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The Natures of Indian America Before Columbus

Given that so many people believe that America before Columbus was a version of the Garden of Eden, the history since then is usually understood as a fairly straightforward story, which goes like this: when Indians dominated America, the place was beautiful and natural. When Europeans arrived, they trashed the place.

The truth is far more complicated and interesting, however. William Denevan explores pre-contact Indian America with an eye to seeing how Indians shaped and changed the natural worlds around them. To be sure, most Indians did not impose nearly as great a strain on natural environments as subsequent non-Indian settlers or modern industrial capitalism eventually would. But nonetheless, they did alter the earth around them in important ways. This points to a key insight of environmental history: all peoples change nature to achieve their notion of the good life. To suggest that any people does not do this – that some people are part of nature without being willing or able to change it – is to remove them from history and to dehumanize them.

As you read Denevan's article, ask yourself how Native changes to the natural environment before 1500 differed from the kinds of alterations, modifications, and wholesale changes in nature that your society makes today. Is there any way in which they were similar? How does it change your perception of American history to consider that Indians did not live in a Garden of Eden?

American Environmental History, Second Edition. Edited by Louis S. Warren.

The Pristine Myth: The Landscape of the Americas in 1492

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(*Annals of the Association of American Geographers* 82(3) 1992: 369–385.)

This is the forest primeval …

Evangeline: A Tale of Acadie
(Longfellow 1847)

What was the New World like at the time of Columbus? …

Scholarship has shown that Indian populations in the Americas were substantial [in 1492], that the forests had indeed been altered, that landscape change was commonplace. This message, however, seems not to have reached the public through texts, essays, or talks by both academics and popularizers who have a responsibility to know better ….

The evidence is convincing. By 1492 Indian activity throughout the Americas had modified forest extent and composition, created and expanded grasslands, and rearranged microrelief via countless artificial earthworks. Agricultural fields were common, as were houses and towns and roads and trails. All of these had local impacts on soil, microclimate, hydrology, and wildlife. This is a large topic, for which this essay offers but an introduction to the issues, misconceptions, and residual problems. The evidence, pieced together from vague ethnohistorical accounts, field surveys, and archaeology, supports the hypothesis that the Indian landscape of 1492 had largely vanished by the mid-eighteenth century, not through a European superimposition, but because of the demise of the native population. The landscape of 1750 was more "pristine" (less humanized) than that of 1492.

Indian Numbers

The size of the native population at contact is critical to our argument. The prevailing position, a recent one, is that the Americas were well-populated rather than relatively empty lands in 1492. In the words of the sixteenth-century Spanish priest, Bartolomé de las Casas, who knew the Indies well:

> All that has been discovered up to the year forty-nine [1549] is full of people, like a hive of bees, so that it seems as though God had placed all, or the greater part of the entire human race in these countries.
>
> (Las Casas, in MacNutt 1909, 314)

Las Casas believed that more than 40 million Indians had died by the year 1560. Did he exaggerate? In the 1930s and 1940s, Alfred Kroeber, Angel Rosenblat, and Julian Steward believed that he had. The best counts then available indicated a population of between 8 and 15 million Indians in the Americas. Subsequently, Carl Sauer, Woodrow Borah, Sherburne F. Cook, Henry Dobyns, George Lovell, N. David Cook, myself, and others have argued for larger estimates. Many scholars now believe that there were between 40 and 100 million Indians in the hemisphere (Denevan 1992). This conclusion is primarily based on evidence of rapid early declines from epidemic disease prior to the first population counts (Lovell 1992).

I have recently suggested a New World total of 53.9 million (Denevan 1992, xxvii). This divides into 3.8 million for North America, 17.2 million for Mexico, 5.6 million for Central America, 3.0 million for the Caribbean, 15.7 million for the Andes, and 8.6 million for lowland South America. These figures are based on my judgment as to the most reasonable recent tribal and regional estimates. Accepting a margin of error of about 20 percent, the New World population would lie between 43 and 65 million. Future regional revisions are likely to maintain the hemispheric total within this range.... In any event, a population between 40 and 80 million is sufficient to dispel any notion of "empty lands." Moreover, the native impact on the landscape of 1492 reflected not only the population then but the cumulative effects of a growing population over the previous 15,000 years or more.

European entry into the New World abruptly reversed this trend. The decline of native American populations was rapid and severe, probably the greatest demographic disaster ever (Lovell 1992). Old World diseases were the primary killer. In many regions, particularly the tropical lowlands, populations fell by 90 percent or more in the first century after contact. Indian populations (estimated) declined in Hispaniola from 1 million in 1492 to a few hundred 50 years later, or by more than 99 percent; in Peru from 9 million in 1520 to 670,000 in 1620 (92 percent); in the Basin of Mexico from 1.6 million in 1519 to 180,000 in 1607 (89 percent); and in North America from 3.8 million in 1492 to 1 million in 1800 (74 percent). An overall drop from 53.9 million in 1492 to 5.6 million in 1650 amounts to an 89 percent reduction (Denevan 1992, xvii–xxix). The human landscape was affected accordingly, although there is not always a direct relationship between population density and human impact (Whitmore et al. 1990, 37).

The replacement of Indians by Europeans and Africans was initially a slow process. By 1638 there were only about 30,000 English in North America (Sale 1990, 386), and by 1750 there were only 1.3 million Europeans and slaves (Meinig 1986, 247). For Latin

America in 1750, Sánchez-Albornoz (1974, 7) gives a total (including Indians) of 12 million. For the hemisphere in 1750, the *Atlas of World Population History* reports 16 million (McEvedy and Jones 1978, 270). Thus the overall hemispheric population in 1750 was about 30 percent of what it may have been in 1492. The 1750 population, however, was very unevenly distributed, mainly located in certain coastal and highland areas with little Europeanization elsewhere. In North America in 1750, there were only small pockets of settlement beyond the coastal belt, stretching from New England to northern Florida (see maps in Meinig 1986, 209, 245). Elsewhere, combined Indian and European populations were sparse, and environmental impact was relatively minor.

