



# HUNTER-GATHERER SOCIETIES, ECOLOGICAL IMPACT OF

Kathleen A. Galvin  
*Colorado State University*

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## GLOSSARY

- bands** The basic economic, social, and political unit of hunter-gatherer societies.
- exogamy** The practice of a person seeking a mate outside of his or her group.
- patrilocal residence** The practice of married couple's living in the husband's community.
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A **HUNTER-GATHERER OR FORAGING SOCIETY** is a group of people whose subsistence is based on the hunting (or fishing) of animals and gathering of plants. Whether or not foragers have an impact on their environment depends on several factors, some of which emanate from foragers themselves and others which are external to their society.

## I. INTRODUCTION

Many people have impressions of hunter-gatherers as people who live in harmony with nature, who are organized into simple societies and are associated with our "pristine" paleolithic hunter-gatherer past. Many of these stereotypic impressions are false (cf. Moran, 1991; Wilmsen, 1989). Today all foragers live in nation-states, have some dependence on either crop cultivation or farmers, and are not isolated. Hunter-gatherer societies have social systems that are extremely complex and whose interactions with the biodiversity surrounding them are as complicated and variable as was probably the case 10,000 years ago when all humans were foragers. It is no accident that today, areas with the greatest remaining biodiversity are also the areas inhabited by hunter-gatherers. Many hunter-gatherers retreating from land appropriation, settler immigration, and European diseases have occupied the most remote parts of their region. Today, these homelands are often part of or adjacent to conservation areas, parks or other protected areas.

This chapter describes traditional hunter-gatherer societies and the adaptations these societies have made to the environment. However, since hunter-gatherer societies and their environments have undergone continuing changes, issues of biodiversity conservation and hunter-gatherer welfare are discussed with the context of their changing world.

## II. HUNTER-GATHERER SOCIETIES AND NATURAL RESOURCE EXPLOITATION

Because hunter-gatherers live in diverse environments they manifest an incredible diversity of cultures and natural resource management adaptations. Nevertheless, there are several general characteristics of hunter-gatherer societies; these traits have a direct impact on the use of natural resources. Traditional hunter-gatherer societies are comprised of bands, social groups made up of close biological kin and friends. The composition and sizes of bands change seasonally, depending on the abundance and location of food resources. Bands are lead by individual hunters who are respected for particular talents such as singing or dancing well, good storytelling, or hunting prowess. Other features of band organization are small group size, flexible but primarily patrilineal residence, and strong pair bonds between individual men and women. Marriage is exogamous, that is, females are recruited from other groups. These features of hunter-gatherer society are a reflection of ecological, economic, and social necessity. For example, Efe Pygmy hunter-gatherer men of the Ituri Forest in the former Zaire have very strong relationships with close kin, which facilitates defense of their territories against other cooperative kin groups. Moreover, related men can assure women access to valuable resources in neighboring Lese agricultural villages. And women are attracted to men who can guarantee long-standing reciprocal economic relationships with Lese villages. Competition for women is high so close relations with kin may also help to obtain marriageable women and provide protection, as some women leave Efe society to live in Lese agricultural villages.

Hunter-gatherers are sedentary or nomadic depending on the distribution and dynamics of their resource base. Typically, men hunt and fish while women gather and collect foods. Sometimes women's work contributes more to the diet and sometimes male hunting and fishing products are most important. Gathering of wild foods tends to contribute more to the diet among people inhabiting tropical and semitropical areas (e.g., San Bushmen of the Kalahari) than in northern temperate climates (e.g., the Inuit of Canada) where hunting contributes the bulk of the diet.

Foragers learn about their environment and resource use through acculturation. Parents teach their children different kinds of ecological knowledge and resource exploitation strategies.

Ecological knowledge is a source of landscape manipulation. For example, the Kayapo Indians of Brazil create forest islands of planted semidomesticated crops of medicinal species, wild yams, and bush bean, as well as domesticated plants such as taro, papaya, and banana. A fully grown island has sites that vary in shade and moisture thereby creating the opportunity for cultivation of different crops. They become, through time, forest patches of varying successional stages within the savanna. Cree Indians of North America rotate their hunting and fishing lands yearly to reduce wildlife disturbance and increase harvests. Biodiversity conservation is, in this case, an indirect effect of resource management. There is evidence that until recently Indians of Canada used fire to maintain trails and to open up meadows. This provided improved habitat for ungulates and increased hunting success. Australian aborigines used fire to clear trails (of poisonous snakes) and keep game habitat open.

Appropriate use of natural resources are maintained through moral and belief systems of forager societies, which includes a strong respect for nature. Through religious belief and social conventions, people respect and exert some control their natural resources. These beliefs, however, do not always prevent hunter-gatherers from overusing their resource base. Not all hunter-gatherers live always harmoniously with the environment. Indeed, evidence of escalating overuse is accumulating (e.g., Redford and Mansour, 1996).

