

2

Theories of Human-Habitat Interaction up to the 1950s

Contemporary theories about the nature of human physiological functioning and about the effects of human beings upon the environment and the effects of the environment upon them are only fully intelligible in the light of the historical roots of such theories. Modern notions of homeostasis reflect ancient concerns and assumptions about the order of nature, just as our current fascination with chaos theory reflects a contemporary jaundiced view of social and natural order and discourses about postmodernity. The gloomy view of some authors about the potential of the tropics for development reflects a long tradition of environmental determinism that sees some regions of the world as ecologically bound to backwardness and others to progress. In fact, every society has philosophical or mythological explanations about the natural world and human beings' place in it. It is through such explanations that members of a society articulate both their behavior as individuals and their requirements of survival as a population. Such explanations also provide societies with a means of achieving a measure of well-being.

In this chapter, we will survey the major Western intellectual currents up to the 1950s that sought to explain the interaction between people and nature. Three main themes may be noted: environmental determinism—that is, the determining effect of nature upon human society and **culture**; human adaptation to nature; and nature as a limiting factor to human possibilities. These themes represent three points on the intellectual spectrum. One view overemphasized the influence of nature, another the role of human culture. The third view bridges the gap between the other two themes. The common features of all these themes is that they conceptualized the human-environment interaction as mainly unidirectional rather than systemic and that they emphasized stages rather than process. The

theme of environmental determinism offers the clearest example of this type of unidirectional, stage-oriented explanation.

Environmental Determinism

Determinism is a broad term referring to explanations that assign one factor a dominating influence over the whole system. From Greco-Roman times through the early part of the twentieth century, scientific theories stressed single-factor explanations to the neglect of the complex interactions of biological systems. Environmental deterministic theories served as rationales for political dominance in many guises. The format of all such theories was essentially the same: A "temperate" or "balanced" climate, ethnocentrically defined, was responsible for the virtuous qualities of the area's inhabitants. As a result, they were destined to rule and control the "lesser" domains, where populations were more lethargic, less courageous, and less intelligent. Roughly, then, a predominant or technologically superior position indicated that the powerful were really innately superior peoples. This superiority was produced by "favorable" geoclimatic conditions. Ironically, the locus of the "temperate climes" or "middle latitudes" has shifted from the balmy Mediterranean to the cooler regions of Western Europe as shifts have occurred in world power over the centuries. Such ethnocentric theories served not only to explain a country's dominant position but also to rationalize policies for ensuring its continued dominance.

Greek, Roman, and Arab Theories

The original Greek geoclimatic theories arose from observations of nature and society. At the heart of their argument lay a recognition of their own political power and of the role that their strategic location in the Mediterranean played in the acquisition and maintenance of such power. Writers rose to the task by explaining that the "middle latitudes" (that is, Greece) were most conducive to favorable cultural developments because in that locale humans were subject to an ideal proportion of the basic four elements (fire, water, earth, air). A hot tropical climate was believed to foster idleness and resignation (Thomas 1925:227), whereas the climate of Greece with its seasonal changes balanced the exposure to the elements and thus was the most conducive to progress. These ideas, which were endorsed by Hippocrates, Aristotle, and other major figures of ancient Greece, set a trend that was followed by the Romans.

Roman writers confidently cited geoclimatic reasons for the Roman conquest of the rest of the civilized world. Cicero attributed this success to the strategic location of Rome itself; Vitruvius to the superiority of peo-

ples located in the middle latitudes. Like Greek authors before him, Vitruvius felt the optimal location was one midway between the two extremes of hot and cold. He pointed to Rome's dominance as proof of the correctness of his judgment. In a similar geoclimatic vein, Tacitus viewed Germanic tribes as strong but disorganized savages. Pliny, another Roman author, added to this assertion by describing Rome's location as so salutary to human development that "the manner of the people are gentle, the intellect clear, the genius fertile and capable of comprehending every part of nature. They have formed empires which has never been done by the remote nations" (Pliny, quoted in Thomas 1925:38).

Because of the protection afforded classical learning in Christian monasteries and Arab centers of scholarship, the major nature-people theories of classical times survived the turmoil that followed the breakdown of Roman rule (Castaglioni 1958:258-63). Environmental and astrological explanations, which were derived from classical speculations, dominated medieval science. These theories were relevant to understanding the medieval world and complemented the theology of the time.