Indigenous imprints on landscapes at the time of initial European contact varied regionally in form and intensity. Following are examples for vegetation and wildlife, agriculture, and the built landscape.

Vegetation

The Eastern Forests

The forests of New England, the Midwest, and the Southeast had been disturbed to varying degrees by Indian activity prior to European occupation. Agricultural clearing and burning had converted much of the forest into successional (fallow) growth and into semi-permanent grassy openings (meadows, barrens, plains, glades, savannas, prairies), often of considerable size. Much of the mature forest was characterized by an open, herbaceous understory, reflecting frequent ground fires. "The de Soto expedition, consisting of many people, a large horse herd, and many swine, passed through ten states without difficulty of movement" (Sauer 1971, 283). The situation has been described in detail by Michael Williams in his recent history of American forests: "Much of the 'natural' forest remained, but the forest was not the vast, silent, unbroken, impenetrable, and dense tangle of trees beloved by many writers in their romantic accounts of the forest wilderness" (1989b, 33). "The result was a forest of large, widely spaced trees, few shrubs, and much grass and herbage …. Selective Indian burning thus promoted the mosaic quality of New England ecosystems, creating forests in many different states of ecological succession" (Cronon 1983, 49–51).

The extent, frequency, and impact of Indian burning is not without controversy. Raup (1937) argued that climatic change rather than Indian

burning could account for certain vegetation changes. Emily Russell (1983), assessing pre-1700 information for the Northeast, concluded that: "There is no strong evidence that Indians purposely burned large areas," but Indians did "increase the frequency of fires above the low numbers caused by lightning," creating an open forest. But then Russell adds: "In most areas climate and soil probably played the major role in determining the precolonial forests." She regards Indian fires as mainly accidental and "merely" augmental to natural fires, and she discounts the reliability of many early accounts of burning.

Forman and Russell (1983, 5) expand the argument to North America in general: "regular and widespread Indian burning (Day 1953) [is] an unlikely hypothesis that regretfully has been accepted in the popular literature and consciousness." This conclusion, I believe, is unwarranted given reports of the extent of prehistoric human burning in North America and Australia (Lewis 1982), and Europe (Patterson and Sassaman 1988, 130), and by my own and other observations on current Indian and peasant burning in Central America and South America; when unrestrained, people burn frequently and for many reasons. For the Northeast, Patterson and Sassaman (1988, 129) found that sedimentary charcoal accumulations were greatest where Indian populations were greatest.

Elsewhere in North America, the Southeast is much more fire prone than is the Northeast, with human ignitions being especially important in winter (Taylor 1981). The Berkeley geographer and Indianist Erhard Rostlund (1957, 1960) argued that Indian clearing and burning created many grasslands within mostly open forest in the so-called "prairie belt" of Alabama. As improbable as it may seem, Lewis (1982) found Indian burning in the subarctic, and Dobyns (1981) in the Sonoran desert. The characteristics and impacts of fires set by Indians varied regionally and locally with demography, resource management techniques, and environment, but such fires clearly had different vegetation impacts than did natural fires owing to differences in frequency, regularity, and seasonality.

Forest Composition

In North America, burning not only maintained open forest and small meadows but also encouraged fire-tolerant and sun-loving species. "Fire created conditions favorable to strawberries, blackberries, raspberries, and other gatherable foods" (Cronon 1983, 51). Other useful plants were saved, protected, planted, and transplanted, such as American chestnut, Canada plum, Kentucky coffee tree, groundnut, and leek

(Day 1953, 339–40). Gilmore (1931) described the dispersal of several native plants by Indians. Mixed stands were converted to single species dominants, including various pines and oaks, sequoia, Douglas fir, spruce, and aspen (M. Williams 1989a, 47–48). The longleaf, slash pine, and scrub oak forests of the Southeast are almost certainly an anthropogenic subclimax created originally by Indian burning, replaced in early Colonial times by mixed hardwoods, and maintained in part by fires set by subsequent farmers and woodlot owners (Garren 1943). Lightning fires can account for some fire-climax vegetation, but Indian burning would have extended and maintained such vegetation (Silver 1990, 17–19, 59–64).

Even in the humid tropics, where natural fires are rare, human fires can dramatically influence forest composition. A good example is the pine forests of Nicaragua (Denevan 1961). Open pine stands occur both in the northern highlands (below 5,000 feet) and in the eastern (Miskito) lowlands, where warm temperatures and heavy rainfall generally favor mixed tropical montane forest or rain forest. The extensive pine forests of Guatemala and Mexico primarily grow in cooler and drier, higher elevations, where they are in large part natural and prehuman (Watts and Bradbury 1982, 59). Pine forests were definitely present in Nicaragua when Europeans arrived. They were found in areas where Indian settlement was substantial, but not in the eastern mountains where Indian densities were sparse. The eastern boundary of the highland pines seems to have moved with an eastern settlement frontier that has fluctuated back and forth since prehistory. The pines occur today where there has been clearing followed by regular burning and the same is likely in the past. The Nicaraguan pines are fire tolerant once mature, and large numbers of seedlings survive to maturity if they can escape fire during their first three to seven years (Denevan 1961, 280). Where settlement has been abandoned and fire ceases, mixed hardwoods gradually replace pines. This succession is likely similar where pines occur else-where at low elevations in tropical Central America, the Caribbean, and Mexico.

