, as mentioned above. This disappearance or reduction in the usage is noticeable in Eastern Bihar, high altitude Himalayan villages, Leh and Ladakh region. Thus, similar kinds of central clusters about South Indian food culture is noticeable in the heart of Southern states, in areas like Andhra Pradesh, Tamil Nadu, Karnataka, Telangana, Kerala, etc., dispersing to the proximal areas such as Orissa, Maharashtra, Goa, M.P., etc.

9.4 CULTURAL ECOLOGY

Cultural ecology as an approach came against the ideas of environmental determinism in the mid-20th century based on Darwin's theory of biological evolution. Gordon Childe (1892-1957), Leslie A. White (1900-1975), and Julian Steward (1902-1972) are the neo evolutionists who proposed the idea of multilinear cultural evolution. Childe (1951) described the evolution of cultures because of technological and societal 'diffusion' due to migration. However, this notion of evolution promotes the superiority of the Western developmental norm, invoking 'ethnocentrism,' i.e., judging a culture from another culture's standards and norms. Among the multilinear evolutionists, White and Steward were responsible for building a scholarship in the field of cultural ecology with a framework of evolutionary model different from earlier theories. White's (1949) model was based on humans' ability to be able to harness resources with the use of technology through the level of energy consumption. His energy and technology theory formed the basis of the culture around which other aspects such as symbolism and art developed. Steward's (1955) model was based on the theory of biological evolution and cultural relativism to highlight the divergent evolution in culture while there are cultural parallels within it. The parallels are related to diffusion and modification of cultures with the environment and social organizations or social institutions and looked at evolution complexity in the way societies organized themselves. It acknowledged that there are biological and cultural aspects that are also involved in the interaction of human communities and their environment. It saw the relationship between the environment and human society as continually influencing one another where evolution is not linear but multifaceted. Steward maintained that even though the historicist notion of history creating culture eliminated determinism, it did not correctly explain the societies' cultures and so its denial. At the same time, Steward hinted his disregard for determinism by maintaining that environmental factors did not determine humanity. It was also the other way around, 'human interaction with nature through subsistence and work determined and directed the influence of environment on the social and cultural order.' It is both a problem and a method for Steward.

Check Your Progress

2) What do you mean by Cultural Ecology?

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The problem lies in the level of dissimilarity in the interrelationship between the cultural adaptations and the environmental conditions of 'culture types' separated by space and time. Therefore, 'cultural types' showing similar cultural patterns represent the same 'levels of socio-cultural integration.' In the 1930s, Steward studied the cultural ecology of the **North American Shoshonean Indians of the Great Basin** who illustrated the lowest 'level of socio-cultural integration', also shown by the North American Eskimo and the South American Nambicuara, Guató, Mura, and other groups despite representing distinct 'cultural types.' The primary unit of function was the nuclear family, working separately rather than cooperatively.

The Shoshoneans were a society of hunter-gatherers, structured and integrated along with a familial 'level of socio-cultural integration' compared to the modern Americans that are structured and integrated along with higher levels of socio-cultural integration.' Employing the methodology of multilinear evolution, Steward (1955) identified the synchronic regularities of hunting-gathering techniques through 'diffusion' from the Southwest but a distinct cultural adaptation to "the intermontane steppes and deserts" not derived from the Southwest. He noted a sparse population in response to natural resources' sparse availability due to unpredictable and irregular rainfall patterns. The not-so-promising availability of resources all year round at a particular locality and their simple hunting-gathering techniques made the Shoshoneans continuously migrate in search of food and resources seasonally and annually along known terrains.

During the winter, survival was centered in and around the collection and storage of pine nuts. The Shoshoneans traveled to where the nuts were plentiful. Each family worked in isolation reasonably on its own patch to collect more nuts. Cooperation with other families on the same patch would have decreased the per capita harvest. The competition was tackled by the mutual understanding of boundaries and portions of resource expenditure set based on regular usage and the "first come, first served" principle.

The resource crunch made sense for the familial structure of integration, providing better survivability. However, the Shoshoneans did exhibit suprafamilial 'levels of socio-cultural integration' in their associations with and marriages into other families. However, Steward (1955) disregarded the higher levels of integration on the grounds of "no permanent social groups of fixed membership" under a leader. Steward (1955) noted that "permanent social groups of fixed membership" are possible under a leader only when resource abundance exists throughout the year. Otherwise, the cultural ecology did not permit them permanent social settlements. Social gatherings in communal hunts, recreational and other social activities were possible only if there were enough families around, plentiful resources, and appropriate leadership to coordinate independent families. However, isolated individuals like unmarried or widowed persons were also incapable of surviving independently, which is why they moved in with a nuclear family where the men hunted, and the women gathered and prepared food. However, they did not integrate at a social, political, or economic level. All feuds and disputes were settled amongst the hostile parties themselves without any outside intervention. They only came together to form 'predatory bands' with the domestication of horses and the European settlers' arrival. The leader had authority only over a raid or conflict against the European retaliators, and not all of the families came together. The familial integration changed only with the

arrival of the European settlers when the Shoshoneans started institutionalizing into the colonial arrangements of the fur trade and working in ranches, mines, and other odd jobs. Finally, they disbanded their group and joined the Europeans in the late 19th century.

Activity

To understand the concept of “Cultural Ecology,” develop a study among the Homeless people in Delhi’s ecology and see how they manage and adapt to some culture cores/centres such as Temples/Shelter homes/Bus depot to feed themselves and earn a living. How familial and social ties are developed among them, or how they select their location for daily earnings, food aids, etc.

Or,

Find out different tribal communities in India who claimed themselves as self-reliant and see the possibilities of using the themes discussed above to understand the approach of Cultural ecology.

9.5 THE CONCEPT OF ECOSYSTEM

The basis of this approach comes from the field of biological sciences and ecology in particular, and in anthropology, it comes from the cultural ecology aspect of Julian Steward. Encyclopedia Britannica defines an ecosystem as “the complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space.” E.P. Odum (1971) defines the concept of an ecosystem as “Any unit that includes all of the organisms (i.e., the “community”) in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e., exchange of materials between living and nonliving parts) within the system.” In population Ecology, “an ecosystem is the structural and functional interrelationships among living organisms and the physical environment within which they exist (Moran, 1990:3)” and remain a part of it. The living organisms consist of all the living beings, including human beings and the relationships between and within the living and non-living beings such as soil, climate, etc.,

In anthropology, the idea of cultural ecology principally focuses on adaptation to the environment. Later on, many anthropologists have started using the concept of ‘ecosystem’ without correctly following the defined required framework of it but using the ‘energy flow’ framework descriptively. For using the ecosystem approach, cybernetic strategies and design are essential to maintain an equilibrium or homeostasis of the interrelationships, including the cultural practices. Roy Rappaport introduced a necessary account of this approach of the ecosystem in a cybernetic way. He used the laws and principles of regulations, and feedback loop mechanisms present within the system or area to regulate and control the structural and functional relationships in a homeostatic manner. Adaptation of ecological units such as resources or organisms (community-wise) mainly focuses on maintaining equilibrium rather than efficient resource utilization or reproductive succession of the organism.

Therefore, we can simplify this notion of maintaining homeostasis from Roy Rappaport’s study on the Maring community of the Tsembaga in the 1960s. This

study highlights the dangers of an increase in pig population exceeding the environment's carrying capacity, resulting in resource competition among the pig and human population. To regulate and control the pressure of energy level consumption and shortage of natural resources, particularly food items that are common to both the population (pig and human), a feedback loop mechanism called "Kaiku" becomes functional to control the structural changes that occurred in the communities. He viewed culture (Kaiku) as a functional unit of the ecosystem to regulate organisms' relationships in a homeostatic manner.

The American anthropologist Roy Rappaport's (1926–1997) study of the Kaiku rituals of the Tsembaga tribe in Papua New Guinea represents the best example of the ecosystem approach in ecological anthropology. The patrilineal society of the Tsembagas does not have any political figure, but the integration of the community members took through kinship and co-residence. They are an agrarian society with an ecosystemic environment of fixed boundaries for the regulation of society. Pig rearing is central to their subsistence mode of living, where pigs provide advantages and disadvantages. Pigs feed on garbage around the settlement areas allowing them to weed and clear the ground through wallowing and herding. However, this becomes disadvantageous with the growth of pig size and number. They do not slaughter the pigs except during the festival of the "Kaiku." The Kaiku festival involves the large-scale slaughter of pigs, consumed by the local clan and its allies as a method of paying off the debt or appreciation. The Kaiku continues for about a year, allowing socialization and facilitating mechanical trade and other commodities of importance. This ritual ensures that the number of pigs in each community does not become so high that it becomes burdensome to support them. It also ensures that there is a regular supply of nutritious meat intake as all allied groups share the pig meat. The ritual of the Tsembagas thus serves social, political, economic, and ecological purposes through the war restrictions, distribution of land and resources, mobilization of local groups, and facilitating 'diffusion' of technical, social, and economic arrangements. Cultural ecology, thereby, draws attention to the aspects of culture closely related to humans' sustenance activities co-existing with other humans through the economic system.