Theoretical contributions of the Arab world elaborated on classical theories. The Arab conception of the human-environment relationship was twofold. One part consisted of an astrological explanation that considered humans to be part of the cosmos, as a result of which their character and outlook were determined by the ruling stars of their environment. The other part was a purely geographical explanation based on climatic considerations (Alavi 1965:68). Elaborating upon the geographical explanation, Arab scholar Al-Mas'udi discussed the importance of the availability of water, natural vegetation, and topography in determining the sites of human settlements. He also correlated the climate to the humors of the body, showing how a certain climate gives rise to humoral imbalance and thus to particular virtues or vices (Alavi 1965:69-70). To quote Al-Mas'udi:

The Arabs preferred life in an open countryside, where the air was pure, wholesome and free from epidemics, and where there was refinement of intelligence and strength of body; for intelligence, they thought, was produced in the same way as fresh air. The Arabs are, therefore, marked by strength of resolution, wisdom and physical fitness. They take care of those whom they take under their protection, they are distinguished in acts of charity and possess good intelligence, for these qualities are produced by the purity of environment. (Al-Mas'udi, quoted in Alavi 1965:70)

Arab scholars preserved and translated the Greco-Roman classics and, in the process, added some of their own interpretations to the texts. As a result, when the classics were read in twelfth and thirteenth century Eu-

rope, it was with the addition of commentaries by Arab and Jewish scholars from Cordoba, Seville, Toledo, Baghdad, and Damascus.

Theories of the Renaissance and Eighteenth Century

With the discovery of the East Indies and the New World, Europeans were thrust into contact with cultures and environments that differed considerably from their own. Among the adventurers, missionaries, and merchants of those days were naturalists and curious travelers; their accounts of the strange habitats and ways of native Asians and Americans excited intellectual interest in explaining cultural and environmental differences and similarities.

A new boldness, based on the discoveries of the natural sciences, fostered secular explanations for similarities and differences in plant and animal forms. Many of these explanations contributed to later evolutionary and adaptational approaches. As information on new environments continued to spread, writers of the Renaissance began to question Greco-Roman theories on the relationship between environment and human character. With a growing awareness of the oversimplifications in classical conceptions, Renaissance writers raised many questions, including whether climate had the same influence on all living things. The role of human culture in buffering the impact of environment upon society began to be appreciated, and the scope of possible explanations for similarities and differences in human populations was greatly expanded.

In the eighteenth century, climatic influences again became the focus of deterministic explanations. Bodin and Montesquieu, among others, reaffirmed the ancient notions that the middle latitudes were superior environments. (This time France was shown to be ideally located and predisposed for greatness!) The association of climate to physical and moral character was strongly made. During this period, theories were secularized as the role of religion and astrology was deemphasized. Generalizations were rampant: Whole regions were treated as uniform, and nations were seen as drawn together by the action of dominant civilizations.

Nineteenth- and Twentieth-Century Theories

In the late nineteenth century, a general trend toward organizing increasing amounts of archeological and **ethnological** data resulted in an attempt to illuminate the processes by which human cultural history changes. A very simple heuristic device was quickly discovered—many cultures with similar artifacts and customs could be grouped by geographic location. Geographers and, later, ethnographers seized upon this

notion. They viewed the interrelation of groups with their habitats as producing specific kinds of cultural traits.

Friedrich Ratzel (1844–1904), a scholar with broad ethnographic interests who was the founder of anthropogeography, emphasized the primacy of **habitat** in bringing about cultural diversity (Helm 1962:630). In his view, human society reacts to nature like any animal to its habitat. He explained human cultural evolution as being spurred by the conflicts over territory between migrating peoples. His thesis thus centered on the **migration** of groups, which promotes the diffusion of cultural traits (Harris 1968:383). Although diffusion may produce divergence in the original traits, Ratzel believed that migratory peoples usually “hold fast to their natural conditions of existence [that is, culture]” (quoted in Thomas 1925:140).

Ratzel pointed out that, among other things, the “natural boundaries” created by topography and location give definition, distinction, coherence, and unity to such entities as political units. This particular politico-environmental relationship is twofold. First, similar locational conditions give rise to similar political models, as, for example, in all island societies (Thomas 1925:163). Second, geographic diversity within a nation’s territory can produce a variety of effects:

A variety of orographic [i.e., mountainous] features divides a state; . . . mountains produce isolation and cultural stability, while lowlands promote racial and cultural mixture and migration; . . . topography that promotes isolation and overexuberant flora [as in tropical forests] inevitably produces political and cultural stagnation. (quoted in Thomas 1925:165)

In explaining cultural similarities and differences as the result of the processes of migration and diffusion, Ratzel began a trend in both ethnography and evolutionism that viewed human beings as limited by their habitat in their range of responses.

The environmental determinist trend continued in the twentieth century with the work of geographers Ellsworth Huntington (1915) and Griffith Taylor (1951). Huntington’s chief concern was to ascertain the bearing of various climatic, seasonal, and weather conditions upon human efficiency. According to this view, humans, when confronted with an environmental challenge, always take the path of least effort—for example, herding cattle in dry areas rather than farming and irrigating the land. Although acknowledging that several options may exist, Huntington and Taylor believed that the best and most often utilized option is that which involves the least cost.