## III. CONSERVATION AMONG HUNTER-GATHERERS

It has been suggested that the hunter-gatherer adaptation occurred in environments where resources were freely available to all and were abundant. Thus, the environment was one where subsistence strategies emphasized short-term returns over long-term conservation. But during the Neolithic rise of agriculture, natural ecosystems were compressed and the value of resources increased as relative abundance declined. Some scholars have suggested that self-regulatory mechanisms evolved under resource limitation in some hunter-gatherer societies (Berkes and Folke, 1998).

There has been much written about how hunter-gatherers are actively engaged in conserving resources, especially animal resources. However, the limited actual data gathered on the subject suggests that subsistence hunters do not conserve prey resources. Most work

shows that hunters are concerned about short-term gains and not about resource conservation. Small, mobile groups may use resources in a sustainable manner, for example, by maintaining small groups and ranging over a large territory, but this does not necessarily imply they are consciously conserving resources. Evidence suggests that some resources may be used intensively or even depleted in local areas while other resources are sparingly used. For example, Alvard (1998) has shown that the Piro hunters of Peru depleted the large primates in the area around their village yet have not done so to peccaries. Likewise he shows that the Indonesian Wana have nearly depleted their area of macaques (large primates) but hunt pigs in a sustainable manner. These and other studies (e.g., among the Inuit of Canada, the Ache of Paraguay, the Cree of Canada) show that both overexploitation and conservation may be practiced by hunting groups. But the point remains that hunters sometimes reduce prey species to the point of local extinction.

One plausible explanation for resource depletion is that the resources exploited by subsistence hunters are considered to be open-access resources. Open access implies that there are no controls over resource use, which is said to result in the "tragedy of the commons" (Hardin, 1968). This concept proposed that deterioration of open-access grazing land is inevitable when individuals see no benefits from resource conservation. Another reason for resource depletion is lack of concern for very abundant resources. Some level of scarcity adds value to a resource relative to when resources are quite abundant. Resource users are motivated to conserve only when they see benefits to nonuse of resources. Thus, it is only when long-term benefits outweigh the short-term benefits that conservation is expected. When tied to a specific resource base and well-defined territories, hunter-gatherers have long-term strategies for natural resource conservation (Alvard 1998). For example, traditional Maine lobstermen have strong norms of territory ownership, which are enforced through threats of violence and damage to property.

Although foragers may or may not overuse resources, their perception of the land and its value is based on use rights. Local biological diversity is an important element of local survival strategies. This view contrasts with the western view of biodiversity conservation, which is based in Western epistemology. In the western view, nature exists apart from humankind and has value independent of human use. Biodiversity conservation implies no resource use or restraints in resource use.

#### IV. MODERNIZATION PROCESSES AND HUNTER-GATHERERS

Major changes in hunter-gatherer society are occurring even in the most remote regions of the world. These changes are associated with agricultural development, infrastructure advancement, resettlement schemes, tree harvesting, mining and oil exploration, and other types of development. The building of roads makes it easier for outsiders to gain access to remote areas and the resources therein. In addition, hunter-gatherer populations are growing, altering their relationship to the land. The result is that indigenous systems of resource use are changing due to both internal and external pressures. The traditional systems of resource use are less appropriate or are sometimes ineffectual under current conditions. For example, traditional sanctions to protect or at least not exhaust resources are becoming ineffectual as cash income has become increasingly important to individuals interested in commodities from the modern world. Hunter-gatherers now have, under these conditions, a growing demand for cash and market goods. Under these conditions, it is less likely that people will give priority to conservation.

#### V. LAND TENURE, INSTITUTIONS, AND BIODIVERSITY

One political factor that is almost universally common among hunter-gatherers today is that they do not control the land they live on. Until recently, their remoteness meant that they and the resources on which they depended were somewhat protected from outside influences. Thus, resources were locally controlled by informal norms through individual behavior. Now, however, national governments, among others, have put native lands to "productive" use. This means that if the market for some product is strong it will be exploited or cultivated regardless of environmental impact. For example, the strong local demand for aguaja (a local plant) in the Peruvian Amazon has led to destructive harvesting. In theory, most hunter-gatherer communities have use rights to their territories but old laws and treaties are continually violated. Legalizing communal resource-use rights is a way of giving hunter-gatherers a long-term stake in conserving the resources on which they depend. Securing rights to resources can occur through various management and development institutions. This means that hunter-gatherers, who for-

mally did not have institutions for collective action in the formal sense, find the need to deal with western institutions to acquire control over their lands.

The future of biodiversity, conservation, and hunter-gatherer sustainability depends on understanding that there are fundamental differences in the concept of conservation for westerners and for indigenous hunter-gatherers. Understanding that there are different worldviews toward nature is fundamental to forming a relationship between outside conservation groups and hunter-gatherer peoples. The reality is that even if hunter-gatherers are using resources, selling wild animals and cutting down trees, they perhaps remain the most effective conservationists for their region. Therefore, acceptance that there are different ways of viewing the world is a first prerequisite to working with indigenous hunter-gatherer populations. Second, it is necessary to recognize that there are no longer any "pristine" hunter-gatherers and they have needs just like the rest of us. Third, securing land tenure for hunter-gatherers and biodiversity conservation is required for a basis of a "sustainable" interaction.

