

FOOD, FORAGE AND MEDICINAL RESOURCES OF FORESTS

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Summary

The world's forests have nurtured humans and their livestock, and have been a source of innumerable medicinal plant species for hundreds of thousands of years. Forest foods include wild mammals, birds, fish and other vertebrates, insects, and products such as honey. Many types of forest plants also provide food: roots, tubers and other underground parts; leaves, shoots and inner bark; grains, fruits and nuts; and edible resins, gums and beverages. Various types of edible fungi also grow in forests, on trees or on the ground. Forests also yield forage species used by livestock. Medicines from forests – especially many species of trees and shrubs – are numerous. Some of these are used commercially in medicinal drugs.

However, knowledge about many plant medicines remains with Indigenous forest peoples, who continue to use these medicines in treating illness and injury and maintaining health. Humans in forests around the world have had considerable influence on the species and habitats, and even in ancient times, humans affected forest succession through use of fire, and have also influenced species composition in forests. Loss and deterioration of forests due to impacts of industrial forestry, conversion of forests to farmlands, urbanization and other types of development is an ongoing concern, with serious implications for humans and all of the Earth's life forms. In this chapter, we discuss and provide examples of many different forest species on which humans depend.

1. Introduction

From our earliest beginnings, humans have relied on forests. It is not surprising then, that we still depend on forest ecosystems to fill many of our needs for food, animal forage and medicine today. Indigenous peoples around the world particularly rely on forests for their sustenance, and many of the food species enjoyed today were originally cultivated and managed by Indigenous peoples over thousands of years.

Many medicinal products, too, were discovered and tested first by Indigenous forest peoples. Much of the history of colonization has been of rediscovery and exploitation of forests and forest products, and our current world economy and production systems continue to focus on forest ecosystems, not only for timber, but for a wide variety of foods, medicines and materials (Figures 1, and 2).



Figure 1. Saanich (Coast Salish) Elder, the late Elsie Claxton, makes “10-barks” medicine (inset), a family recipe used for many generations to treat tuberculosis and other ailments (with permission of Earl and Belinda Claxton). It is made by boiling the barks of 10 specific kinds of trees and shrubs of southern Vancouver Island.



Figure 2. *Abies grandis* (grand fir) - an ingredient in “10-barks medicine” and other traditional medicines of Northwest Coast First Nations of Canada

Every forest ecosystem in the world is occupied and influenced by humans to some extent, and each forest type yields hundreds of products used in peoples' everyday lives. Some forest plants and animals have been domesticated by humans over millennia, but many products are still harvested from wild or semi-domesticated ecosystems. In some cases, we have developed complex and sophisticated techniques and strategies for harvesting, processing and utilizing these products and we continue to search for innovative ways to apply forest species in nutrition, animal care and medicine.

The story of human reliance on forests and our consequent impacts on forest ecosystems is partially reflected in the archaeological record. New methodologies, and more traditional methods applied to new problems, in fields ranging from paleontology to comparative linguistics, have revealed many details of human-forest interactions. Foraging and farming have been shown to consist of a diverse and variable range of activities and practices, a continuum, varying over time and space, and having many types of influences on forests and their associated habitats. Towards one side of the spectrum, for instance, we know from archaeological research that as long ago as 30 000 or 40 000 years B.P., the forest dwellers of what is now Papua New Guinea were clearing small patches through tree girdling, canopy thinning and trimming to promote the growth of wild bananas (*Musa* sp.), taro (*Colocasia* sp.) and yams (*Dioscorea* sp.). In contrast, however, foraging societies have existed in rainforests such as those of Central Africa for thousands of years, without requiring the use of environmental modifications such as clearing forested areas and gardening. In Sri Lanka, people were gathering wild breadfruit (*Artocarpus* sp.) and wild bananas, as well as hunting wild animals, some 12 000 to 10 000 years ago. At Spirit Cave, an archaeological site in northern Thailand dating from 14 000 to 8 000 years ago, people were not only hunting forest species, but were collecting nuts, berries, mango (*Mangifera* sp.), broad beans (*Fava* sp.), bottle gourds (*Lagenaria siceraria*), cucumber (*Cucumis* sp.) and betel palm (*Areca catechu*) nuts from the surrounding forests. More recent sites in northeastern Thailand show that people were gathering several types of wild yams and wild rice (*Oryza* sp.) from dense patches.

Through our search for food and medicine, humans have affected forest ecosystems for many thousands of years. In Africa, some of the “true” forest species gathered by ancient people and eventually domesticated include cola nut (*Cola* spp.), akee apple (*Blighia sapida*), guinea millet (*Brachiaria deflexa*) and perhaps wild yams. Other species, including cowpeas (*Vigna* sp.), and oil palm (*Elaeis guineensis*), are believed to have evolved along the forest margins. It is within the clearings and edges associated with forests, areas naturally high in biodiversity, that many species of value to humans are most productive. Human activities aimed at managing forests for food production, including various types of clearing, thinning and burning, are often directed towards creating more open environments, or at least successional continuums between dense forest and clearings. True domestication of plant species and varieties, with accompanying wide-scale genetic changes from selection and breeding, began in various parts of the world only within the last 10 000 to 5 000 years. Nevertheless, humans have been major players, influencing forest species composition and structure over a much longer time.