In general, Huntington believed that variations in temperature and humidity were beneficial, provided they were not taken to extremes. He

eventually postulated what he came to regard as an ideal climate for maximum human efficiency: one with moderate seasonal changes, average humidity, and abundant storms. Although Huntington was far from naive, he formulated his generalizations as if climate were the only important factor.¹ Variations on this form of determinism are still expounded today. However, they are often tempered by a clearer awareness of the complex factors that may be involved in any human-habitat situation.

An elementary problem with these deterministic theories is their misuse of inductive reasoning. The inductive approach requires that one observe the facts and then form a generalization that will fit all the observed facts. It has been more common among determinists to formulate a generalization first and then set out to prove it with an unclear methodology and an inadequate sample. Selective sampling led to confirmation of many deterministic generalizations. At a time when so little was known about the workings of the physical world, it is striking how broad the scope of these generalizations was.

Human Adaptation to Environment

The Humoral Doctrine

Greco-Roman scientific concepts originated in attempts to cure disease and achieve a healthful balance. Disease was considered to be a disturbance of the natural harmony of the body. According to Hippocrates (460–375 B.C.), everything on the earth and in the universe was made up of four elements (air, earth, water, and fire) that had their analogues in the human body in the form of the four humors (blood, phlegm, black bile, and yellow bile). When the four humors were in balance, the body enjoyed health. Air was thought to be represented in the body by blood, both being hot and moist; fire by yellow bile (hot and dry); water by phlegm (cold and moist); and earth by black bile (cold and dry). This theory, known as the humoral doctrine, significantly contributed to the development of environmental deterministic theories and also strongly influenced the development of soil theory, chemistry, and agriculture (Glacken 1967:12). In addition, the humoral doctrine has also influenced psychological and physiological research on the influence of climate upon the body.

Such was the strength of humoral theory that alternative notions of human adaptation were rare throughout the Middle Ages and the Renaissance; and when such alternative theories were suggested, they linked diseases with environmental conditions. For example, José de Acosta (1539–1600) noted that individuals who traveled into high alti-

tudes experienced mountain sickness, but those who lived there permanently seemed to have adjusted to the altitude (Leake 1964:4).

Purpose in Nature: The Problem of Misplaced Teleology

The eighteenth century witnessed the development of approaches that emphasized not the determining influence of environment but the limitations that environment places upon all life. During this same period, the writings of Hume and Kant explored the question of teleology in nature. Teleology, which is the doctrine of final causes, implying purpose in the evolution of organisms, continues to be a crucial question in contemporary biology.

The great Lisbon earthquake of 1755 caused intellectuals to question the assumed order, harmony, and beneficence of nature and the validity of the wisdom of evolution (Glacken 1967:521). That disaster was probably the most catastrophic natural occurrence in Western Europe since the eruption of Mount Vesuvius in 79 A.D. It provoked such questions as: Why is such pain and devastation necessary? What is its purpose? Kant used the example of alluvial deposition to illustrate the weakness of teleological explanations: Rivers carry soil in suspension, and during floods or high tides, deposit such soil on the banks; nature builds up soils this way to the benefit of human beings; was it the purpose of nature to benefit the farmers who would cultivate such alluvial soils?

According to Kant, use of nature does not prove that such use was intended by nature. Kant argued that the landscape and living forms on it are the result of historical events, not of final causes (Glacken 1967:535). Nevertheless, because human beings are aware of acting with purpose, projection of such purposiveness continued to make its way into ecological theories.

Evolutionary Sequences: Eighteenth-Century Views

The eighteenth century was also a period when natural historians, concerned with human progress, formulated evolutionary sequences that attempted to explain human society in terms of increased human control over nature. One of these figures, Turgot (1727–1781), foreshadows the cultural ecological approach of Julian Steward (see Chapter 3). In his *Universal History*, Turgot interpreted the band organization of hunters as a response to the necessity of pursuing game over vast areas. Such pursuit resulted, in turn, in the dispersal and diffusion of peoples and ideas. In contrast, where easily domesticated species were present, a pastoral way

of life with greater population concentrations and greater control over resources might emerge.