Midwest Prairies and Tropical Savannas

Sauer (1950, 1958, 1975) argued early and often that the great grass-lands and savannas of the New World were of anthropogenic rather than climatic origin, that rainfall was generally sufficient to support trees. Even nonagricultural Indians expanded what may have been pockets of natural, edaphic grasslands at the expense of forest. A fire burning to the edge of a grass/

forest boundary will penetrate the drier forest margin and push back the edge, even if the forest itself is not consumed (Mueller-Dombois 1981, 164). Grassland can therefore advance significantly in the wake of hundreds of years of annual fires. Lightning-set fires can have a similar impact, but more slowly if less frequent than human fires, as in the wet tropics.

… Most ecologists now believe that the eastern prairies "would have mostly disappeared if it had not been for the nearly annual burning of these grasslands by the North American Indians," during the last 5,000 years. A case in point is the nineteenth-century invasion of many grasslands by forests after fire had been suppressed in Wisconsin, Illinois, Kansas, Nebraska, and elsewhere (M. Williams 1989a, 46).

The large savannas of South America are also controversial as to origin. Much, if not most of the open vegetation of the Orinoco Llanos, the Llanos de Mojos of Bolivia, the Pantanal of Mato Grosso, the Bolívar savannas of Colombia, the Guayas savannas of coastal Ecuador, the *campo cerrado* of central Brazil, and the coastal savannas north of the Amazon, is of natural origin. The vast *campos cerrados* occupy extremely senile, often toxic oxisols. The seasonally inundated savannas of Bolivia, Brazil, Guayas, and the Orinoco owe their existence to the intolerance of woody species to the extreme alternation of lengthy flooding or waterlogging and severe desiccation during a long dry season. These savannas, however, were and are burned by Indians and ranchers, and such fires have expanded the savannas into the forests to an unknown extent. It is now very difficult to determine where a natural forest/savanna boundary once was located (Hills and Randall 1968; Medina 1980).

Other small savannas have been cut out of the rainforest by Indian farmers and then maintained by burning. An example is the Gran Pajonal in the Andean foothills in east-central Peru, where dozens of small grasslands (*pajonales*) have been created by Campa Indians – a process clearly documented by air photos (Scott 1978). *Pajonales* were in existence when the region was first penetrated by Franciscan missionary explorers in 1733.

The impact of human activity is nicely illustrated by vegetational changes in the basins of the San Jorge, Cauca, and Sinú rivers of northern Colombia. The southern sector, which was mainly savanna when first observed in the sixteenth century, had reverted to rainforest by about 1750 following Indian decline, and had been reconverted to savanna for pasture by 1950 (Gordon 1957, map p. 69). Sauer (1966, 285–88; 1975, 8) and Bennett (1968, 53–55) cite early descriptions of numerous savannas in Panama in the sixteenth century. Balboa's first view of the Pacific was from a "treeless ridge," now probably forested. Indian settlement and agricultural fields were common at the time, and with their decline the rainforest returned.

Anthropogenic Tropical Rain Forest

The tropical rain forest has long had a reputation for being pristine, whether in 1492 or 1992. There is, however, increasing evidence that the forests of Amazonia and elsewhere are largely anthropogenic in form and composition. Sauer (1958, 105) said as much at the Ninth Pacific Science Congress in 1957 when he challenged the statement of tropical botanist Paul Richards that, until recently, the tropical forests have been largely uninhabited, and that prehistoric people had "no more influence on the vegetation than any of the other animal inhabitants." Sauer countered that Indian burning, swiddens, and manipulation of composition had extensively modified the tropical forest.

"Indeed, in much of Amazonia, it is difficult to find soils that are not studded with charcoal" (Uhl et al. 1990, 30)….

The Amazon forest is a mosaic of different ages, structure, and composition resulting from local habitat conditions and disturbance dynamics (Haffer 1991). Natural disturbances (tree falls, landslides, river activity) have been considerably augmented by human activity, particularly by shifting cultivation. Even a small number of swidden farmers can have a widespread impact in a relatively short period of time….

Indian modification of tropical forests is not limited to clearing and burning. Large expanses of Latin American forests are humanized forests in which the kinds, numbers, and distributions of useful species are managed by human populations.

…There are no virgin tropical forests today, nor were there in 1492.

Wildlife

The indigenous impact on wildlife is equivocal. The thesis that "overkill" hunting caused the extinction of some large mammals in North America during the late Pleistocene, as well as subsequent local and regional depletions (Martin 1978, 167–72), remains controversial. By the time of the arrival of Cortéz in 1519, the dense populations of Central Mexico apparently had greatly reduced the number of large game, given reports that "they eat any living thing" (Cook and Borah 1971–79, (3) 135, 140). In Amazonia, local game depletion apparently increases with village size and duration (Good 1987). Hunting procedures in many regions seem, however, to have allowed for recovery because of the "resting" of hunting zones intentionally or as a result of shifting of village sites.

On the other hand, forest disturbance increased herbaceous forage and edge effect, and hence the numbers of some animals (Thompson and Smith 1970, 261–64). "Indians created ideal habitats for a host of wildlife species … exactly those species whose abundance so impressed English colonists: elk, deer, beaver, hare, porcupine, turkey, quail, ruffed grouse, and so on" (Cronon 1983, 51). White-tailed deer, peccary, birds, and other game increases in swiddens and fallows in Yucatán and Panama (Bennett 1968; Gordon 1982, 96–112; Greenberg 1991). Rostlund (1960, 407) believed that the creation of grassy openings east of the Mississippi extended the range of the bison, whose numbers increased with Indian depopulation and reduced hunting pressure between 1540 and 1700, and subsequently declined under White pressure.