Some scholars have mentioned the limitations of this approach. They opined that too much emphasis on the regulatory mechanism became the anthropological study's focus, while discussion of other processes and factors present in the system or study areas becomes minimal.

9.6 CULTURAL MATERIALISM

Cultural Materialism is the idea developed by Marvin Harris (1968) to explain some of the exciting aspects of ecological underpinnings in the context of cultural practices and norms. It gives a new dimension of understanding culture and cultural practices that are available under the purview of religion. Materialism emphasizes the economic and political aspects of a cultural practice rather than the ideational and symbolic.

It considers all the factors in the surrounding environment that affect the production and consumption of food. It includes economic, political, social, and other environmental factors. This method of analyzing food across cultures assumes that what we eat, why we eat it, why we prefer it as compared to other

consumable stuff, and how we eat it is mainly controlled by the material conditions rather than ideals. This approach lies in the Marxist theory. Materialists address the structural approach's limitations by pointing out that life does not exclusively consist of self-expression and theories developed by just attaching symbolic meanings. Instead, there are a variety of constraints and differences in the real world.

Harris (1978) discusses the sacred cow in India and the prohibition of eating meat. Now prescribed and codified in Hindu religious scriptures and practice, this practice is suspected not always to have been a tenet of the religion. Textual evidence from the second millennium B. C. suggests that cow slaughter was prevalent as a part of sacrificial rituals, and the ritual meat was also consumed. Around this time, the valley around the Ganges became densely populated, eventually resulting in ecological degradation, causing several droughts, floods, and erosion, making it very difficult to maintain domesticated animals. Harris suggests that this was possibly the driving factor that caused communities to incorporate prohibition on eating cows' meat into their practice as the people who refrained from eating their cattle were perhaps the ones who survived against the hurdles of ecological conditions. Over time, these practices were codified and inculcated into religious practice. Thus, Harris (1978) argues that the cow's sacred status enables Indian society to derive the benefit of milk, mechanical energy for farming, dung for manure or fuelwood, hide for leather products or items, instead of consuming as meat. He intends to imply that saving cows instead of slaughtering them is economically and ecologically better, and it increases productivity.

Dandekar (1969) poses a critique to Harris's (1978) argument based on the fact that the quantity of cows in India is far too numerous and alleges that a cultural-ecological and materialism perspective does not do justice to the actual contribution of the sacred cow or Indian cattle as many of the resources in the form of materials do not function in the way that is suggested.

Thus, through the approach of cultural materialism, we can see that various societies develop cultural practices to ensure their interactions with their material base non-human beings and with other elements of the ecosystem.

Check Your Progress 3

- 3) How do you explain the sacred Cow in India in the light of Cultural Materialism?

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9.7 HISTORICAL ECOLOGY

It is an approach to fill the nuances and responsiveness of culture and environment over time. It is a concept and method to study the past, present, including future relations present among human beings and the environment. It provides past evidence of historical, ethnographic, archaeological, environmental, or other details to construct and reconstruct the transformation of a landscape, human activity, and culture, suggesting future pathways. In this, political ecology, ethnoecology shape a vital role as the decision on future opportunities.

Let us take an example of historical ecology to highlight the context of man and environment relationships from the past and what could be expected in the future. As is the case in India with the taboo on beef-eating, similarly in other places worldwide, communities affirm taboos. Studies in Amazonia reflect similar principles to protect the biodiversity and available biomes and provide scope for feasible alternatives of understanding ecological services concerning specific conditions (Ross, 1978). Biodiversity is scientifically studied as well as socially constructed using the method of historical ecology. Historical ecology studies in Amazon show a detailed account of the transformation of original landscapes and indigenous populations. William Balee's research of more than 30 years does explain the general presumption of indigenous people giving less control and regulation of the forests as its own. His study highlights the actions and influences of human beings at Amazon. The notion of wilderness in the region has changed with time. At present, the natural landscapes of the region have changed drastically. However, there is no expectation of the complete transformation of Amazon's environment and biome shortly, as indigenous people's technologies are mostly dependent on their traditional knowledge. Some of the cultural practices and taboos also help in managing the resources. His historical ecology method also highlights the power relations present among the local communities who live in a nomadic form and those living in a more settled habitat. This changing nature and culture relationship in the region is the best example of adaptation, where hurdles and opportunities remain familiar to the Amazonians' social and natural environment.

9.8 SUMMARY

Let us briefly sum up the above points of discussion on human and environmental relationships. We have discussed some of the prominent theories in ecological anthropology, particularly in dealing with human and environmental relationships. The first framework of environmental determinism arises from the early scholars who looked at the environment's forces and considered as directly determining how human beings live. This theory was too rigid in representing human culture and society. Sutton and Anderson (2013) suggested that this theory becomes too static while the environment and culture are dynamic, and the causal relationship established is not a one-way direction. The development of different cultures that shared a similar environmental condition becomes questionable under this theory. Later in the late 1920s and 30s, the theory of possibilism came up where the environment is seen as a limiting factor but not a direct modifier or determiner of human culture. Instead, it enables human society to develop appropriate knowledge and technology. This way of understanding the man and environment relationship was influenced by the cultural history, diffusion, and migration of

different groups. The two theories looked at cultures evolving linearly, with communities progressing from one stage to the next cultural evolution stage. However, it is unnecessary to fulfill every stage; instead, a different trajectory is possible, bypassing the specific stages and reaching one that lies in between the linearity structure. The orientation of the concept of culture area further adds to the logical analysis of cultural traits and elements present in different societies. Culture Area is another framework for understanding human and environment relations. It is an effort to map out the centres or areas in which significant cultural clusters are present. The dispersal pattern of the cultural items and elements present in culture provides the established nature of human and environmental relationships better.

In the culture area, the availability and use of cultural items decide the core and periphery. It shows the shared relationship between and within human societies and different environmental situations. It provides scope for understanding humankind's adaptation process, as provided by the theory of cultural ecology. The concept of cultural ecology focussed on the successful adaptation to the environment (Julian Steward) and the utilization of energy and technology used in harnessing natural resources (Leslie White). This approach led to the replacement of the theory of unilineal cultural evolution by the theory of multilinearity or multilineal evolution.

Cultural practices of diffusion and migration influence cultural ecology, while the significant adaptation pattern occurred in core areas of culture area. Then, the development of the ecosystem approach took place. Roy Rappaport's study among the Tsembaga Marings provides the best anthropological study of the ecosystem approach. This approach shows the role of cultural practices, particularly the "Kaiku ritual," as a feedback loop mechanism to maintain homeostasis among the pig and human population provided that there are regulations and control over food resources or level of energy consumption in the area. The idea of cultural materialism proposed by Marvin Harris argued that cultural systems are practical, unlike the symbolic meanings present in structuralism or the one mentioned above in the ecosystem approach. In materialism, culture systems are the facilitator in the ecological context and the production and distribution of resources. Resource management and the question of human survival and continuation could be explained better by historical ecology methods.

Thus, the theoretical frameworks used in studying human and environmental relationships are interdisciplinary and progressing day by day, along with new approaches like political ecology and environmental humanities. However, the above theories reveal that the interplay between the environment and human culture is strong and influential in different dimensions.

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9.10 ANSWER TO CHECK YOUR PROGRESS

- 1) True
- 2) Cultural ecology is the adaptation of human beings to the environment.
- 3) The sacredness of the Indian Cow links to the practical aspects of the Indian economy. Its contribution to agriculture and allied products is paramount for sustenance.

UNIT10 VARIOUS MODES OF HUMAN ADAPTATION IN PRE-INDUSTRIAL SOCIETIES*

Contents

- 10.1 Introduction
- 10.2 Human Adaptation
- 10.3 Hunting and Gathering
- 10.4 Horticulture
- 10.5 Pastoralism
- 10.6 Agriculture
- 10.7 Summary
- 10.8 References
- 10.9 Answers to Check Your Progress

Learning Objectives

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

- understand the concept of human adaptation;
- explore various pre industrial societies; and
- know various modes of human adaptation in pre industrial societies.

10.1 INTRODUCTION

In biology, **adaptation** has three related meanings. Firstly, it is the dynamic evolutionary process that fits organisms to their environment, enhancing their evolutionary fitness. Secondly, it is a state reached by the population during that process. Thirdly, it is a phenotypic or **adaptive trait**, with a functional role in each individual organism that is maintained and has evolved through natural selection. In the present unit we will see various modes of human adaptation in pre industrial societies.