During this period, the Scottish School (an intellectual elite in Scotland in the eighteenth century) made efforts to correlate social organization with **subsistence**. A major figure of this school was historian William Robertson. His *History of America* (1777) is a landmark for its discussion of the conditions for cultural similarities around the world. Robertson believed that cultural similarities were evidence of independent invention, arguing that similarities between the resource bases of two groups would lead to similar adaptive responses:

The character and occupations of the hunter in America must be little different from those of the Asiatic, who depend for subsistence on the chase. A tribe of savages on the banks of the Danube must nearly resemble one upon the Plains washed by the Mississippi. Instead of presuming from the similarities that there is any affinity between them, we should only conclude that the disposition and manners of men are formed by their situation and arise from the state of society in which they live. (Robertson 1777:652, quoted in Harris 1968:34)

Whenever Robertson encountered seemingly "nonadaptive" traits, he attributed such behaviors to the group's borrowing the trait, despite its nonadaptiveness, from neighbors with whom they had had previous contact. Thus, Robertson dealt with two of the major research questions in cultural ecology: diffusion of traits versus innovation or invention and the explanations for adaptive versus maladaptive cultural behavior.

The Scottish School included many writers, such as Adam Smith (1723–1790), Adam Ferguson (1723–1816), David Hume (1711–1776), and James Millar (1735–1801), all of whom examined the evolution of complex societies and the cultural and materialistic forces that lead to social stratification (Voget 1975:90). These men looked at the interrelation of cultural units, especially those involved in the economics of a society, rather than the evolution of ideas per se. Some (for example, Adam Smith) emphasized the division of labor in systems of production as basic to understanding the increasing complexities of a modern nation (Voget 1975:78). Ferguson and Millar attempted to correlate various institutions, such as land tenure, marriage, and slavery, to the subsistence base found in various cultures. In so doing, they tried to correct some of the distorted accounts and explanations of primitive life by utilizing a variety of data sources and by avoiding racial and ethnocentric ideas about primitive "nature" or "intellect" (Harris 1968:29–31).

Millar and others also emphasized control over resources and accumulation of an economic surplus as accounting for differing institutions. In the writings of these men, we see a growing awareness that any explanation of cultural diversity must include a consideration of a broad range of factors. They do not yield to single-factor deterministic explanations, nor do they overemphasize individual choice, cultural determinism, or the purposeful movement of nature toward "progress" and higher civilization. Turgot and the Scottish philosophers, unlike other eighteenth-century evolutionists, emphasized adaptation rather than the evolution from one subsistence mode to another.

Buffon (1707–1788) and Cuvier (1769–1832) emphasized the functional interrelations of different parts of living things and the relevance of the study of past living forms for understanding the present. Buffon thought that change in an environment had little impact on the structures of individual living things. Lamarck (1744–1829), however, suggested that change could occur in individual morphology during a creature's lifetime as an adjustment to environmental change and that these changes could then be passed on, and intensified, through inheritance (Leake 1964:5). Advances in evolutionary theories were particularly remarkable in the nineteenth century.

Darwin's Theory of Evolution

The nineteenth century was the heyday of the naturalists. Their careful recording of the similarities and differences in living organisms impressed them and stimulated their search for explanations. The contributions of Charles Darwin (1809–1882) to ecological theory are particularly notable. Darwin found inspiration for his theory of evolution in the works of Charles Lyell and Thomas Malthus (1766–1834). Darwin took a copy of Lyell's *Principles of Geology* (1830) with him on his *Beagle* voyage and confided in his diary that it "altered the whole tone of [his] mind." Through Lyell's account of the geological record, Darwin saw an alternative to the narrow biblical timescale and was impressed by the relationship between environmental change and modifications in biological forms. Malthus's *An Essay on the Principle of Population* (1798) influenced Darwin with its idea that the natural trend of the human population was to increase unless stopped by disease, war, or famine. Darwin extended this notion to plant and animal populations.

Darwin's synthesis appeared in 1859 under the title *On the Origin of Species by Means of Natural Selection*. In this work, Darwin began by assuming that all living things are related and that the diversity of species results from a continual branching out. Such branching is a product of the

process known as natural selection. According to the principle of natural selection, those organisms most fit to survive and reproduce in a given environment will outreproduce less well-adapted organisms; species not adapted to current environmental conditions will be reduced to insignificant numbers and possibly to extinction.

Evolution includes what may be termed *mechanisms of continuity* and *mechanisms of variation* (Alland 1973:4). Mechanisms of continuity provide stability in nature, but mechanisms of variation are the product of chance and provide the variability in species that allows new solutions to be available when environmental changes occur. If **biological evolution** reflected only the process of adaptation to environment, it would be a static, nonevolutionary process. For evolutionary change to occur, there must be random changes in species that are not responses to current needs but that under given circumstances give an advantage to individuals who share the trait in a population.

