

## THE ARCHAEOLOGY OF LIFE SUPPORT SYSTEMS

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### Summary

The archaeological record documents a varied and complex history of human life support systems. Early hominids engaged in scavenging of dead animals and plant collecting but may have practiced some intentional hunting as early as 1.8 million years ago. Life support systems based upon intensive hunting appeared on the human scene by 400,000 years ago. Foraging of wild resources based upon hunting, fishing, and plant gathering emerged as the universal human life support system by at least 70,000 years ago. Domestication of plants and animals established the foundation for farming and pastoralism as life support systems as early as 12,000 years ago. Farming systems based upon horticulture and agriculture spread throughout the world between 5,000 to 10,000 years ago. The earliest civilizations emerged from this foundation in several world areas as a distinctive human life support system between 3,000 and 6,000 years ago. States and empires rapidly developed as variants or expressions of early civilizations and continued into the modern world. World-systems appeared as another, and related, variant of civilization, perhaps as early as 5,000 years ago, and dominated the modern world after A.D. 1500. The past three centuries experienced the rise and global expansion of industrialism as a human life support system based upon mechanical technology, inanimate sources of power, wage labor, and factories. In the present world, the process of globalization is replacing nation-states with the historical reproduction of economic, political, social, and cultural systems on a global scale based upon intensifying global consciousness.

## 1. Introduction

Human life support systems in the past include foraging, food production systems such as farming and pastoralism, civilization, states and empires, world-systems, industrialism, and global systems. The archaeological record documents their origins, dynamics, and successes or failures and can be used, therefore, to provide guideposts for human actions in the present and in the future. For this reason, documenting and understanding past life support systems is one of the most pressing research directions in archaeology today.

## 2. Foraging

Foraging, the practice of subsisting on naturally occurring plants and animals, is the most ancient and the most enduring of all human life support systems. (See “The Archaeology of Foragers”. Human foragers apply the techniques of gathering, fishing, hunting, and scavenging for this purpose and exploit a wide variety of resources. The earliest hominids such as *Homo habilis* appear to have engaged in a foraging life support system predominantly focused upon the scavenging of animals killed by predators such as lions, a practice particularly characteristic of hyenas on the African savannahs. Some archaeologists, however, argue for the existence of some hunting among hominids as early as 1.8 million years ago at Olduvia Gorge in East Africa. Still, not until about 400,000 years ago among the European Neanderthals is there good archaeological evidence of a well-developed pattern of intentional hunting by early hominids.

Behaviorally modern hominids emerged in the last 70,000 years and left an archaeological record of organized hunts, meat storage, and regional tool making traditions suggesting language, future planning, and social cooperation. They developed a lifestyle that is similar to historically documented foragers. The global expansion of foragers engaged in this life support system began about 40,000 years ago, when they migrated first to Australia and New Guinea and then to the Melanesian islands by 20-35,000 years ago but not to the rest of the Pacific islands before 3,500 years ago. Foragers reached the Americas by at least 12-14,000 years ago and possibly as early as 25,000 years ago. They had expanded throughout most of the world by 10,000 years ago. Global climate change may have driven the diaspora. The Pleistocene epoch experienced a rapid warming period between 18,000 and 10,000 years ago and extreme climatic volatility during the last part of this time period. Foragers responded to local and regional climate change bringing about food shortages by migrating to unoccupied lands. Population growth also played an important role in bringing about migration. In places without mobility as an option, however, they intensified foraging practices during times of food shortages, using a greater variety of and less desirable plants and animals in the habitat and increasing storage. Not surprisingly, plant and animal domestication followed.

Domestication of plants and animals began in many places around the world between 4,000 and 11,500 years ago, including Africa, China and Southeast Asia, southern Mexico, the Andes in South America, and eastern North America. It established the base for the development of specialized farmers and pastoralists who eventually

replaced, lived side by side with, or developed symbiotic relationships with foragers. Early domestication, however, did not bring about an agricultural revolution. Rather, domesticated plants and animals supplemented traditional foods and allowed the survival of foraging lifestyles in the face of population growth and environmental change. Only later after the continuation of foraging proved to be impossible did food production emerge as a life support system.

The archaeological record suggests that Holocene foragers mostly organized themselves into egalitarian bands with relatively little individual variation in power, prestige, and wealth. There is evidence, however, for the early emergence of complex social organizations and sedentary village life among some foragers. Intensive foragers with a more sedentary life, especially those living in village settlements, often organized themselves into complex social hierarchies and shifting social networks or heterarchies. The best examples are the chiefdoms formed by the fishing based foragers of the North American northwest coast, but others have been documented in the Middle Eastern Levant, the eastern Amazon, the southern California coast and the Midwest of North America, and the Arctic. Sedentism appears to be the reason for the emergence of greater social complexity among foragers. Population growth typically follows. The consequent need for food storage, conflict resolution, and regulated access to limited foraging areas in close proximity to the settlement entails a social management system provided by political leaders, hereditary chiefs, or other social mechanisms. Economic exchange networks that link foraging systems in local regions to other places also appear early in the archaeological record. Sharing appears to be a fundamental characteristic of human societies that provides the foundation of exchange systems operating at the level of the household and the local community. Foragers living off the land established economic exchange systems with other regions at least as early as the late Pleistocene.