10.2 HUMAN ADAPTATION

Humans have **biological plasticity**, or an ability to adapt biologically to our environment. An **adaptation** is any variation that can increase one's biological fitness in a specific environment; more simply it is the successful interaction of a population with its environment. Adaptations may be biological or cultural in nature. Biological adaptations vary in their length of time, anywhere from a few seconds for a reflex to a lifetime for developmental acclimatization or genetics. What type of adaptation is activated often depends on the severity and duration of **stressors** in the environment. A stressor is anything that disrupts homeostasis, which is a "condition of balance, or stability, within a biological system..."

* Contributed by Dr. Anjuli Chandra, Assistant Professor, Assistant Professor cum Assistant Director, Centre for Study of Social Exclusion and Inclusion Policy, The Gandhigram Rural Institute, Gandhigram, Tamilnadu.

(Jurmain et al 2013: 322). Stressors can be abiotic, e.g., climate or high altitude, biotic, e.g., disease, or social, e.g., war and psychological stress. Cultural adaptations can occur at any time and may be as simple as putting on a coat when it is cold or as complicated as engineering, building, and installing a heating system in a building.

Types of Biological Adaptation

1) Acclimatization

This form of adaptation can take moments to weeks to occur and is reversible within an individual's lifetime no matter if it occurs when one is a child or an adult.

a) **Short-term acclimatization** can occur within seconds of exposure to a stressor. This type of response quickly reverses when the stressor is no longer present. For example, tanning is a short-term response to increased UV-radiation exposure especially during summer months, which can occur within hours. Tans are generally lost during the winter when UV-radiation decreases.

b) **Developmental acclimatization** occurs during an individual's growth and development. It's also called ontological acclimatization or developmental adjustment. This adaptation can take months to years to acquire. A famous example of this is those who were born at high altitude tend to develop larger lung capacities than do those who were not born at high altitude, but moved there later in life.

2) **Genetic adaptations** can occur when a stressor is constant and lasts for many generations (O'Neil 1998-2013). The presence of the sickle cell allele in some human populations is one example. Keep in mind that genetic adaptations are **environmentally specific**. In other words, while a particular gene may be advantageous to have in one environment it may be detrimental to have in another environment.

3) Body size and shape

There are following two ecological rules that explain the variation in size and shape of bodies and extremities using latitude and temperature.

a) **Bergmann's rule:** Warm-blooded animals tend to have increased body size with increasing latitude (toward the poles) and decreasing average temperatures.

b) **Allen's rule:** A corollary of Bergmann's rule that applies to appendages. Warm-blooded animals tend to have shorter limbs with increasing latitude and decreasing average temperatures.

This has been applied to humans. The idea is that populations toward the pole tend to be shorter and have shorter limbs than do people on the equator. For example, the Inuit people of Canada tend to be shorter than the Maasai people of Kenya (O'Neil 1998-2013).

4) Adapting to Climate Extremes

Humans and many other mammals have unusually efficient internal temperature regulating systems that automatically maintain stable core body temperatures in cold winters and warm summers. In addition, people have

developed cultural patterns and technologies that help them adjust to extremes of temperature and humidity.

Activity

You can explore the hypothermia and hyperthermia body conditions, how it can be controlled and the factors affecting these body conditions

5) Adapting to High Altitude

There are two major kinds of environmental stresses at high altitude for humans. First, there are the alternating daily extremes of climate that often range from hot, sunburning days to freezing nights. In addition, winds are often strong and humidity low, resulting in rapid dehydration. Second, the air pressure is lower. This is usually the most significant limiting factor in high mountain regions. At high altitudes, the lower air pressure makes it more difficult for oxygen to enter our vascular systems. The result is **hypoxia**, or oxygen deprivation. Other early symptoms of “high altitude sickness” include a lack of appetite, vomiting, headache, distorted vision, fatigue, and difficulty with memorizing and thinking clearly. There is also an increased risk of heart failure due to the added stress placed on the lungs, heart and arteries at high altitudes. Later, a more efficient response normally develops as acclimatization takes place. Additional red blood cells and capillaries are produced to carry more oxygen. The lungs increase in size to facilitate the osmosis of oxygen and carbon dioxide. Usually, the populations that are most successful are those whose ancestors have lived at high altitudes for thousands of years. This is the case with some of the indigenous peoples living in the Andes Mountains of Peru and Bolivia as well as the Tibetans and Nepalese in the Himalaya Mountains. The ancestors of many people in each of these populations have lived above 13,000 feet (ca. 4000 meters) for at least 2,700 years (O’Neil 1998-2013).

6) Skin Color Adaptation

Skin color is primarily due to the presence of a pigment called **melanin**, which is controlled by at least 6 genes. Both light and dark-complexioned people have melanin. In lighter skin, color is also affected by red cells in blood flowing close to the skin. Human skin color is quite variable around the world. It ranges from a very dark brown among some Africans, Australian Aborigines, and Melanesians to a near yellowish pink among some Northern Europeans. There are no people who actually have true black, white, red, or yellow skin. These are commonly used color terms that do not reflect biological reality. Nature has selected for people with darker skin in tropical latitudes, especially in non-forested regions, where ultraviolet radiation from the sun is usually the most intense. Melanin acts as a protective biological shield against ultraviolet radiation. By doing this, it helps to prevent sunburn damage that could result in DNA changes and subsequently, several kinds of malignant skin cancers. Melanoma in particular is a serious threat to life. In the United States, approximately 54,000 people get this aggressive type of skin cancer every year and nearly 8,000 of them die from it. Those at highest risk are European Americans. They have a 10 times higher risk than African Americans.

It would be harmful if melanin acted as a complete shield. A certain amount of shortwave ultraviolet radiation (UVB) must penetrate the outer skin layer in order for the body to produce **vitamin D**. Approximately 90% of this vitamin in people normally is synthesized in their skin and the kidneys from a cholesterol-like precursor chemical with the help of ultraviolet radiation. The remaining 10% comes from foods such as fatty fish and egg yolks. New evidence suggests that vitamin D may help prevent a wide range of cancers, including those of the colon and breasts (O'Neil 1998-2013).

7) Nutritional Adaptation

There are major differences around the world in how effectively our bodies process particular foods. Different human populations not only eat different foods, but their digestive systems often use them in somewhat different ways. For instance, the Inuit of Alaska, Northern Canada, and Greenland traditionally ate far more fat than most other populations and their gastrointestinal systems apparently are more capable of breaking fats down for use by their bodies. Another example is that of lactose intolerance whereby different people show difference in nutritional adaptation related to milk sugar, or **lactose**, commonly found in uncooked dairy products, due to the deficiency of particular enzyme called lactase which helps to digest the milk sugar. Lactose intolerance is at its highest frequency in some parts of Africa, East Asia, and among Native Americans. Northern Europeans generally have the lowest frequency of this dietary problem. This is an indication that adapting to local nutritional opportunities has led to the evolution of related genetic differences among the populations of the world (O'Neil 1998-2013).

Check Your Progress

- 1) Define an adaptation?

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10.3 HUNTING AND GATHERING SOCIETY AND ADAPTATION

Hunting and gathering was **humanity's** first and most successful **adaptation**, occupying at least 90 percent of **human** history. In this society, human beings obtain their food by hunting, fishing, scavenging, and gathering wild plants and other edibles. The culture accelerated with the appearance of *Homo erectus* (1.9 million years ago), whose larger brain and shorter digestive system reflected the increased consumption of meat. Additionally, these were the first hominins built for long-distance walking, pushing nomadic tribes into Asia and Europe. Hunting and gathering remained a way of life for *Homo heidelbergensis* (700,000 to

200,000 years ago), the first humans to adapt to colder climates and routinely hunt large animals, through the Neanderthals (400,000 to 40,000 years ago) who developed more sophisticated technology (Robinson, 2014).

a) Adaptation through Tools and Technology

The tools used by hunter-gatherers to make their lifestyle possible had their humble beginnings, so far traced back to around 2.6 million years ago, in the Oldowan technology (lasting until c. one million years ago). Simple stone cores were used as choppers, hammerstones, and retouched flake scrapers, in order to both cut the meat off of animals and get to the nutritious marrow inside, or process plants and seeds. In Africa, in the meantime, the Acheulean (c. 1.7 million years ago to c. 250,000 years ago) had begun to evolve, which came to Eurasia a bit later on. It saw the development of tools into large bifaces like hand axes, picks and cleavers, enabling *Homo erectus*, and later on *Homo heidelbergensis*, to literally get a better grip on the processing of their kills. Tool use was by now decently established, and the following Middle Palaeolithic saw a fine-tuning; retouched flake tools, such as scrapers, points, and backed knives were made by early forms of *Homo sapiens*, Neanderthals and the earliest anatomically modern humans. A huge proliferation then occurred in the Late Palaeolithic, where blade tools were created alongside bone, antler and ivory artifacts, and even such technological feats as spear throwers and bows and arrows began to appear. These more specialized tools enabled them to widen their diet and create more effective clothing and shelter as they moved about in search of food (Groeneveld, 2016).