It is easy to misunderstand Darwin's view of natural selection. The Lamarckian idea that organisms improve themselves by their own efforts and that they pass on these advantages to their offspring appeals to common sense and to the notion that evolution travels along a progressive path (Gould 1980:76). However, it is not in this manner that species evolve. There are biological and cultural mechanisms for the inheritance of acquired characteristics, for offspring to benefit from their parents' efforts, but it is not in this manner that evolution proceeds. The specter of Lamarck in evolutionary theory can be traced to his central notion that organisms respond to felt needs—and indeed, Lamarck's ideas are relevant to the notion of specific evolution as proposed by Sahlin and Service (1960) and to Steward's emphasis on adaptive processes in local environments (1955a). In contrast, Darwinian theory emphasizes that genetic variation arises randomly and undirected toward any particular adaptive direction. Selection acts upon unoriented variation, and changes result from reproductive success. Darwinian theory's power derives from its complexity, from its refusal to be a mechanistic theory driven by environmental determinism (Gould 1980:81). It is less appealing than Lamarck's theory because it presents us with a universe devoid of intrinsic meaning or direction. As Rappaport noted (1984), human beings have had to invent culture and ritual "to give meaning to a world devoid of meaning." Lamarck's theory, while failing to explain how species evolve, suggested instead how human cultural evolution occurs. It is within this realm that we can expect rapid acquisition of adaptive traits through ideological and behavioral change and its transmission through socialization. Technological change and cultural change work in Lamarckian ways, and they have unleashed a rate of change inconceivable in the slower, undirected process of natural selection.

Modern Evolutionary Theory

Unlike the theory of evolution, which is very general, the knowledge required for determining how natural selection works is very specific. The science of genetics provides an exact accounting of the sources of variation and continuity in organisms. Although environment has a strong influence on the individual, it cannot transform it beyond the bounds of its own heredity. Every organism is the product of its own particular environmental history and of its genetic heritage (Alland 1973:11).

Modern evolutionary theory and genetics have put to rest the simplistic notions of determinism. The functions and forms of organisms can be understood only by careful accounting of complex processes of interaction. This is best expressed in the contrast between genotype and phenotype. On the one hand, the genotype refers to the hereditary potential of an organism. The phenotype, on the other hand, is the product of the interaction between the genotype and the environment where the organism is located. Some species tolerate a minimum of environmental change and exhibit a minimum of phenotype variation (that is, highly specialized species). Bacteria, for one, tolerate only minute differences in habitat temperature. The human species, by contrast, manifests great phenotypic variations and can tolerate a wide range of environmental conditions (that is, generalized species).

The basic elements of evolutionary theory are, briefly: (1) all populations are capable of genetic variation through the mechanisms of mutation and recombination; (2) all populations seek to increase their numbers exponentially until restricted by environmental constraints; (3) under a given set of environmental circumstances, the best-adapted phenotypes in a population will be selected for; and (4) the effect of the environment on the genotype is indirect. Adaptive changes in all organisms, including human beings, are mediated by the genetic hereditary material passed on from generation to generation. "The evolutionary fitness of the particular combination of hereditary traits embodied in an organism is largely determined by interaction of the organism with its environment during its lifetime" (Ricklefs 1973:69). Since more fit individuals who possess the best-adapted traits must replace a population, evolutionary change is always slow. A population thus often reflects earlier conditions and is always in a process of change—just as the environment is always changing (Levins 1968:11).

Biological adaptation is seldom perfect and is opposed by numerous factors. Among these are mutations and **gene flow**, evolutionary opportunity, physical limits, problems of allocation, and changing environments (Ricklefs 1973:71–73). No matter how well adapted a population may be, new random mutations occur and are introduced into a popula-

tion, leading to change. The past history of an organism limits future changes, so that major changes in anatomy are rare and may take millennia. The range of adaptation is also limited by the properties of the natural world, and these cannot be easily altered either. Adaptation is essentially a compromise. The results are seldom the "best," but represent solutions to conflicting priorities, and if they are to be advantageous and selected, they must increase fitness over the cost (Levins 1968:35). Adaptation is never perfect because environments are always changing, and populations must constantly readjust to the new environmental conditions. Since biological change is slow, populations are rarely in perfect adaptation to their present situation—except in rare cases of long-term environmental stability.²

The development of the field of evolutionary ecology has been particularly vigorous since the 1980s (e.g., Winterhalder and Smith 1981; E. A. Smith 1991; Boyd and Richerson 1985; Durham 1990). The attention that it gives to the great complexity of the environment distinguishes it from earlier forms of sociobiology. The latter tended to be very general (e.g., kin selection, sexual selection, sex-ratio manipulation) and best when addressing interspecific, comparative research. However, if one is interested in the exceptional plasticity and diversity of behavior within a species, an evolutionary ecological approach is more appropriate. It is more concerned with why diversity of behavioral outcomes occurs, and less with how such adaptations effectively address the needs of species or individuals. For the latter, an adaptationist or functional approach is still more appropriate.