Agriculture

Fields and Associated Features

To observers in the sixteenth century, the most visible manifestation of the Native American landscape must have been the cultivated fields, which were concentrated around villages and houses. Most fields are ephemeral, their presence quickly erased when farmers migrate or die, but there are many eye-witness accounts of the great extent of Indian fields. On Hispaniola, Las Casas and Oviedo reported individual fields with thousands of *montones* (Sturtevant 1961, 73). These were manioc and sweet potato mounds 3–4 m in circumference, of which apparently none have survived. In the Llanos de Mojos in Bolivia, the first explorers mentioned *percheles*, or corn cribs on pilings, numbering up to 700 in a single field, each holding 30–45 bushels of food (Denevan 1966, 98). In northern Florida in 1539, Hernando de Soto's army passed through numerous fields of maize, beans, and squash, their main source of provisions; in one sector, "great fields … were spread out as far as the eye could see across two leagues of the plain" (Garcilaso de la Vega 1980, (2) 182; also see Dobyns 1983, 135–46).

It is difficult to obtain a reliable overview from such descriptions. Aside from possible exaggeration, Europeans tended not to write about field size, production, or technology. More useful are various forms of relict fields and field features that persist for centuries and can still be recognized, measured, and excavated today. These extant features, including terraces, irrigation works, raised fields, sunken fields, drainage ditches, dams, reservoirs, diversion walls, and field borders number

in the millions and are distributed throughout the Americas (Denevan 1980; see also Doolittle 1992; Whitmore and Turner 1992). For example, about 500,000 ha of abandoned raised fields survive in the San Jorge Basin of northern Colombia (Plazas and Falchetti 1987, 485), and at least 600,000 ha of terracing, mostly of prehistoric origin, occur in the Peruvian Andes (Denevan 1988, 20). There are 19,000 ha of visible raised fields in just the sustaining area of Tiwanaku at Lake Titicaca (Kolata 1991, 109) and there were about 12,000 ha of *chinampas* (raised fields) around the Aztec capital of Tenochtitlán (Sanders et al. 1979, 390). Complex canal systems on the north coast of Peru and in the Salt River Valley in Arizona irrigated more land in prehistory than is cultivated today. About 175 sites of Indian garden beds, up to several hundred acres each, have been reported in Wisconsin (Gartner 1992). These various remnant fields probably represent less than 25 percent of what once existed, most being buried under sediment or destroyed by erosion, urbanization, plowing, and bulldozing. On the other hand, an inadequate effort has been made to search for ancient fields.

Erosion

The size of native populations, associated deforestation, and prolonged intensive agriculture led to severe land degradation in some regions. Such a landscape was that of Central Mexico, where by 1519 food production pressures may have brought the Aztec civilization to the verge of collapse even without Spanish intervention (Cook and Borah 1971–79 (3), 129–76). There is good evidence that severe soil erosion was already widespread, rather than just the result of subsequent European plowing, livestock, and deforestation. Cook examined the association between erosional severity (gullies, barrancas, sand and silt deposits, and sheet erosion) and pre-Spanish population density or proximity to prehistoric Indian towns. He concluded that "an important cycle of erosion and deposition therefore accompanied intensive land use by huge primitive populations in central Mexico, and had gone far toward the devastation of the country before the white man arrived" (Cook 1949, 86).

Barbara Williams (1972, 618) describes widespread *tepetate*, an indurated substrate formation exposed by sheet erosion resulting from prehistoric agriculture, as "one of the dominant surface materials in the Valley of Mexico." On the other hand, anthropologist Melville (1990) argues that soil erosion in the Valle de Mezquital, just north of the Valley of Mexico, was the result of overgrazing by Spanish

livestock starting before 1600: "there is an almost total lack of evidence of environmental degradation before the last three decades of the sixteenth century." The Butzers, however, in an examination of Spanish land grants, grazing patterns, and soil and vegetation ecology, found that there was only light intrusion of Spanish livestock (sheep and cattle were moved frequently) into the southeastern Bajío near Mezquital until after 1590 and that any degradation in 1590 was "as much a matter of long-term Indian land use as it was of Spanish intrusion" (Butzer and Butzer 1993). The relative roles of Indian and early Spanish impacts in Mexico still need resolution; both were clearly significant but varied in time and place. Under the Spaniards, however, even with a greatly reduced population, the landscape in Mexico generally did not recover due to accelerating impacts from introduced sheep and cattle.

The Built Landscape

Settlement

The Spaniards and other Europeans were impressed by large flourishing Indian cities such as Tenochtitlán, Quito, and Cuzco, and they took note of the extensive ruins of older, abandoned cities such as Cahokia, Teotihuacán, Tikal, Chan Chan, and Tiwanaku (Hardoy 1968). Most of these cities contained more than 50,000 people. Less notable, or possibly more taken for granted, was rural settlement – small villages of a few thousand or a few hundred people, hamlets of a few families, and dispersed farmsteads. The numbers and locations of much of this settlement will never be known. With the rapid decline of native populations, the abandonment of houses and entire villages and the decay of perishable materials quickly obscured sites, especially in the tropical lowlands.

We do have some early listings of villages, especially for Mexico and Peru. Elsewhere, archaeology is telling us more than ethnohistory. After initially focusing on large temple and administrative centers, archaeologists are now examining rural sustaining areas, with remarkable results. See, for example, Sanders et al. (1979) on the Basin of Mexico, Culbert and Rice (1990) on the Maya lowlands, and Fowler (1989) on Cahokia in Illinois. Evidence of human occupation for the artistic Santarém Culture phase (Tapajós chiefdom) on the lower Amazon extends over thousands of square kilometers, with large nucleated settlements (Roosevelt 1991, 101–02).

Much of the rural precontact settlement was semi-dispersed (*rancherías*), particularly in densely populated regions of Mexico and the Andes, probably reflecting poor food transport efficiency. Houses were both single-family and communal (pueblos, Huron long houses, Amazon malocas). Construction was of stone, earth, adobe, daub and wattle, grass, hides, brush, and bark. Much of the dispersed settlement not destroyed by depopulation was concentrated by the Spaniards into compact grid/plaza style new towns (*congregaciones*, *reducciones*) for administrative purposes.