Activity

Make a list of tools used by early hunter gatherers and compare it with anyone of the present-day hunter gatherers and see the similarity and differences between the two and how the tools help them to adapt to present day environment

b) Adaptation through Diet

The exact types of food hunter-gatherers consumed obviously varied depending on the landscape and its resident flora and fauna. Whereas some might specialise in hunting the impressive prehistoric mega fauna such as the megaloceros or giant elk, woolly mammoths and woolly rhinoceros, others might focus on trapping small game or on fishing. Early humans, in general, went down the path towards smaller teeth. Already in species such as *Homo rudolfensis* the molars were not as large as their ancestors', and later species such as *Homo habilis* and *erectus* continued this trend. Teeth size declined, while at the same time brain size grew. They made up for their smaller teeth by developing a stone tool culture, which allowed them to more efficiently exploit their environment than ever before. As such, these humans became more omnivorous- and thus, more versatile and adaptable- by adding more meat to their previously pretty green diet.

'The bigger the animal, the better' is a philosophy that definitely holds up when one is concerned with feeding a whole band of hungry humans leading active lives. For living that dream, the time to be alive was the Late Pleistocene (c. 120,000 – 10,000 years ago), specifically in the main part of

Eurasia and stretching all the way into eastern Siberia. There, humans would have found an astonishingly high concentration of mega fauna such as mammoths, woolly rhinoceros, Lena horse, and bison, in what has been called the 'Mammoth complex'. Neanderthals, for instance, surely took advantage of this: they are known to have eaten a fair amount of mammoth and rhino meat, besides other meat from mammals such as bison, wild cattle, reindeer, deer, ibex and wild boar (Groeneveld, 2016).

Because plant remains do not stand the test of time as well as butchered animal bones do, it is generally hard to determine exactly what our ancestors' veggie habits were like. However, a recent 2016 study by Melamed Et.al, (PNAS, 2016) gives us a rare glimpse into the plant diet of the people living at GesherBenotYa'aqov, Israel, some 780,000 years ago. A stunning 55 kinds of food plants were found there that include seeds, fruits, nuts, vegetables, and roots or tubers. The diversity shows these people had a good knowledge of which edible things could be found in their environment, and in which season, and reflects a varied plant diet (Groeneveld, 2016).

c) Adaptation through dwellings

Mostly, prehistoric hunter-gatherers would have used natural shelters as living space; overhanging cliffs would have provided a place to nestle into to escape the wind and rain, and caves were highly popular as comfortable living spaces could be created within, mostly near the entrance to stay in range of the daylight. The living spaces of the earliest hunter-gatherers were basic and not clearly structured. Hand-built shelters likely date back to the time of *Homo erectus*, though one of the earliest known constructed settlements, from 400,000 years ago in Terra Amata, France, is attributed to *Homo heidelbergensis*. By 50,000 years ago, huts made from wood, rock and bone were becoming more common, fueling a shift to semi-permanent residencies in areas with abundant resources. The remains of man's first known year-round shelters, discovered at the Ohalo II site in Israel, date back at least 23,000 years (Groeneveld, 2016).

In the Upper Paleolithic, humans became ever more inventive and organised, as manmade structures were now created to a much higher degree than before. Thus, some societies-built huts or tents with wooden supports, or even with mammoth bones forming the structure, which were also illuminated by the light of hearths and had clear architectural features that organised the spaces into designated areas. All in all, as their technologies developed and they became more versatile, humans were able to master all kinds of challenging environments, from scorching deserts to dense forests and frigid tundra (Groeneveld, 2016).

d) Adaptation by moving out and expanding their habitat

The geographical spread of early man was so vast. A huge continent such as Africa in itself already hosts all sorts of different landscapes, although in general, some degree of sun and heat would have been part of the deal, but once man spread beyond its borders, a whole new kind of adaptability would have been necessary. Early bands of *Homo erectus* were likely the first to venture out into new worlds, nearly 2 million years ago, spreading out all the way to Eurasia, China, and Indonesia by c. 1.7- c. 1.6 million years ago. Europe was most likely not explored until much later; although the

Mediterranean shows some tentative human activity before 1 million years ago, until around 700,000 years ago. Once they had crossed, they flourished. Neanderthals later evolved from this population and they ended up expanding beyond their initial European homes into both the Near East and parts of Central Asia, up to the Altai region in Siberia. By the end of the Middle Palaeolithic, almost the entirety of the Old World had been reached by some group of humans. Insular Asia, Australia and the New World would also be conquered by humans by the end of the Pleistocene (Groeneveld, 2016).

e) Adaptation through Fire

The controlled use of fire was likely an invention of our ancestor *Homo erectus* during the Early Stone Age (or Lower Paleolithic). The earliest evidence of fire associated with humans dates back from 1.7- 2 million years ago comes from Oldowan hominid sites in the Lake Turkana region of Kenya. The site of Koobi Fora contained oxidized patches of earth to a depth of several centimeters, which some scholars interpret as evidence of fire control (Hirst, 2019).

Fire thus plays a central role in human survival. However, by at least 400,000 years ago it is clear that the human bands roving around and setting themselves up in caves not just in Africa, but also the Middle East and Europe, knew and used fire; clear evidence of hearths has been found in Acheulean levels. These people were clearly skilled at maintaining and using fire (Groeneveld, 2016).

Fire had important benefits. Apart from protection and warmth, a major advantage that came when the deliberate use of fire began to become more widespread is the ability to cook. Until around 500,000 years ago, cooking seems to have been a rare sight within hunter-gatherers societies. What happened when humans did convert to sizzling their bison steaks and the likes is as follows. Firstly, cooking softens the food, making it easier to chew and digest, which meant people could develop smaller teeth and less long digestive systems, and spend less of their time digesting their food. The traditional hunter-gatherer diet is moreover so hard to ingest and digest in its raw form that cooking, in addition to the calorific benefits, really represented a big change. It also left these early humans' brains free to grow to a larger size than previously possible; large brains are more complex but also more expensive and require high-quality foods. Of course, having larger and more complex brains meant that humans could come up with better ways to maintain and use fire, develop better hunting strategies, and so forth. Thus, the cycle continued (Groeneveld, 2016).

Activity

Visit an archeological museum nearby and find out how the invention of fire changed the human history and its role in adapting to the then environment

Fire in general also had an impact on the social side of these hunter-gatherer groups. Fire, with the light it provided, enabled hunter-gatherers to stay active even after sundown, extending their days and leaving more time for social bonding, which is very important especially in larger groups. Modern humans are awake for nearly twice as long as many of their primate cousins (Groeneveld, 2016).

10.4 ADAPTATION IN HORTICULTURAL SOCIETIES

Primitive agriculture is called horticulture by anthropologists because it is carried on like simple gardening, supplementary to hunting and gathering. It is typically practiced in forests, where the loose soil is easily broken up with a simple stick, rather than on grassy plains. Horticulture is therefore much less productive than agriculture. Horticultural societies are differentiated from hunting and gathering societies by the use of domesticated plants as the major basis for subsistence. Horticultural societies are technically differentiated from agrarian societies by their lack of plows and animal traction and from pastoral societies because they do not make domesticated herd animals the main basis of subsistence. Horticulture first developed in the Middle East beginning about 9,500 years ago and by about 5,000 years ago this technology had spread far eastward and to the Atlantic in the West (Times Historical Atlas1, 1979: 42).

a) Adaptation through swidden cultivation

Forest horticulturists use fallowing techniques variously called “slash and burn” “shifting cultivation,” and “swidden cultivation” (a northern English term now widely used by anthropologists). After about two years of cropping a plot is left fallow for some years and allowed to revert to secondary forest or bush. Before resuming cultivation, the bush may be cut, left to dry, and then burned. The ashes bestow some fertilization, but the foremost benefit of this procedure is that the plot will be relatively weed free at first (<https://www.britannica.com/topic/primitive-culture/Horticultural-societies>). Swidden cultivation has turned out to be a quite durable adaptation to the wet tropics. During this idle time, wild vegetation and brush will take over the unused land. A great example of this type of shifting cultivation is the **Yanomami of the Amazon**. As reported by famous anthropologists Carol and Melvin Ember, the Yanomami usually farm a piece of land for a few years, filling it with things like plantains and sweet potatoes. They then move on to another spot and allow nature to sort of rejuvenate their left-behind fields (Ember & Ember, 2015). Currently, it is still in practice in the northeastern states of India like Arunachal Pradesh, Meghalaya, Mizoram, and Nagaland and also in the districts of Bangladesh like Khagrachari and Sylhet (Puhan, 2020).