Nature as Limiting Factor: Malthus and Possibilism

Unlike deterministic theories that emphasize the influence of nature on the behavior and institutions of people, theories of nature as a limiting factor were based on an awareness that populations do not exploit their habitat to the fullest, and when they begin to do so, environmental factors limit their capacity to expand in numbers. These theories view nature as a relatively static factor that prevents human growth or the performance of given actions. The idea of limiting factors seemed to appear after the Age of Discovery and continues up to the present. It is an important element of population ecology and serves to explain the dynamic aspects of community structure.

The notion of limiting factors was most clearly stated by Justus Liebig around 1840. His contribution, known as "the law of the minimum," explained that organisms were limited by the factor in most limited supply. When the principle is extended to include the limiting effect of too much

and the limiting effect of one thing on the rest of the system, we have a broadly encompassing concept of wide applicability. In ecological research, the concept of limiting factors points the researcher in the direction of empirically accounting for nonconstant factors whose supply may be limiting. For example, nutrients like nitrogen and phosphorus may be rapidly leached from the soil under some management practices and account for declines in yield, village fissioning, fallow cycles, and even choices of crops.

The most memorable effort to show the limitations of the earth as an abode for human beings is that of Malthus in the late eighteenth century. He was neither interested in how environment molds culture nor in how human cultures have modified the environment. According to Malthus, all living things have a tendency to increase geometrically if they have enough food. However, once good soils have been put into production, populations find increasing difficulty in providing enough food for the rapidly growing population. Disease, war, famine, and other forms of population control enter to reduce the pressure on resources. His views continue to have relevance today. The notion of Spaceship Earth and of the limited resources of the biosphere to support our exponentially growing human population so common today has its roots in the insights of Malthus.

A very different view of environmental limitations was proposed by Franz Boas (1858–1942). His approach has been called one of **historical possibilism**—that is, nature circumscribes the possibilities for humans, but historical and cultural factors explain what possibility is actually chosen. Boas rejected the idea that the environment was a primary molder of culture (Boas 1896:901–908) and sought explanation for cultural differences in the particular cultural history of a people. Boas did not come to this position immediately, but rather after initial acceptance of the environmental deterministic views of his day. He read Buckle and Ritter, major exponents of deterministic views. He was also influenced by Adolf Bastian (1826–1905) the well-traveled German ethnographer who wrote about folkways around the world. Bastian saw variation in geographical conditions as the basic source of cultural variations. When Boas went on his trip to Baffin Island to study the Eskimo, he did so “with a strong presumption in favor of the primacy of geographical factors in the life of the Eskimo” (Harris 1968:265). Boas’s account, *The Central Eskimo* (1964, originally published in 1888), is a lucid portrayal of life in the Arctic, stressing the interrelationship between geographical and cultural factors.

Thereafter, however, Boas gave the geographical setting only a perfunctory role in his work. For Boas, people use what they want in nature, and it is such cultural decisions, not nature, that dictate the direction of

cultural change. In other words, culture is environmentally selective (Bennett 1976:165). In Boas's scheme, culture takes precedence over environmental settings. The ethnological inquiry began with the perceptions, interests, wants, and actions of humans as conditioned by their social milieu. The Boasian approach set out to correct environmental determinism but in so doing introduced a strong culture-centeredness. The environment is seen not as a dynamic influence but only as a limiting one in which cultural forms are "manifested and stabilized in a distinct geographical milieu at the moment of study" (Bennett 1976:162). Culture as the basis of human behavior became such a dominant outlook in anthropology that even recent discussions of human adaptation (for example, Cohen 1968; Sahlins 1964) continue to state this as a given rather than as a subject of inquiry.

In *The Mind of Primitive Man* (1963, originally published in 1911), Boas pointed out that the environment furnishes the material out of which people shape and develop the artifacts of daily life as well as their theories, beliefs, and customs (Thomas 1925:278). Yet while he granted that the environment had a general influence, Boas criticized the one-sided notion that the same type of environment will in a given stage of culture produce the same results everywhere. He noted that in the Arctic, Eskimo subsistence is based on hunting and fishing, whereas the Siberian Chukchi derive their support from the breeding of reindeer. At the opposite climatic extreme, the Hottentot follow a pastoral life, whereas the Bushmen rely on hunting in a semitropical environment (Thomas 1925:279). Boas and his students pointed out that customs that may have originated in one habitat can be perpetuated by "cultural inertia" after the group has moved to a new location in which the custom is no longer appropriate. Examples cited are the expensive and complicated tents of the Chukchi—a survival from the time when they were permanent dwellers on the coast (Goldenweiser 1937:446–447).