Mounds

James Parsons (1985, 161) has suggested that: "An apparent mania for earth moving, landscape engineering on a grand scale runs as a thread through much of New World prehistory." Large quantities of both earth and stone were transferred to create various raised and sunken features, such as agricultural landforms, settlement, and ritual mounds, and cause-ways.

Mounds of different shapes and sizes were constructed throughout the Americas for temples, burials, settlement, and as effigies. The stone pyramids of Mexico and the Andes are well known, but equal monuments of earth were built in the Amazon, the Midwest United States, and elsewhere. The Mississippian period complex of 104 mounds at Cahokia near East St. Louis supported 30,000 people; the largest, Monk's Mound, is currently 30.5 m high and covers 6.9 ha (Fowler 1989, 90, 192). Cahokia was the largest settlement north of the Río Grande until surpassed by New York City in 1775. An early survey estimated "at least 20,000 conical, linear, and effigy mounds" in Wisconsin (Stout 1911, 24). Overall, there must have been several hundred thousand artificial mounds in the Midwest and South. De Soto described such features still in use in 1539 (Silverberg 1968, 7). Thousands of settlement and other mounds dot the savanna landscape of Mojos in Bolivia (Denevan 1966). At the mouth of the Amazon on Marajó Island, one complex of 40 habitation mounds contained more than 10,000 people; one of these mounds is 20 m high while another is 90 ha in area (Roosevelt 1991, 31, 38).

Not all of the various earthworks scattered over the Americans were in use in 1492. Many had been long abandoned, but they constituted a conspicuous element of the landscape of 1492 and some are still prominent. Doubtless, many remain to be discovered, and others remain unrecognized as human or prehistoric features.

Roads, Causeways, and Trails

Large numbers of people and settlements necessitated extensive systems of overland travel routes to facilitate administration, trade, warfare, and social interaction (Hyslop 1984; Trombold 1991). Only hints of their former prominence survive. Many were simple traces across deserts or narrow paths cut into forests. A suggestion as to the importance of Amazon forest trails is the existence of more than 500 km of trail maintained by a single Kayapó village today (Posey 1985, 149). Some prehistoric footpaths were so intensively used for so long that they were incised into the ground and are still detectable, as has recently been described in Costa Rica (Sheets and Sever 1991).

Improved roads, at times stone-lined and drained, were constructed over great distances in the realms of the high civilizations. The Inca road network is estimated to have measured about 40,000 km, extending from southern Colombia to central Chile (Hyslop 1984, 224). Prehistoric causeways (raised roads) were built in the tropical lowlands (Denevan 1991); one Maya causeway is 100 km long, and there are more than 1,600 km of causeways in the Llanos de Mojos. Humboldt reported large prehistoric causeways in the Orinoco Llanos. Ferdinand Columbus described roads on Puerto Rico in 1493. Gaspar de Carvajal, traveling down the Amazon with Orellana in 1541, reported "highways" penetrating the forest from river bank villages. Joseph de Acosta (1880, (1) 171) in 1590 said that between Peru and Brazil, there were "waies as much beaten as those betwixt Salamanca and Valladolid." Prehistoric roads in Chaco Canyon, New Mexico are described in Trombold (1991). Some routes were so well established and located that they have remained roads to this day.

Recovery

A strong case can be made for significant environmental recovery and reduction of cultural features by the late eighteenth century as a result of Indian population decline. Henry Thoreau (1949, 132–37) believed, based on his reading of William Wood, that the New England forests of 1633 were more open, more park-like, with more berries and more wildlife, than Thoreau observed in 1855. Cronon (1983, 108), Pyne (1982, 51), Silver (1990, 104), Martin (1978, 181–82), and [M.] Williams (1989a) all maintain that the eastern forests recovered and filled in as a result of Indian depopulation, field abandonment, and reduction in burning. While probably correct, these writers give few specific examples,

so further research is needed. The sixteenth-century fields and savannas of Colombia and Central America also had reverted to forest within 150 years after abandonment (Bennett 1968, 54; Parsons 1975, 30–31). On his fourth voyage in 1502–03, Columbus sailed along the north coast of Panama (Veragua). His son Ferdinand described lands which were well-peopled, full of houses, with many fields, and open with few trees. In contrast, in 1681 Lionel Wafer found most of the Caribbean coast of Panama forest covered and unpopulated. On the Pacific side in the eighteenth century, savannas were seldom mentioned; the main economic activity was the logging of tropical cedar, a tree that grows on the sites of abandoned fields and other disturbances (Sauer 1966, 132–33, 287–88). An earlier oscillation from forest destruction to recovery in the Yucatán is instructive. Whitmore et al. (1990, 35) estimate that the Maya had modified 75 percent of the environment by A.D. 800, and that following the Mayan collapse, forest recovery in the central lowlands was nearly complete when the Spaniards arrived.

The pace of forest regeneration, however, varied across the New World. Much of the southeastern United States remained treeless in the 1750s according to Rostlund (1957, 408, 409). He notes that the tangled brush that ensnarled the "Wilderness Campaign of 1864 in Virginia occupied the same land as did Captain John Smith's 'open groves with much good ground between without any shrubs'" in 1624; vegetation had only partially recovered over 240 years. The Kentucky barrens in contrast were largely reforested by the early nineteenth century (Sauer 1963, 30). The Alabama Black Belt vegetation was described by William Bartram in the 1770s as a mixture of forest and grassy plains, but by the nineteenth century, there was only 10 percent prairie and even less in some counties (Rostlund 1957, 393, 401–03). Sections of coastal forests never recovered, given colonist pressures, but Sale's (1990, 291) claim that "the English were well along in the process of eliminating the ancient Eastern woodlands from Maine to the Mississippi" in the first one hundred years is an exaggeration.