### **3. Farming**

Domestication established the foundation for food production as another life support system. Both farmers and pastoralists have a long archaeological record. Farming is a life support system that depends upon cultivated plants for basic subsistence but that requires a complementary source of protein in the form of wild or domesticated animals or fish. (See “The Archaeology of Farming Systems” ) It involves a co-evolutionary relationship between plants and people in which “humans manipulate plants to increase their productivity and plants manipulate people to increase the plant’s reproductive contribution to the next generation.” ( “The Archaeology of Farming Systems”) The origin of farming as a life support system is debatable, but two hypotheses are popular. One, the “dump-heap” hypothesis, explains plant domestication as an outgrowth of the creation of anthropogenic landscapes by practices such as intentional burning, which enhances a close association between plants and people. The other hypothesis, proposed by Jack Harlan and Daniel Zohary, attributes the origin of domestication to the intentional transplanting of plants from their primary natural habitat to marginal habitats, where they need the interference of people in order to survive competition with other plants. Both hypotheses explain evolutionary pathways toward domestication that separates farming systems from the intentional plant manipulation of foragers. Farming systems includes horticulture and agriculture. Horticulture involves growing several

plant domesticates in the same field for a short period of time in comparison to the length of time that the field lies fallow or out of production. The most common varieties of horticultural systems are house gardens and swidden or slash and burn farming. Agriculture, the other type of farming system, is growing one or a few domesticates for a long period of time in the same field without a fallow period. Specialization and intensification are characteristic of agricultural systems. Both horticulturalists and agriculturalists, although mostly the latter, used a variety of water management technologies to distribute water from rivers or other natural sources, to collect water in reservoirs for future use, or to drain wetlands. (See “Physical and Cultural Properties of Ancient Water Management”.) Old World farmers and New World farmers used water management techniques in both arid and humid lands. They constructed and used wells, dams, reservoirs, canals, and raised fields in various combinations to adapt to environmental constraints and opportunities and to cultural traditions. Agriculture underpinned by large-scale water management systems emerged in both the Old World and the New World as a key foundation of early states and empires. Food producers also often participated in regional or larger economic exchange systems. The emergence of Jericho as one of the earliest towns in human history, for example, is probably tied to an exchange relationship between early farmers and pastoral nomads who needed to use the same source of water. In places with diverse environments, widely separated settlements participated in bartering and other informal social networks that served to circulate foodstuffs and raw materials among different ecological zones. Perhaps the best example of this is the ancient system of local and regional markets and long distance trading networks that linked together highland and lowland regions in Mexico and Central America.

The archaeological record of farming systems dates to as early as 12,000 in the Near East, documented by stone sickle blades, polished stone axes for land clearance, and grinding stones used to harvest wild stands of cereal grains, especially barley and wheat. Other early plant domesticates in the Near East included lentils and field peas. By 10,000 years ago in places like Jericho, early farmers lived in small villages with an egalitarian social structure and raised goats and sheep. Most people in the Near East lived this way by 8500 years ago. The same farming tradition spread northward into temperate Europe by 6500 years ago in the midst of a period of climatic warming and higher rainfall and expanded eastward to India by 5500 years ago. Farming in Egypt and North Africa followed the Near East pattern for the most part. Sub-Saharan Africa, however, took a different pathway and developed horticultural systems based upon sorghum and millet by 9000 years ago and yam cultivation by 5000 years ago. Afterwards, large-scale irrigation agriculture emerged in Mesopotamia by 4000 years ago and established the foundation for the rise of states and empires.

The archaeological record suggests that farming systems developed independently in the Far East. Rice played a major role in the history of farming in East Asia, appearing as early as 10,000 years ago in the archaeological record of northern Thailand. Farming systems based upon wet rice cultivation and domesticated pigs appeared in the Yangtze River basin of southern China by 8000 years ago. Millet farming emerged in the Huang Ho River basin in northern China by 8500 years ago. Farm village cultures in the Far East gradually developed during the following 4000 years into several regional variants marked by autonomous egalitarian settlements. Yam and taro cultivation provided the

foundation for farming systems in the Pacific Islands and played important roles in farming throughout Southeast Asia.

Farming systems emerged independently in the Americas in several places. Maize played the key role in the history of farming in Mexico and Central America by 5000 years ago, although it appears as early as 8000 years ago in the archaeological record. Dryland cultivation of squash, beans, maize, and a variety of other domesticates led to the establishment of a specialized farming tradition by at least 3500 years ago and supported the development of Mesoamerican Civilization. In the southeastern United States, horticultural systems based upon marsh elder, chenopods, squash, and sunflower emerged by 3-4000 years ago. The introduction of maize into the area from the southwestern United States about 1200 years ago rapidly changed indigenous horticultural farming into agriculture. South America was another center of farming as a life support system. Horticultural farming based upon the cultivation of potatoes, maize, beans, quinoa, and a variety of other plants emerged by 4000 years ago. Domesticated animals, mostly llamas, alpacas, and guinea pigs, supplemented the horticultural system. Irrigation agriculture developed by 3000 years ago in the coastal valleys of Peru and the Andean highlands. In the South American lowlands such as the Amazon Basin, horticulture based upon root crops (manioc and sweet potatoes) and swidden methods emerged by 4000 years ago in the upland areas. Agricultural farming appeared on the floodplains of the Amazon River and its tributaries by the first millennium B.C. based upon the introduction of maize and beans and established the foundation for the development of complex societies.

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