Boas's emphasis on the particular circumstances of a population led him to fruitless attempts to explain cultural similarities in terms of geographical proximity or economic forces. In the data he collected, he found no significant law to cover the relationship between social organization and industrial activities. He even denied any causality between religion and art forms. Boas did not deny that all these factors could have a determining influence but instead maintained that they were determinative in an unpredictable way and in a manner unique to each case. Such eclecticism was a natural reaction to the facile systematization and assignment of causality that were the hallmarks of his deterministic predecessors. Boas, like Francis Bacon before him, glorified the inductive method as a means to correcting the lack of data behind scientific doc-

trine (Harris 1968:287). He demanded from his students careful collection of data, suspension of generalization, critical analysis of materials, and conservative excursions into theory.

Although the followers of Boas insisted that there was no Boasian school, they shared a certain common ground. Regarding the environment, their approach was a reaction to environmental determinism and, therefore, iconoclastic in character. Lowie (1883–1957), for one, in his *Culture and Ethnology* (1917) set out to disprove the deterministic notions that “culture reaches its highest stages in temperate regions”; that the concept of liberty is directly correlated with altitude; and that island inhabitants are accomplished seafarers. Lowie argued that under the same geographical conditions, radically different cultures have developed. As examples, he pointed to the differences between the native cultures of North America and the modern civilization that quickly arose in that same environment. He sought to tighten his argument by studying racially and culturally related populations (i.e., the Hopi and the Navaho) within comparable environments. Despite their occupation of similar regions in the Southwest, Lowie showed their cultures to be markedly different. Lowie attempted to demonstrate that the availability of a resource does not predispose a population to use it in any particular manner. North American Indians did not domesticate the buffalo, nor the Eskimo the reindeer. Like Boas before him, and Goldenweiser thereafter (1937:443–454), Lowie showed how culture defines what is a resource or, in other words, how “a culture assigns relevance to particular external conditions” (Sahlins 1964).

Goldenweiser's view was similar to Lowie's and Boas's in that he saw the environment as a static force and culture as the dynamic element that shaped the use of natural resources. He also suggested the important argument, later to be used by Ferndon (1959), that man changes the natural environment (for example, he turns forests into cultivated fields), and as a result, man makes his own environment instead of being determined by it (Goldenweiser 1937:452–453). As we will see in the next chapter, this view (that people do not adapt to environment but modify their environment to suit them) has returned in the 1990s under the guise of historical ecology (Balée 1998).

The “cultural area” approach also accounts for the little effort spent on establishing direct relationships between aspects of cultural systems and the environment. In this approach, continents were divided into culture areas based on shared linguistic characteristics and a mixed bag of cultural traits. This emphasis on shared traits was based on the strong assumption that diffusion may have occurred. The basis for that assumption can be traced to the work of the German and British diffusionists

and, more immediately, to the work of Wissler (1870–1947). Wissler had noted that maps of geological and ecological features matched areas of cultural features. From this observation he postulated the diffusionist **age-area concept**. According to this principle, traits tend to diffuse outward in all directions from their point of origin. The more widely distributed a trait from its origin, the older it is. Environment in this scheme is an inert configuration and at its most active is seen as passively setting limits to cultural development (Wissler 1926).

Kroeber (1876–1960), like other anthropologists of his day, subscribed to the Boasian credo that the physical environment is there merely to be acted upon by human culture. However, unlike the other Boasians, Kroeber completely subordinated the individual to his cultural milieu. Kroeber elaborated this idea in his notion of the “superorganic in culture.” According to this idea, in all cultures the individual is subordinated to the cultural pattern and is an agent of inevitable cultural forces. The implication of this view is that scientific understanding of historical processes and social evolution is impossible.

In his 1939 book *Cultural and Natural Areas of Native North America*, Kroeber briefly departed from his usual approach and followed the scheme earlier proposed by Wissler. Kroeber organized his descriptive material into regional categories developed from data on subsistence systems, habitat characteristics, and population densities. In this work, he momentarily admits that “no culture is wholly intelligible without reference to . . . environmental factors with which it is in relation, and which condition it” (Kroeber 1939:205). He gives extensive examples of how environmental factors limit and define such cultural practices as maize farming, population concentration, and tribal and linguistic boundaries.

Kroeber’s approach in *Cultural and Natural Areas* can be likened to that of his contemporary, the British geographer-anthropologist C. D. Forde (1902–1973). Both of them emphasized the need for collecting ecological data and viewed such data as potentially valuable in explaining cultural similarities. Both, however, eventually returned to a possibilist stance. Forde, for example, after summarizing the history of economic systems in relation to ecology and social organization, concluded that neither an evolutionary sequence of “economic stages” nor the nature of the subsistence base will explain the changes in a group’s culture (Forde 1934). He therefore warned against racial, geographical, and economic determinism (Minshull 1970:18). Economic and social activities, he concluded, are products of the long, but largely unpredictable, processes of cultural accumulation and integration.