After World War II views on swidden cultivation have changed substantially (Conklin, 1954). In many areas of the hot, wet tropics, high rainfall has developed soils that are very poor in nutrient holding capacity. An effective way to farm these poor soils is to burn off the forest and grow crops for a few years in the ash fertilized plot. As nutrients are depleted and weeds invade the field, it is allowed to return to forest. The period of forest fallow varies greatly, but 15-50 years is perhaps the typical range. No more elaborate form of cultivation has yet proved practical on the worst of these soils and many examples of quite simple horticulture are common in S.E. Asia, S. America, and Africa. In some tropical areas, especially Africa, there are also societies practicing more advanced forms of horticulture in the seasonally dry regions north and south of the Congo Basin. In Oceania, Melanesian and Polynesian societies still practice horticulture (Conklin, 1954).

Activity

Identify the group of swidden cultivators in India and how they practice slash and burn at present and how it is affecting the present-day environment

b) Adaptation through tools and technology

The toolkit of horticulturalists varies immensely in complexity. Lenski and Lenski (1982) recognize this fact by subdividing the continuum into “simple” and “advanced” subtypes. The Amazonian Basin horticulturalists like the Yanomamo, Xavante, and Waorani made tool with a simple stone axe to cut the forest, a means of making fire by friction to burn it, and simple wooden digging sticks and spades to plant their cuttings of manioc, sugar cane, maize seeds, etc. South American simple horticulturalists typically keep no domesticated animals and the men hunt and fish for protein. In Oceania, by contrast, pigs are a near-universal element of simple horticulture. In Sub-Saharan Africa, cattle are frequently kept whenever tsetse flies, which transmit devastating diseases from native game to the relatively recent cattle, are absent (Lenski & Lenski, 1974).

To get an impression of the range of technical sophistication of horticulture, we can compare the extremely simple Amazonian basin technology to much more sophisticated toolkit of the Andean Highlands. Andean peoples were a fair example of an advanced horticultural society in 1500. Cultivation implements included a “foot-plow”, a sort of spade. Fields were permanent, often terraced and irrigated, and normally manured or cultivated with a short fallow. Inca and pre-Incan water control and irrigation works were quite impressive. Much of the system is still used today in the Highlands and Coastal Valleys of Peru, and ruined hydraulic structures are common as well (Lenski & Lenski, 1974).

c) Adaptation through dwelling

The Neolithic village of Catal Huyuk, in modern Turkey, was occupied from about 6500-5700 B.C. During that time, people regularly renovated dwellings, or leveled some and built others on top. By the time Catal Huyuk was abandoned, the village was on top of a mound of cultural debris (huyuk or hoyuk means mound). The houses themselves were one story, single-room dwellings which usually shared walls with neighboring houses and meant that access was frequently by a ladder. The houses were made of mud brick, with a wooden support for the roofs. The roof was made of a layer of reeds covered by a layer of thick mud. These houses were considerably more permanent than anything constructed by foragers (laulima.hawaii.edu).

Residence is semi-permanent, so houses of modest sophistication are constructed. Villages may last on the same spot for a decade or longer, until it is convenient to move to find more game or to be closer to swidden plots. Houses made of mud brick were designed to last a generation or two. Monumental architecture and fortifications of dressed stone are the visually most arresting accomplishments of the Andean peoples. Textiles and pottery were in common use. Perhaps significantly, Sub-Saharan Africa has little monumental architecture, which is a product of highly stratified societies (Conklin, 1954).

Check Your Progress

- 2) How horticultural societies are differentiated from hunting and gathering societies.

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10.5 ADAPTATION IN PASTORAL SOCIETY

Activity

Select some of the pastoral society mentioned above and study in detail their peculiarities, culture, tradition, life style and ways to adapt in present day

Pastoral or Herding societies are in many respects the direct opposite of forest horticulturalists. They are usually the most nomadic of primitive societies, they occupy arid grasslands rather than rainforests, they have a nearly total commitment to their animals and their sociopolitical system is nearly always that of a true hierarchical chiefdom rather than of egalitarian villages and tribal segments. Pastoralism is the branch of agriculture concerned with the raising of livestock. It is animal husbandry: the care, tending and use of animals such as camels, goats, cattle, yaks, llamas, and sheep. "Pastoralism" generally has a mobile aspect, moving the herds in search of fresh pasture and water. Pastoralism is a successful strategy to support a population on less productive land and adapts well to the environment. For example, in savannas, pastoralists and their animals gather when rain water is abundant and the pasture is rich, and then scatter during the drying of the savanna. Pastoralists often use their herds to affect their environment. Grazing herds on savannas can ensure the biodiversity of the savannas and prevent them from evolving into scrubland. The best known and purest pastoral nomads are found in the enormous arid belt from Morocco to Manchuria, passing through North Africa, Arabia, Iran, Turkistan, Tibet, and Mongolia. They include peoples as diverse as the Arabized North Africans and the Mongol hordes. Other less specialized and successful pastoralists include the Siberian reindeer herders, cattle herders of the grasslands of north-central Africa, and the Khoekhoe and Herero of southern Africa (Pritchard, 1940). India has 34 million pastoralists managing a livestock population of more than 50 million (downtoearth.org). In India, nomadic pastoralism is practised by a lot of tribes in states like Jammu and Kashmir, Himachal Pradesh, Maharashtra, Andhra Pradesh, Rajasthan etc. Some herding communities are *Gujjar* Tribe from *Garhwal*, *Dhangars* from Maharashtra, *Gollas* Herders of Karnataka, *Raikas* of Rajasthan (toppr.com).

a) Adaptation through searching of best fodder and knowing their livestock

Pastoralists do not generally move in response to pasture shortage, as is widely believed. Instead, they seek out the best fodder for their animals: As a general rule pastoralist are much more concerned with the quality of the diet (grasses, shrubs, tree leaves and water), as measured by their animals'

health and productivity. They generally move towards higher quality, rather than away from low quantity. To an outsider the grasses, shrubs and trees of the drylands may look much the same, but in fact pasture quality varies on a daily, seasonal and annual basis and most importantly is not evenly spread across the landscape. It is this scattering of different pastures over different places, at different times, which makes mobile livestock-keeping so productive in what is otherwise a difficult environment.

It takes skill to ensure that the cattle are well fed. Communities have learnt both to guide cattle in their feeding habits and to be sensitive to their needs. The WoDaaBe from Niger say that they train their Bororo zebu to pick and choose from over 40 different plant species, including shrubs and trees and even wild melons and water lilies. The pastoralists have also learnt, when appropriate, to trust their animals' instincts (IIED & Sahel International, 2010)

b) Adaptation through developing military power

A society largely committed to herding has military advantages that a settled agricultural society does not have. Wealth is a burden in such societies. Classic, full pastoralism with its powerful equestrian warriors seems to have developed around 1500 to 1000 BC in inner Asia which requires the care of animals- including varying combinations of horses, cattle, camels, sheep, and goats- kept in ecological balance with grazing conditions over an enormous area. In some regions, however, the people may depend on a single animal species. In Arabia it is the camel (although most tribes in Arabia or North Africa also keep horses) and in east-central Africa some peoples specialize exclusively in cattle (Pritchard, 1940).

c) Adaptation by borrowing pastoral techniques and by wanderings

There are many part-time pastoral societies and many that have merely borrowed herding techniques. The reindeer breeders of the Siberian tundra have learned to apply to reindeer some of the methods of the horsemen farther south, but hunting remains their main subsistence activity. In the Argentine pampas, Indians learned to domesticate and ride the Spanish horse, which they used to hunt the rhea bird and the wild herds of Spanish cattle. The Navajo and other Indians of the American Southwest have exploited the sheep brought in originally by Spaniards, but mostly as a source of wool for blanket and rug weaving. Llamas and alpacas were domesticated in the South American Andes, but no independent pastoral society ever emerged there (Pritchard, 1940).

The wanderings imposed on pastoralists by the necessities of forage and water tend to be cyclical and to follow long-established routes. The cycles are usually seasonal: to the lowlands in winter, to highlands in summer in temperate zones, to more arid areas in the wet season, to more watered regions in the dry season, and so on. Frequently the seasonal moves are accompanied by cultural and organizational changes. For example, a large group may draw together to pass through hostile territory and disperse later when in their own land; frequently the lush (normally wet) season brings the pastoralists together for ceremonies, trade, and fun while the dry season requires dispersion and arduous work (as in digging deep wells to water the animals). Anthropologists call such established cyclical movements "transhumance orbits" (Pritchard, 1940).

10.6 ADAPTATION IN AGRICULTURAL SOCIETY

An agrarian society, or agricultural society, is any community whose economy is based on producing and maintaining crops and farmland. In an agrarian society, cultivating the land is the primary source of wealth. Agrarian societies have existed in various parts of the world as far back as 10,000 years ago and continue to exist today. Agrarian society was preceded by hunter and gatherers and horticultural societies and transition into industrial society (Johnson, 2000).