## VI. ECONOMIC DEVELOPMENT AND BIODIVERSITY CONSERVATION

Community-based conservation is a concept aimed at involving local people in the conservation of wildlife or protection of biodiversity. The concept developed from the realization that much of the planet's wildlife and biodiversity exist outside protected areas and in regions occupied by rural people in developing countries. Models of community-based conservation adhere to the notion that if local communities can derive some value, nominally income, through conserving biodiversity, they will do so. This promising concept has been widely promoted as "the answer" to conservation in developing countries. Thus, several models of community-based conservation have developed. The biosphere reserve is one kind of conservation area that theoretically allows for local population involvement in management of the protected areas. Integrated Conservation-Development projects are another type of community-based development. However, results from community-based conservation projects in Africa and elsewhere suggest that there are more failures than successes. Many community-based conservation efforts involve local communities in name only. Locals are neither involved in project identification and planning nor are they beneficiaries, thus these projects are not really

community-based conservation projects. Another pattern of failure includes involvement of the local people only in a cursory way. Other scenarios for failure also have in common insufficient involvement of the local people at all levels in the project. In order for community-based conservation to work, people need to be considered a component of the ecosystem being conserved and brought into the project process from the beginning.

### A. It Is Useful to View Humans as Part of Ecosystems

One of the fundamental problems with community-based conservation is that hunter-gatherers as well as other indigenous populations are often viewed as an external disturbance to the natural system rather than as integral components of the ecosystem. But hunter-gatherer societies see their relationship with the environment as one; they are part of that environment. Though not a study of foragers, but rather herders who do some hunting and gathering, the South Turkana Ecosystem Project (Ellis and Swift, 1988; Little and Leslie, 1999) is one of the only truly interdisciplinary and long-term projects to study the social behavior, knowledge systems, demography, human biology, and ecology of a group of people. An important goal of this study was to understand how the environment affected human management and how people affected the environment. In this case people and livestock (camels, cattle, sheep, goats, and donkeys) lived in a harsh, dry, and highly seasonal environment. This assemblage of people, livestock, plants, and other organisms within a semiarid ecosystem produced a remarkably interactive system.

Vegetation structure in this tropical savanna and dry woodlands was shown to be hierarchically constrained by physical factors: by climate at regional scales, by topography and geomorphology at landscape scales, and by water redistribution and disturbance at local and patch scales; livestock and humans played a small role. The pastoralists did influence vegetation composition and cover by burning, woodcutting, and through seed distribution by livestock. These influences were small. Livestock ecology and production followed those of the seasonal dynamics of plants. The different patterns of forage utilization by different herbivores, plus differential habitat use, lead to almost complete niche separation among this suite of domestic herbivores; among all five species, they managed to utilize a wide variety of the available plant types in the ecosystem. Thus, physical heterogeneity on the Turkana land-

scapes ultimately resulted in spatial and temporal variation in plant production, plant life form diversity, and refuge areas for pastoralists. These, in turn, contributed to social and ecological persistence by reducing variability of ecosystem energy flow and long-term variations in species diversity. Thus, biodiversity was important to ecosystem (which included people) maintenance. This systems approach to understanding human-environment interactions is a useful way to discern the ecological impact of hunter-gatherers and, more important, to derive appropriate management of lands where hunter-gatherers live.

The description presented here shows that indigenous concepts of conservation, ecological knowledge, and moral and religious beliefs are fundamental to understanding how hunter-gatherers use resources. Not all hunter-gatherers conserve their resources, thus whether or not and to what extent hunter-gatherers effect their environment is an empirical question that needs to be investigated, not a notion to be assumed one way or another. It is, however, the case that when hunter-gatherers have short-term strategies for resource use they may overuse some resources; when long-term goals are in place, they do not. Informal institutions control use of some resources in hunter-gatherer societies, but collective action or formal institutions are generally not well developed. With major changes in and around the lands inhabited by hunter-gatherers, it is becoming increasingly necessary for hunter-gatherers to develop institutions to gain control over their resource base. Alliances between hunter-gatherers and others interested in conservation may facilitate resource-management strategies that reduce the impact of negative changes. Hunter-gatherer natural resource-management strategies that include their social system are important attributes of these ecological systems and need to be fundamental components of any plan to conserve biodiversity.

## See Also the Following Articles

BIODIVERSITY-RICH COUNTRIES • ETHNOBIOLOGY AND ETHNOECOLOGY • INDIGENOUS PEOPLES, BIODIVERSITY AND • LAND-USE PATTERNS, HISTORIC • RELIGIOUS TRADITIONS AND BIODIVERSITY • TRADITIONAL CONSERVATION PRACTICES

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