Kroeber’s conclusions in *Cultural and Natural Areas* (1939) resemble those of Forde’s in *Habitat, Economy, and Society* (1934). With that effort,

Kroeber's fleeting use of technoenvironmental explanation ended, and he turned his idea of culture area increasingly toward the Wisslerian notions of diffusion and "areas of culture origins." In regard to his culture-environment explorations, he became baffled and wrote: "The interaction of culture and environment become increasingly complex when followed out. And this complexity makes generalization unprofitable, on the whole. In each situation or area, different natural factors are likely to be impinging on culture with different intensity" (Kroeber 1939:205).

Despite this inability or unwillingness to deal with irregularities in human-environment interaction, Kroeber's *Cultural and Natural Areas* is of major importance in that it forms the backdrop to the formulation of the cultural ecological approach. Although Kroeber was unwilling to accept the idea that modes of subsistence are causally and functionally related to social structure, his efforts had a comprehensiveness that is impressive to this day.

Summary

From Greco-Roman times through the 1950s, ideas about the relationship between people and nature emphasized three main themes. One was the notion that the environment exercised a determining influence on human society. According to Greco-Roman conceptions, this influence took place through the action of climate upon the body—favoring health, intelligence, and good government. Such a view was generally accepted well into the eighteenth century. In the nineteenth and twentieth centuries, the focus of explanation shifted to the role of geographical features and their influence on society. Although writers admitted that differences in response were possible, they emphasized that humans usually took the path of least effort and thereby yielded to the forces of environment.

The second theme was that of human adaptation to environment. These views emphasized the interaction of human beings with nature. Greco-Roman theories expounded on the effect of environment upon the humors of the body and on the characteristics of people living in unbalanced climates. Eighteenth-century writers addressed the problem of teleology and causality in nature and proposed stages along which human society progressed. With each stage, human beings gained increased control over resources and greater independence from the environment's weighty influence. The development of evolutionary theory and genetics gave further impetus to the adaptational approach by providing a theory and a method that simultaneously helped explain change and continuity. This approach was fundamental to the emergence of a modern theory of people-nature relationships.

The third theme was that of environment as a circumscribing or limiting factor. This view, which was espoused by Malthus and then by Boas and others, demonstrated little sensitivity about nature but showed a clear awareness of the human side of the equation. The Boasian approach must be understood as a reaction to the broad generalizations of determinists and as an effort to return scientific investigation to empirical and more modest goals.

The three themes are not totally distinct, and the same authors emphasized one idea over another in different contexts. Determinism and possibilism are really the two ends of the spectrum of human-habitat interaction. One overemphasizes nature, the other people. They are not so much contradictory, as overzealous efforts at explanation. The adaptational-evolutionary approach served as the mediating model between the two extremes. The efforts up to the 1950s to provide a more satisfactory explanation of observed facts exercised an important intellectual influence on the more recent development of theories. These will be taken up in the next chapter.

Recommended Readings

Numerous articles and chapters in books review the history of anthropological interest in ecology. One of the most scholarly sources on the history preceding the eighteenth century is Glacken's *Traces on the Rhodian Shore* (1967). Glacken discusses the development of ideas about nature and culture in Western thought and finds three dominating concerns: the earth as designed for human beings alone; the environment as a modifying influence on human beings; and human beings as a modifying influence on nature. The book is based on research of primary sources and serves as an excellent starting point for analyses of the evolution of ideas in cultural ecology.

The other essential source on this early period is Thomas's *The Environmental Basis of Society* (1925). It is weaker than Glacken's on the Greek, Roman, and medieval periods. However, its discussion of the period from the eighteenth century to the 1920s is very useful. Glacken's book is organized chronologically and within each period by the three ideas around which he organizes the material. Thomas's book is strictly chronological. Brief surveys on the theoretical development of the period up to Julian Steward are found in Helm (1962); Geertz (1963:1-11); Sahlins (1964); Netting (1968:3-25); Vayda and Rappaport (1976); Bennett (1976); Netting (1977); Ellen (1982); Moran (1990); and Turner et al. (1990).

The collections of essays by Stephen Jay Gould on natural history provide enjoyable reading on Darwinian theory and its complexities (e.g.,

Gould 1980; 1977, 1981, among many others). There has been a virtual revival of interest in Darwin, and in Alfred Russell Wallace, who jointly shared with Darwin the honor of discovering the concept of natural selection and its role in evolution. Readers will want to read recent biographies of each of these men and their times.

Notes

1. Reviews of the determinist tradition in geography are to be found in Minshull (1970:100-118) and Sprout and Sprout (1965).

2. Readers will find stimulating discussions of evolutionary theory in Levins (1968), Bajema (1971), and Lewontin (1968). The journal *Evolution* is particularly recommended.