One only needs to look at the products sold in any large North American supermarket or drugstore to appreciate the extent to which forest foods and medicines have spread from their places of origin to all parts of the globe. Mango (*Mangifera indica*) is a good example. Mango was originally domesticated from its native forests in Southeast Asia, in the vicinity of India and Burma. Today, mangoes are the most popular and characteristic fruit throughout the tropics, with India being the most important mango-producing country. As well as being grown and consumed in tropical and some subtropical regions, mangoes are a major export to the temperate zones of the world. Bananas, oranges, apples, strawberries, grapes, olives, avocados, pineapples, potatoes, corn, coffee, tea, sugar, pine nuts, chestnuts, walnuts, hazelnuts, cinnamon, nutmeg: all of these are examples of products originating from forests within particular regions and gaining prominence in the world marketplace (Figures 3-8). All have their histories of domestication, development, trade and diffusion around the world. Some have been the cause of major incidents and conflicts among nations, and control of the markets for these products is an ongoing concern for countries and corporations.



Figure 3. *Fragaria* hybrid (strawberry) - domesticated from wild forest species.



Figure 4. *Citrus sinensis* (sweet orange) - one of a major group of “citrus” fruits prominent as a world food crop.



Figure 5. *Persea americana* (avocado) - a major New World savory fruit.



Figure 6. *Pinus edulis* (pinyon pine) - one of many species of pines of the world’s forests that produce large, edible seeds.



Figure 7. *Psidium guajava* (guava) - a New World forest fruit, now widely grown in the tropics and used for beverages and flavoring.



Figure 8. *Coffea arabica* (coffee) - a major beverage plant of the world, growing in forest understory.

One notorious incident associated with a forest food was the mutiny on the *Bounty*, the British ship whose Captain, William Bligh, had been ordered by the British government to travel to Tahiti to obtain seedlings of breadfruit (*Artocarpus altilis*) (Figure 9). This starchy “vegetable fruit” was, and is, a staple in the Polynesian diet. Bligh was expected to transport breadfruit plants to the West Indies in order to provide a cheap source of food for the slaves working on the plantations. In 1787, however, his crew rebelled at his cruel discipline, jettisoned his precious breadfruit seedlings and set him and some of his loyal crew members adrift in the ship’s launch. The story of the mutiny, Bligh’s return to England, and the fate of the mutineers remains one of the best-known sagas of British Colonial history, and illustrates the bond between issues as seemingly diverse as slavery and the human relationship to forest plants. The reader is referred to the books given in the Bibliography for further information on the origin and global diffusion of major crop plants.



Figure 9. *Artocarpus altilis* (breadfruit) - Polynesian fruit sought by British colonial powers to transplant to the West Indies as food for plantation slaves.

Forest foods and medicines have, in fact, directed the course of human history on many occasions. Of medicines, quinine is a prime example. Quinine, a bitter, white crystalline alkaloid derived from the bark of various species of *Cinchona*, is a major anti-malarial drug, also used to treat cardiac arrhythmia. In the late 16th and early 17th centuries, the Spanish invaders of the Incan empire in Peru learned about the tree with remarkable powers to alleviate fever. Jesuit missionaries began using this medicine to treat malaria, and by the mid-1600s, the miraculous “Peruvian bark” had been transported back to Rome, where it is credited with having saved many lives. From Italy it spread to England, but Oliver Cromwell, the well known English Protestant reformer and anti-monarchist, who rejected anything of Jesuit influence, refused to take it and died of malaria. It wasn’t until nearly a century later that the actual source plant was collected and described, a small understory tree in the coffee family (Rubiaceae), and it wasn’t until the early 1800s that the alkaloid quinine was isolated from the bark. This one forest medicine, first discovered by Indigenous peoples, is credited with saving hundreds of thousands of lives. In some circles, it is better known as the bitter flavoring of the “tonic water,” in the quintessential British “gin and tonic,” but even this use can be traced to the practice of the British colonial forces in India medicating themselves with an anti-malarial tonic in the most agreeable way they knew.

Of particular concern today is the significant and ongoing role humans have played in changing and reducing the area of forests. Major changes in forest composition and structure wrought by humans from Europe and the Middle East to Southeast Asia, Australia and the Americas are evident from the archaeological record. Globally, deforestation continues to be a major problem. The use of much of the best farm land in the South for export crops to the North, leads many hungry populations to push further into remaining forested land, while even wealthier nations, like the United States and Canada, continue to harvest timber at unsustainable rates. The global loss of forests is closely related to an accelerated loss of biological and cultural diversity, as discussed elsewhere in this volume. Forest ecosystem conservation issues are broad and complex, extending not only to the loss of trees and their associated plant communities, but to short term thinking and lack of respect for forest ecosystems combined with political

unrest, loss of wildlife, soil erosion, colonial history and neocolonial global economic systems, pollution, reductions in the populations of insects and other types of pollinators, encroachment by invasive species, the deterioration of fisheries sourced in forest rivers and lakes, and many other factors. All of these issues affect, and are affected by, our quest for forest products used daily for comfort and survival around the world.

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Biographical Sketches

Nancy Turner is an ethnobotanist and Professor in the School of Environmental Studies, University of Victoria. She began working with Indigenous plant specialists and elders in British Columbia over 30 years ago, recording and documenting their ethnobotanical and environmental knowledge, including the role of plants in nutrition, technology, medicine, language and classification systems, narratives, and ceremony. Increasingly her work has focused on the interrelationship between traditional knowledge and traditional management systems and environmental deterioration. She has written many books and papers on traditional plant knowledge and use, many of them co-authored with Indigenous colleagues.

Sarah Turner is an interdisciplinary graduate student studying primatology in the Department of Anthropology, University of Victoria. She is currently researching Japanese macaques at Awajishima, Japan. She has had a long-standing interest in, and concern for, the old growth forests of British Columbia and their deterioration and loss due to industrial logging.