Wildlife also partially recovered in eastern North America with reduced hunting pressure from Indians; however, this is also a story yet to be worked out. The white-tailed deer apparently declined in numbers, probably reflecting reforestation plus competition from livestock. Commercial hunting was a factor on the coast with 80,000 deer skins being shipped out yearly from Charleston by 1730 (Silver 1990, 92). Massachusetts enacted a closed season on deer as early as 1694, and in 1718 there was a three-year moratorium on deer hunting (Cronon 1983, 100). Sale (1990, 290) believes that beaver were depleted in the Northeast by 1640. Other fur bearers, game birds, elk, buffalo, and car-

nivores were also targeted by white hunters, but much game probably was in the process of recovery in many eastern areas until a general reversal after 1700–50.

As agricultural fields changed to scrub and forest, earthworks were grown over. All the raised fields in Yucatán and South America were abandoned. A large portion of the agricultural terraces in the Americas were abandoned in the early colonial period (Donkin 1979, 35–38). In the Colca Valley of Peru, measurement on air photos indicates 61 percent terrace abandonment (Denevan 1988, 28). Societies vanished or declined everywhere and whole villages with them. The degree to which settlement features were swallowed up by vegetation, sediment, and erosion is indicated by the difficulty of finding them today. Machu Picchu, a late prehistoric site, was not rediscovered until 1911.

The renewal of human impact also varied regionally, coming with the Revolutionary War in North America, with the rubber boom in Amazonia, and with the expansion of coffee in southern Brazil (1840–1930). The swamp lands of Gulf Coast Mexico and the Guayas Basin of Ecuador remained hostile environments to Europeans until well into the nineteenth century or later (Mathewson 1987; Siemens 1990). On the other hand, Highland Mexico-Guatemala and the Andes, with greater Indian survival and with the establishment of haciendas and intensive mining, show less evidence of environmental recovery. Similarly, Indian fields in the Caribbean were rapidly replaced by European livestock and sugar plantation systems, inhibiting any sufficient recovery. The same is true of the sugar zone of coastal Brazil.

Conclusions

By 1492, Indian activity had modified vegetation and wildlife, caused erosion, and created earthworks, roads, and settlements throughout the Americas. This may be obvious, but the human imprint was much more ubiquitous and enduring than is usually realized. The historical evidence is ample, as are data from surviving earthworks and archaeology. And much can be inferred from present human impacts. The weight of evidence suggests that Indian populations were large, not only in Mexico and the Andes, but also in seemingly unattractive habitats such as the rain forests of Amazonia, the swamps of Mojos, and the deserts of Arizona.

Clearly, the most humanized landscapes of the Americas existed in those highland regions where people were the most numerous. Here were the large states, characterized by urban centers, road systems, intensive agriculture, a dispersed but relatively dense rural settlement

pattern of hamlets and farmsteads, and widespread vegetation and soil modification and wildlife depletion. There were other, smaller regions that shared some of these characteristics, such as the Pueblo lands in the southwestern United States, the Sabana de Bogotá in highland Colombia, and the central Amazon floodplain, where built landscapes were locally dramatic and are still observable. Finally, there were the immense grasslands, deserts, mountains, and forests elsewhere, with populations that were sparse or moderate, with landscape impacts that mostly were ephemeral or not obvious but nevertheless significant, particularly for vegetation and wildlife, as in Amazonia and the northeastern United States. In addition, landscapes from the more distant past survived to 1492 and even to 1992, such as those of the irrigation states of north coast Peru, the Classic Maya, the Mississippian mound builders, and the Tiwanaku Empire of Lake Titicaca.

This essay has ranged over the hemisphere, an enormous area, making generalizations about and providing examples of Indian landscape transformation as of 1492. Examples of some of the surviving cultural features are shown in [Map 1.1]. Ideally, a series of hemispheric maps should be provided to portray the spatial patterns of the different types of impacts and cultural features, but such maps are not feasible nor would they be accurate given present knowledge. There are a few relevant regional maps, however, that can be referred to. For example, see Butzer (1990, 33, 45) for Indian settlement structures/mounds and subsistence patterns in the United States; Donkin (1979, 23) for agricultural terracing; Doolittle (1990, 109) for canal irrigation in Mexico; Parsons and Denevan (1967) for raised fields in South America; Trombold (1991) for various road networks; Hyslop (1984, 4) for the Inca roads; Hardoy (1968, 49) for the most intense urbanization in Latin America; and Gordon (1957, 69) for anthropogenic savannas in northern Colombia.

The pristine myth cannot be laid at the feet of Columbus. While he spoke of "Paradise," his was clearly a humanized paradise. He described Hispaniola and Tortuga as densely populated and "completely cultivated like the countryside around Cordoba" (Colón 1976, 165). He also noted that "the islands are not so thickly wooded as to be impassible," suggesting openings from clearing and burning (Columbus 1961, 5).

The roots of the pristine myth lie in part with early observers unaware of human impacts that may be obvious to scholars today, particularly for vegetation and wildlife. But even many earthworks such as raised fields have only recently been discovered (Denevan 1966; 1980). Equally important, most of our eyewitness descriptions of wilderness and empty lands come from a later time, particularly 1750–1850 when interior lands began to be explored and occupied by Europeans. By 1650, Indian

Map 1.1 Selected features of the prehistoric cultural landscape. Some cities and agricultural works had been abandoned by 1492. The approximate limit of agriculture and the distribution of terraces from Donkin, R. A. et. al. 1979, © University of Arizona Press.

populations in the hemisphere had been reduced by about 90 percent, while by 1750 European numbers were not yet substantial and settlements had only begun to expand. As a result, fields had been abandoned, while settlements vanished, forests recovered, and savannas retreated. The landscape did appear to be a sparsely populated wilderness. This is the image conveyed by Parkman in the nineteenth century, Bakeless in

1950, and Shetler as recently as 1991. There was some European impact, of course, but it was localized. After 1750 and especially after 1850, populations greatly expanded, resources were more intensively exploited, and European modification of the environment accelerated, continuing to the present.