Early Agricultural Societies: In the Old World, settled life developed on the higher ground from Iran to Anatolia and the Levant and in China in the semiarid loess plains and the humid Yangtze valley. In contrast, the earliest civilizations based on complex and productive agriculture developed on the alluviums of the Tigris, Euphrates, and Nile rivers. Villages and townships existed in the Euphrates valley in the latter part of the 7th millennium BP (<https://www.britannica.com/topic/agriculture/Early-agricultural-societies>).

The Spread: The transition to agriculture, called the Neolithic Revolution, has taken place independently multiple times. Horticulture and agriculture as types of subsistence developed among humans somewhere between 10,000 and 8,000 years ago in the Fertile Crescent region of the Middle East. In addition to the emergence of farming in the Fertile Crescent, agriculture appeared in: by at least 6,800 B.C.E. in East Asia (rice) and later, in Central and South America (maize and squash). Small scale agriculture also likely arose independently in early Neolithic contexts in India (rice) and Southeast Asia (taro) (Johnson, 2000).

a) Adaptation through surplus production of food

Agriculture allows a much greater density of population than can be supported by hunting and gathering and allows for the accumulation of excess product to keep for winter use or to sell for profit. The ability of farmers to feed large numbers of people whose activities have nothing to do with material production was the crucial factor in the rise of surplus, specialization, advanced technology, hierarchical social structures, inequality, and standing armies. Agrarian societies thus support the emergence of a more complex social structure (Langlois, 2001).

b) Adaptation through environmental relation

In agrarian societies, environmental factors still play a strong role as variables that affect the internal structure and history of a society in complex ways. For example, the average size of agrarian states will depend on the ease of transportation, major cities will tend to be located at trade nodes and the demographic history of a society may depend on disease episodes. Until recent decades, the transition to farming was seen as an inherently progressive one: people learnt that planting seeds caused crops to grow, and this new improved food source led to larger populations, sedentary farm and town life, more leisure time and so to specialization, writing, technological advances and civilization (Cohen, 1989).

c) Adaptation due to protection by big empires

One of the major significances of the classical empire was that it could protect and thus politically incorporate, at least in some areas, scattered villages of simple cultivators. These outlying agricultural villages could not have

survived without internal pacification (in the law-and-order sense) and without some kind of frontier militia. In exchange for such protection the rulers of the urban centre exacted heavy tribute from the farmers. They soon realized that the price of the protection they extended to the agriculturalists could easily be increased to the point of virtual expropriation. As a result, the farmers were reduced to the barest subsistence level. The urban rulers, by contrast, steadily advanced toward a literate culture, thereby widening the gulf between the city elite and peasantry. In the course of time, the preindustrial urban centre, with its state like protection and intervention in the lives of peasants, made it possible to extend agricultural domains, usually as peasant holdings, into pastoral or other “wild” territory (<https://www.britannica.com/contributor/Elman-R-Service/2669>).

10.7 SUMMARY

Adaptation is both biological as well as cultural. The present unit states the biological adaptation happened in different people of the world. Cultural adaptations have been discussed elaborately throughout the human history, starting from hunter- gatherers to horticulturalists to pastoralists and to agriculture.

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10.9 ANSWERS TO CHECK YOUR PROGRESS

- 1) An adaptation is any variation that can increase one's biological fitness in a specific environment; more simply it is the successful interaction of a population with its environment. Adaptations may be biological or cultural in nature.
- 2) Horticultural societies are differentiated from hunting and gathering societies by the use of domesticated plants as the major basis for subsistence.

UNIT 11 DYNAMICS IN CULTURAL DIMENSIONS OF HUMAN ECOLOGY*

Contents

- 11.1 Introduction
- 11.2 Agriculture
- 11.3 Peasantry
- 11.4 Industrial Civilization
- 11.5 Growth of urban societies
- 11.6 Summary
- 11.7 References
- 11.8 Answers to Check Your Progress

Learning Objectives

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

- understand the concept of human ecology;
- know the dynamics of cultural dimensions of agricultural and peasant ecology; and
- explore industrial civilizations and growth of urban societies.

11.1 INTRODUCTION

Human ecology is an interdisciplinary and transdisciplinary study of the relationship between humans and their natural, social and built environments (Young, 1974). In other words, human ecology 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 (Bennett, 1996).

The human ecologists study many aspects of culture and environment including how and why cultures do what they do to solve their subsistence problems, how groups of people understand their environment, and how they share their knowledge of the environment (Sutton & Anderson, 2010). The anthropologist Julian Steward began to analyze the cultural dimensions of the ecological adaptation of indigenous groups (Steward, 1938), and later his research is known as “cultural ecology” (Steward, 1955). In his *Theory of Culture Change: The Methodology of Multilinear Evolution* (1955), cultural ecology represents the “ways in which culture change is induced by adaptation to the environment.” A key point is that any particular human adaptation is in part historically inherited and involves the technologies, practices and knowledge that allow people to live in an environment (Steward, 1955).

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11.2 AGRICULTURE

The history of agriculture records the domestication of plants and animals and the development and dissemination of techniques for raising them productively. Agriculture began independently in different parts of the globe, and included a diverse range of taxa. At least eleven separate regions of the Old and New World were involved as independent centers of origin (*Mercader, 2009*). About 10,000 to 15,000 years ago, humans began to mold nature to their needs and agriculture emerged in multiple places around the planet (Bentley, 2015).

Wild grains were collected and eaten from at least 20,000 BC (*Mercader, 2009*). From around 9500 BC, the eight Neolithic founder crops- emmer wheat, einkorn wheat, hulled barley, peas, lentils, bitter vetch, chick peas, and flax- were cultivated in the Levant (Zeder, 2011). Rice was domesticated in China by 6200 BC with earliest known cultivation from 5700 BC, followed by mung, soy and azuki beans (Molina et al, 2011). Pigs were domesticated in Mesopotamia around 11,000 BC, followed by sheep between 11,000 BC and 9000 BC. Cattle were domesticated from the wild aurochs in the areas of modern Turkey and India around 8500 BC. Sugarcane and some root vegetables were domesticated in New Guinea around 7000 BC. Sorghum was domesticated in the Sahel region of Africa by 5000 BC. In the Andes of South America, the potato was domesticated between 8000 BC and 5000 BC, along with beans, coca, llamas, alpacas and guinea pigs. Bananas were cultivated and hybridized in the same period in Papua New Guinea. In Mesoamerica, wild Teosinte was domesticated to maize by 4000 BC. Cotton was domesticated in Peru by 3600 BC. Camels were domesticated late, perhaps around 3000 BC (Hillman, 1996).

The Bronze Age, from c. 3300 BC, witnessed the intensification of agriculture in civilizations such as Mesopotamian Sumer, ancient Egypt, the Indus Valley Civilization of the Indian subcontinent, ancient China and ancient Greece. During the Iron Age and era of classical antiquity, the expansion of ancient Rome, both the Republic and then the Empire, throughout the ancient Mediterranean and Western Europe built upon existing systems of agriculture while also establishing the Manorial system that became bedrock of medieval agriculture. In the Middle Ages, both in the Islamic world and in Europe, agriculture was transformed with improved techniques and the diffusion of crop plants, including the introduction of sugar, rice, cotton and fruit trees such as the orange to Europe by way of Al-Andalus. After the voyages of Christopher Columbus in 1492, the Columbian exchange brought New World crops such as maize, potatoes, sweet potatoes, and manioc to Europe, and Old-World crops such as wheat, barley, rice, and turnips, and livestock including horses, cattle, sheep, and goats to the Americas (Hillman, 1996).

Modern Agriculture

Between the 16th century and the mid-19th century, Britain saw a large increase in agricultural productivity and net output. New agricultural practices like enclosure, mechanization, four-field crop rotation to maintain soil nutrients and selective breeding enabled an unprecedented population growth to 5.7 million in 1750, freeing up a significant percentage of the workforce, and thereby helped drive the Industrial Revolution (Snell, 1985).

Green Revolution

The Green Revolution was a series of research, development, and technology transfer initiatives, between the 1940s and the late 1970s. It increased agriculture production around the world, especially from the late 1960s. The initiatives, led by Norman Borlaug and credited with saving over a billion people from starvation, involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers (Hazel, 2009). Further, global yield increases were experienced later in the 20th century when high-yield varieties of common staple grains such as rice, wheat, and corn were introduced as a part of the Green Revolution. The Green Revolution exported the technologies (including pesticides and synthetic nitrogen) of the developed world to the developing world (Barrionuevo & Bradsher, 2005).

Activity

Select any nearby village and study the impact of green revolution and organic agriculture on the economic and cultural arenas of that village

Organic agriculture

For most of its history, agriculture has been organic, without synthetic fertilizers or pesticides, and without GMOs. With the advent of chemical agriculture, Rudolf Steiner called for farming without synthetic pesticides, and his Agriculture Course of 1924 laid the foundation for biodynamic agriculture. Lord Northbourne developed these ideas and presented his manifesto of organic farming in 1940. This became a worldwide movement, and organic farming is now practiced in many countries (Paull, 2014).