It is possible to conclude not only that "the virgin forest was not encountered in the sixteenth and seventeenth centuries; [but that] it was invented in the late eighteenth and early nineteenth centuries" (Pyne 1982, 46). However, "paradoxical as it may seem, there was undoubtedly much more 'forest primeval' in 1850 than in 1650" (Rostlund 1957, 409). Thus the "invention" of an earlier wilderness is in part understandable and is not simply a deliberate creation which ennobled the American enterprise, as suggested by Bowden (1992, 20–23). In any event, while pre-European landscape alteration has been demonstrated previously, including by several geographers, the case has mainly been made for vegetation and mainly for eastern North America. As shown here, the argument is also applicable to most of the rest of the New World, including the humid tropics, and involves much more than vegetation.

The human impact on environment is not simply a process of increasing change or degradation in response to linear population growth and economic expansion. It is instead interrupted by periods of reversal and ecological rehabilitation as cultures collapse, populations decline, wars occur, and habitats are abandoned. Impacts may be constructive, benign, or degenerative (all subjective concepts), but change is continual at variable rates and in different directions. Even mild impacts and slow changes are cumulative, and the long-term effects can be dramatic. Is it possible that the thousands of years of human activity before Columbus created more change in the visible landscape than has occurred subsequently with European settlement and resource exploitation? The answer is probably yes for most regions for the next 250 years or so, and for some regions right up to the present time. American flora, fauna, and landscape were slowly Europeanized after 1492, but before that they had already been Indianized. "It is upon this imprint that the more familiar Euro-American landscape was grafted, rather than created anew" (Butzer 1990, 28). What does all this mean for protectionist tendencies today? Much of what is protected or proposed to be protected from human disturbance had native people present, and environmental modification occurred accordingly and in part is still detectable.

The pristine image of 1492 seems to be a myth, then, an image more applicable to 1750, following Indian decline, although recovery had only been partial by that date. There is some substance to this argument, and

it should hold up under the scrutiny of further investigation of the considerable evidence available, both written and in the ground.

Acknowledgments

The field and library research that provided the background for this essay was undertaken over many years in Latin America, Berkeley, and Madison. Mentors who have been particularly influential are Carl O. Sauer, Erhard Rostlund, James J. Parsons, and Woodrow Borah, all investigators of topics discussed here.

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Documents

Richard Nelson, "The Watchful World"

(Extract from *Make Prayers to the Raven: A Koyukon View of the Northern Forest*. Chicago and London: University of Chicago Press, 1983: 14–32.)

Because most pre-Columbian Indians did not have a written language, there are few primary sources that describe their understandings of the natural world. For this reason, we're going to turn first to an anthropologist's account of one Native nation and their views on nature. Technically, what we are looking at here is a secondary source, which describes how American Indian hunters, the Koyukon people of Alaska, understood the natural world.

There are at least two limitations to the usefulness of this document. First, it is by a white anthropologist, Richard Nelson, so we must remind ourselves that we are actually receiving this account of the Koyukon world view second hand. Nelson often quotes Koyukon people's descriptions of their beliefs from interviews he had with them (these appear in italics). But he also quotes his own thoughts as recorded in his journal during his research (these appear in roman, and end with "Huslia Journal," and the date of the entry). Be careful not to confuse the two.

Second, Nelson was describing Koyukon beliefs of the 1970s. To assume that Indian beliefs of the distant past were similar to the 1970's Koyukon views is risky. Indian peoples were and are culturally diverse. Just because a community

of people in Alaska thought in particular ways in the 1970s does not mean that their ancestors of centuries back, much less Indians living thousands of miles away at the same time, thought similarly. (Would your beliefs about religion and nature be a good indicator of the convictions of your ancestors in, say, 1490?) Nevertheless, other evidence suggests that historical Indian beliefs had many parallels to Koyukon religion. Richard Nelson provides us with a coherent interpretation of Indian natural understandings, and for this reason his account remains one of the most useful introductions to the subject.

Nelson describes a perception of nature that was alive and well at the time he lived amongst the Koyukon. The way of life and world view he describes are in fact still vigorous, especially in the remote reaches of Alaska, the Canadian north, and in places in the continental United States. In this sense, the cultural world he sketches for us here is part of modern America – thinking about it as just "history" would mean missing one of the most important insights which environmental history has to offer: that not all people think about nature in the same way. Nelson is attempting to present us with a view of nature through Koyukon eyes. Whatever else we say about his interpretation, there is no doubt that Koyukon people see the natural world as a universe of spirits, most of them having great and potentially dangerous powers. Environmental history often leads us, in surprising ways, to the connections between peoples and their creators.

What in the Koyukon view of nature strikes you as different from your own understandings of nature? Is the Koyukon world generally more "natural" than your world? And is "nature" one thing among the Koyukon? Is nature separate from other parts of the Koyukon world? Or do its distinctive entities, spirits, presences, and forces infuse all aspects of Koyukon life? Do different parts of Koyukon nature have different meanings?

* * *

There's always things in the air that watch us

A Way of Seeing

… Traditional Koyukon people live in a world that watches, in a forest of eyes. A person moving through nature – however wild, remote, even desolate the place may be – is never truly alone. The surroundings are aware, sensate, personified. They feel. They can be offended. And they must, at every moment, be treated with proper respect. All things in nature have a special kind of life, something unknown to contemporary Euro-Americans, something powerful ….

Over a span of millennia, the Koyukon people and their ancestors have sustained themselves directly from their surroundings. The intimacy of their relationship to nature is far beyond our experience – the physical dependence and the intense emotional interplay with a world that cannot be directly altered to serve the needs of humanity. This close daily interaction and dependence upon an omnipotent natural universe has profound importance to the Koyukon people and provides a theme upon which their cultural lives converge.