Cultural dimensions of Agriculture

- 1) First and foremost is the change from nomadic to sedentary life. A sedentary society is one that does not move around; it is permanently settled in one place. When early humans began farming, they were able to produce enough food that they no longer had to migrate to their food source. This meant they could build permanent structures, and develop villages, towns, and eventually even cities (How Agriculture Changed Early Societies, 2020).
- 2) Closely connected to the rise of settled societies was an increase in population. The ability to farm also meant a greater ability to control the amount of food produced, which meant that for the first time in human history, there was a surplus of food. This, along with the lower rates of fatal injuries that were common amongst nomadic societies, led to population booms (How Agriculture Changed Early Societies, 2020). To put this in perspective, before the agricultural revolution experts estimate that there were six to ten million people, which is about how many hunter-foragers the Earth could sustain. By the time of the Roman Empire, about 10,000 years later, the world population had grown over 25-fold to 250 million. Fast forward 2000 years to the present, and the population has grown another 28-fold to seven billion. In roughly 10,000 to 15,000 years, advances in agriculture have allowed the human population to become roughly 1000 times larger (Bentley, 2015).

- 3) Third is the division of labor since half of the society which is made up of farmers those already growing more food than they need, there's really no need for more farmers. That gives the other half of society room to do other things, like invent new tools, construct buildings, create a writing system, produce art, write philosophy, develop mathematics, etc. This is how the division of labor happened in the society and is made possible by agriculture (How Agriculture Changed Early Societies, 2020).
- 4) The development of agriculture really did amazing things for human societies, and frankly major civilizations could never have formed without it. For the first time, there was enough food to sustain larger populations, and those small settlements turned into some pretty sizeable cities (How Agriculture Changed Early Societies, 2020). Many population centers evolved into the first wave of city-states that emerged within a few thousand years of the agricultural revolution. Eventually those states began to have complex bureaucracies to tax and administer their people, a significant catalyst for the birth of writing, which was transformational for civilization (Bentley, 2015).

Check Your Progress

- 1) What is Green Revolution?

11.3 PEASANTRY

A peasant is a pre-industrial agricultural laborer or farmer with limited land ownership, especially one living in the Middle Ages under feudalism and paying rent, tax, fees or services to a landlord (OED, 2012). In Europe, three classes of peasants existed: slave, serf and free tenant. More precise terms that describe current farm laborers without land ownership are farm worker or campesino, tenant farmer and share cropper (Webster, 2004).

Peasants are usually seen as forming part of a structured society, within which they fall between the aristocracy or great landholders, on the one hand, and the landless, on the other. However, this definition has been stretched at both ends. Some writers include among peasants' groups of cultivators with no class of landlords above them; others refer to landless peasantry. With regard to the land which they till, the legal status of peasants may be that of proprietors, tenants, or crop sharers. They may or may not be free to leave the land (Thorner, 1965).

In a broad sense, the peasantry has constituted the most numerous social group in all organized states, from ancient to modern times that have rested on traditional forms of agriculture. Even in Western Europe during nineteenth century industrialization the peasant population constituted the largest segment of society. The progressive emancipation of the peasantry from serfdom and other forms of

bondage has furnished favored themes for discourses by politicians and treatises by historians (Thorner, 1965).

Cultural dimensions of Peasantry

- 1) The small-scale peasant agriculture of the Low Countries was distinguished for its specialization and high technical proficiency. Denmark became famous for its rural education and cooperative movements. Rack rents, poverty, crop failures, depressed prices, crowding on the land, and subdivision of holdings have been cited as factors in the great peasant migrations from Ireland, Germany, Scandinavia, and Italy (Gerschenkron, 1943).
- 2) In Eastern Europe the progress of industry was slower and its impact on peasant society less. The aristocracy and large proprietors held on to enormous estates until the Russian Revolution in 1917, while the peasantry remained illiterate and backward in its agricultural techniques. The eventual solution in the form of a meticulous, rapid collectivization of agriculture, carried out from 1928 to 1934, constituted the most traumatic blow to the structure of peasant society in any country in modern history. After World War II the advent of socialist regimes in the countries of Eastern Europe initiated a series of campaigns designed to collectivize peasant agriculture (Warriner, 1935).
- 3) The most reliable data and the widest range of studies of any peasant society in Asia pertain to Japan. A striking feature of Japan's rural experience has been the impact, since 1945, of the great expansion of urban factory employment, with rising wages and improved amenities. The attraction of the towns for the country youth, especially the young men, has become very powerful. As they leave, the average age of the farm population moves up steeply. To indicate who does the work in rural areas today, the Japanese have coined the expression "grandfather-grandmother-daughter-in-law agriculture." The demand for hired labor has become so great that agricultural wages have set new records. To hold his laborers at the busy season the employer has to feed them well and speak to them politely. Even for small farms of barely one hectare peasant families in central Japan have been buying many small machines—multipurpose two-wheel tractors, chaff cutters, polishers, tiny pickup vans. Also, these families are each likely to have a transistor radio, a television set, a washing machine, and a refrigerator. These items are acquired not solely for economic reasons but as part of a determined effort to lighten labor and make farming more attractive to young people (Dore, 1959).
- 4) The mixture of ancient Indian, Muslim, and British notions and practices about landholding has given India a peculiarly complex structure of land tenure. Agriculture is largely dependent on the monsoons, which are fickle. All economic and social institutions in the villages are deeply affected by the divisions and sense of hierarchy connected with caste. In many regions of India those who do the bulk of the agricultural work are the most disadvantaged and the most looked down upon—the "Untouchables." Since the attainment of independence in 1947, there has been remarkably free debate as to what should be done for, with, or about the Indian peasantry, and how to implement the large number of governmental measures relating to the rural population. Meanwhile, the way of life of India's peasants has

been affected not only by the array of governmental actions undertaken for such purposes, but also by the great growth of industry and over-all modernization of national life since the launching of the first five-year plan, covering 1951-1956. The proliferation of factories and workshops and an immense building program- new factories, government offices, schools, housing, roads, bridges, dams- have given jobs or supplementary income to millions of peasants. The hegemony of the upper-caste families within the village has been challenged (Desai, 1953).

Activity

Select a multi caste village nearby and study the effect of caste system on the peasant's life in that village

- 5) An important new series of contributions to the study of peasantry comes from the ethnologists and social anthropologists. The shift from dealing with secluded entities about which little or no previous information was at hand to peasant villages embedded in countries with well-known cultures and long histories posed new problems of methodology and theory. One key question that the anthropologists found they had to grapple with was the place of the small community in the context of the society as a whole. Robert Redfield, in his work on Mexico, was one of the first to call attention to this relationship between the little community and the larger world, the small and the great traditions (Marriott, 1955).

Check Your Progress

- 2) Define peasant?

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11.4 INDUSTRIAL CIVILIZATION

Industrial civilization refers to the state of civilization following the Industrial Revolution, characterized by widespread use of powered machines. The transition of an individual region from pre- industrial society into an industrial society is referred to as the process of industrialization which may occur in different regions of the world at different times. Individual regions may specialize further as the civilization continues to advance, resulting in some regions transitioning to a service economy or information society, or post-industrial society (these are still dependent on industry, but allow individuals to move out of manufacturing jobs). The present era is sometimes referred to as the Information Age. Industrial civilization has allowed a significant growth both in world population, thanks to mechanized agriculture and advances in modern medicine and in the standard of living. Such a civilization is mostly dependent on fossil fuel, with efforts underway to find alternatives for energy production. Some areas have exhibited de-industrialization as certain industries go into decline or are superseded (Lazonick, 1981).

Industrial Revolution: in modern history, the process of change from an agrarian and handicraft economy to one dominated by industry and machine manufacturing. This process began in Britain in the 18th century and from there spread to other parts of the world. Although used earlier by French writers, the term *Industrial Revolution* was first popularized by the English economic historian Arnold Toynbee (1852–83) to describe Britain’s economic development from 1760 to 1840. Historians conventionally divide the Industrial Revolution into two approximately consecutive parts. What is called the first Industrial Revolution lasted from the mid-18th century to about 1830 and was mostly confined to Britain. The second Industrial Revolution lasted from the mid-19th century until the early 20th century and took place in Britain, continental Europe, North America and Japan. Later in the 20th century, the second Industrial Revolution spread to other parts of the world (<https://www.britannica.com/event/Industrial-Revolution>).

Cultural dimensions of Industrial Civilization

- 1) The Industrial civilization marked a major turning point in Earth’s ecology and humans’ relationship with their environment. Relatively overnight, it dramatically changed every aspect of human life and lifestyles. The impact of the Industrial Revolution on the world’s health and psyche would not begin to register until the early 1960s, some 200 years after its beginnings. From human development, health and life longevity, to social improvements and the impact on natural resources, public well-being, energy usage and sanitation, the effects have been profound (McLamb, 2018).
- 2) The most prolific evidence of the Industrial Revolution’s impact on the modern world is seen in the worldwide human population growth. Humans have been around for about 2.2 million years. By the dawn of the first millennium of the Current Era (C.E., also A.D.), estimates place the total world’s (modern) human population at between 150 – 200 million and 300 million in the year 1,000. Today, the global population is estimated at 7.6 billion, according to the United Nations, Department of Economic and Social Affairs, Population Division (2018).
- 3) Human population growth is indelibly tied together with increased use of natural and human-made resources, energy, land for growing food and for living, and waste by-products that are disposed of, to decompose, pollute or are recycled. This exponential population growth led to the exponential requirements for resources, energy, food, housing and land, as well as the exponential increase in waste by-products (McLamb, 2018).

Activity

Assess the impact of population explosion and industrialization on mankind at world level and national level

- 4) It was the fossil fuel coal that initiated the Industrial Revolution, forever changing the way people would live and utilize energy. While this propelled human progress to extraordinary levels, it came at extraordinary costs to our environment, and ultimately to the health of all living things. Likewise, while coal and other fossil fuels were taken for granted as inexhaustible energy resources, it was American geophysicist M. King Hubbert who

predicted in 1949 that the fossil fuel era would be very short-lived and that other energy sources would ultimately be required (McLamb, 2018).

- 5) There were many new developments in nonindustrial spheres, including the following: (1) agricultural improvements that made possible the provision of food for a larger nonagricultural population, (2) economic changes that resulted in a wider distribution of wealth, the decline of land as a source of wealth in the face of rising industrial production, and increased international trade (3) political changes reflecting the shift in economic power, as well as new state policies corresponding to the needs of an industrialized society, (4) sweeping social changes, including the growth of cities, the development of working-class movements, and the emergence of new patterns of authority and (5) cultural transformations of a broad order. Workers acquired new and distinctive skills, and their relation to their tasks shifted; instead of being craftsmen working with hand tools, they became machine operators, subject to factory discipline. Finally, there was a psychological change: confidence in the ability to use resources and to master nature was heightened (<https://www.britannica.com/event/Industrial-Revolution>).

11.5 GROWTH OF URBAN SOCIETIES

In various parts of the world, including the valleys of the Tigris-Euphrates, Nile, Indus, and Huang rivers, larger and denser settlements began to emerge. These large concentrations of people are referred to as complex societies or civilizations, which share many features, including having a dense population, an agriculture-based economy, a social hierarchy, a division of labor and specialization, a centralized government, monuments, record-keeping and writing, and complex systems of belief (Spodek, 2006).

These complex societies most often took the shape of cities or city-states like Uruk and Ur. These first cities were nexuses of power, production, culture, and innovation. Sustaining these cities was not easy, however. It required extensive and often irreversible manipulation of the surrounding environment in order to extract energy in the form of firewood, materials for building like stone, and resources like food and water. Because of this, these cities were very sensitive to fluctuations in weather and climate. A flood could destroy the entire supply of barley, for example, and a drought could make water supplies worryingly scarce. Because these societies were densely populated, disease, conflict, and shortages were felt even more dramatically. An outbreak of a disease could quickly become an epidemic. In response to these vulnerabilities, these communities developed ways to anticipate the changes in their natural environments, such as storing food and water (Fernandez, 2010).

Cultural dimensions

- 1) Civilizations evoke images of stone walls, monuments, and roads, but they are more than robust physical infrastructure. To facilitate the organization and administration of these large, dense communities, people began to create social infrastructures: economic, political, and religious institutions that created new social hierarchies. These hierarchies were populated with people playing specialized roles, such as professional administrators, farmers, artisans, traders, merchants, and spiritual leaders. Additionally, due to

increased trade and conflict with external civilizations, cities required diplomats, armies, and centralized rulers (Fernández, 2010).

- 2) In order to facilitate cooperation between many different classes and to organize large numbers of people to work together for the large-scale construction of irrigation systems, monuments, and other projects, leaders were required, comprising a new social class. Political leadership would take many different forms in the first civilizations, though powerful **states**, centralized systems of government and command, were the norm (Spodek, 2006).

Activity

Historically compare emergence of different civilizations of the world identifying their growth and failures

- 3) Early cities developed in a number of regions, from Mesopotamia to Asia to the Americas. The very first cities were founded in Mesopotamia after the Neolithic Revolution, around 7500 BCE. Mesopotamian cities included Eridu, Uruk, and Ur. Early cities also arose in the Indus Valley and ancient China. Among the early Old World cities, one of the largest was Mohenjo-daro, located in the Indus Valley (present-day Pakistan); it existed from about 2600 BCE and had a population of 50,000 or more. In the ancient Americas, the earliest cities were built in the Andes and Mesoamerica, and flourished between the 30th century BCE and the 18th century BCE. Ancient cities were notable for their geographical diversity, as well as their diversity in form and function. Excavations at early urban sites show that some cities were sparsely populated political capitals, others were trade centers, and still other cities had a primarily religious focus. Some cities had large dense populations, whereas others carried out urban activities in the realms of politics or religion without having large associated populations. Some ancient cities grew to be powerful capital cities and centers of commerce and industry, situated at the centers of growing ancient empires. Examples include Alexandria and Antioch of the Hellenistic civilization, Carthage, and ancient Rome and its eastern successor, Constantinople (later Istanbul) (lumenlearning.com).
- 4) A good environment and strong social organization are two necessities for the formation of a successful city. A good environment includes clean water and a favorable climate for growing crops and agriculture. A strong sense of social organization helps a newly formed city work together in times of need, and it allows people to develop various functions to assist in the future development of the city (for example, farmer or merchant). Cities may have held other advantages, too. For example, cities reduced transport costs for goods, people, and ideas by bringing them all together in one spot. Finally, cities likely performed the essential function of providing protection for people and the valuable things they were beginning to accumulate (lumenlearning.com).
- 5) While ancient cities may have arisen organically as trading centers, preindustrial cities evolved to become well defined political units, like today's states. During the European Middle Ages, a town was as much a political entity as a collection of houses. However, particular political forms varied.

In continental Europe, some cities had their own legislatures. In the Holy Roman Empire, some cities had no other lord than the emperor. In Italy, medieval communes had a state-like power. In exceptional cases like Venice, Genoa, or Lübeck, cities themselves became powerful states, sometimes taking surrounding areas under their control or establishing extensive maritime empires. By the early 19th century, London had become the largest city in the world with a population of over a million, while Paris rivaled the well-developed regional capital cities of Baghdad, Beijing, Istanbul, and Kyoto. But most towns remained far smaller places—in 1500 only about two dozen places in the world contained more than 100,000 inhabitants (lumenlearning.com).

- 6) Urbanization may be driven by local and global economic and social changes, and is generally a product of modernization and industrialization. Urbanization has economic and environmental effects. Economically, urbanization drives up prices, especially real estate, which can force original residents to move to less-desirable neighborhoods. Recently in developed countries, sociologists have observed suburbanization and counterurbanization, or movement away from cities, which may be driven by transportation infrastructure, or social factors like racism (lumenlearning.com).
- 7) Urbanization has significant economic and environmental effects on cities and surrounding areas. As city populations grow, they increase the demand for goods and services of all kinds, pushing up prices of these goods and services, as well as the price of land. As land prices rise, the local working class may be priced out of the real estate market and pushed into less desirable neighborhoods – a process known as gentrification (lumenlearning.com).

Growing cities also alter the environment. For example, urbanization can create urban “heat islands,” which are formed when industrial and urban areas replace and reduce the amount of land covered by vegetation or open soil. During the day, cities experience higher surface temperatures because urban surfaces produce less evaporative cooling. Additional city heat is given off by vehicles and factories, as well as industrial and domestic heating and cooling units. Together, these effects can raise city temperatures by 2 to 10 degrees Fahrenheit (or 1 to 6 degrees Celsius) (lumenlearning.com).

11.6 SUMMARY

As we studied in this unit that human ecology is basically man’s relationship with his environment. In this relationship culture plays an important role whether it is agricultural society or peasant or even industrialized society. Growth of urban centres all over the world is also an outcome of this relationship. The unit covers the cultural dimensions of each society and its dynamicity from one societal stage to another.

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11.8 ANSWERS TO CHECK YOUR PROGRESS

- 1) The Green Revolution was a series of research, development, and technology transfer initiatives, between the 1940s and the late 1970s. It increased agriculture production around the world, especially from the late 1960s. The initiatives, led by Norman Borlaug and credited with saving over a billion people from starvation, involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers.
- 2) A peasant is a pre-industrial agricultural laborer or farmer with limited land ownership, especially one living in the middle Ages under feudalism and paying rent, tax, fees or services to a landlord.