Koyukon perceptions of nature are aligned on two interconnected levels. The first of these is empirical knowledge. The practical challenges of survival by hunting, fishing, and gathering require a deep objective understanding of the environment and the methods for utilizing its resources. In short, the Koyukon people are sophisticated natural historians, especially well versed in animal behavior and ecology.

But their perception of the natural environment extends beyond what Westerners define as the empirical level, into the realm of the spiritual. The Koyukon inherit an elaborate system of supernatural concepts for explaining and manipulating the environment. From this perspective the natural and supernatural worlds are inseparable, and environmental events are often caused or influenced by spiritual forces. Detailed explanations are provided for the origin of natural entities and for the causation of natural events (which seldom, if ever, take place purely by chance). Furthermore, behavior toward nature is governed by an array of supernaturally based rules that ensure the well-being of both humans and the environment.

It is important to understand that Koyukon beliefs about nature are as logical and consistent as they are powerful, but that they differ substantially from those prevailing in modern Western societies. Our own tradition envisions the universe as a system whose functioning can be explained through rationalistic and scientific means. The natural and supernatural worlds are clearly separated. Environmental events are caused by ongoing evolutionary and ecological processes, or else they happen purely by chance. Finally, modern Western cultures regulate human behavior toward nature and its resources primarily on the basis of practical rather than religious considerations.

For the traditional Koyukon Athapaskans, ideology is a fundamental element of subsistence, as important as the more tangible practicalities of harvesting and utilizing natural resources. Most interactions with natural entities are governed in some way by a moral code that maintains a proper spiritual balance between the human and nonhuman worlds. This is not an esoteric abstraction, but a matter of direct, daily concern to the Koyukon people. Failure to behave according to the dictates of this

code can have an immediate impact on the violator's health or success. And so, when Koyukon people carry out their subsistence activities they make many decisions on the basis of supernatural concerns. The world is ever aware.

From the Distant Time

As the Koyukon reckon it, all things human and natural go back to a time called *'adonts'idnee*, which is so remote that no one can explain or understand how long ago it really was. But however ancient this time may be, its events are recounted accurately and in great detail through a prodigious number of stories. *'adonts'idnee* (literally, "in Distant Time it is said") is the Koyukon word for these stories, but following from its conversational use I will translate it simply as Distant Time.

The stories constitute an oral history of the Koyukon people and their environment, beginning in an age before the present order of existence was established. During this age "the animals were human" – that is, they had human form, they lived in a human society, and they spoke human (Koyukon) language. At some point in the Distant Time certain humans died and were transformed into animal or plant beings, the species that inhabit Koyukon country today. These dreamlike meta-morphoses left a residue of human qualities and personality traits in the north-woods creatures.

Taken together, the Distant Time stories describe a primordial world and its transfiguration into modern form. Some are so long that a single narration may require many evenings, even several weeks of evenings, for a complete telling. Stories of this kind – widely known as legends, myths, or folklore – are found throughout North America and elsewhere. It is common practice, however, to vastly underrate their significance in the lives of people like the Koyukon. They are not regarded as simple entertainment (though they are appreciated as such), and they are certainly not considered fictional. Stories of the Distant Time are, first of all, an accounting of origins. They are a Koyukon version of Genesis, or perhaps of Darwin. Woven into the plots of many stories are innumerable subplots or asides, which often describe the origins of natural entities.

The scope of Distant Time stories ranges from the minute to the cosmological. They explain the beginnings of entities that inhabit the sky – the sun, moon, and aurora. They account for certain weather phenomena, such as thunderstorms, which are the transformed embodiment of a formerly human spirit. For this reason thunderstorms have conscious-

ness and can be turned away by people who know how to influence them. Features of the earth, such as prominent hills or mountains, are also given some accounting in these stories. For example, a hill near Huslia is called "Giant's Firemakers" (*Yiłkuh tł' aala'*), because it was formed when a giant man lost his flints there.

A central figure in this ancient world was the Raven (it is unclear, perhaps irrelevant, whether there was one Raven or many), who was its creator and who engineered many of its metamorphoses. Raven, the contradiction – omnipotent clown, benevolent mischief-maker, buffoon, and deity. It was he, transformed into a spruce needle, who was swallowed by a woman so she would give birth to him as a boy. When the boy was old enough to play, he took from beneath a blanket in her house the missing sun and rolled it to the door. Once outside, he became Raven again and flew up to return the sun to the sky, making the earth light again.

And it was he who manipulated the natural design to suit his whim or fancy. When he first created the earth, for example, the rivers ran both ways, upstream on one side and downstream on the other. But this made life too easy for humans, he decided, because their boats could drift along in either direction without paddling. So Raven altered his creation and made the rivers flow only one way, which is how they remain today.

There are hundreds of stories explaining the behavior and appearance of living things. Most of these are about animals and a few are about plants. No species is too insignificant to be mentioned, but importance in the Koyukon economy does not assure a prominent place in the stories. Many of the stories about animal origins are like this one:

> *When the burbot* [ling cod] *was human, he decided to leave the land and become a water animal. So he started down the bank, taking a piece of bear fat with him. But the other animal people wanted him to stay and tried to hold him back, stretching him all out of shape in the process. This is why the burbot has such a long, stretched-out body, and why its liver is rich and oily like the bear fat its ancestor carried to the water long ago.*

At the end of Distant Time there was a great catastrophe. The entire earth was covered by a flood, and under the Raven's supervision a pair of each species went aboard a raft. These plants and animals survived, but when the flood ended they could no longer behave like people. All the Distant Time humans had been killed, and so Raven recreated people in their present form. My Koyukon teachers were well aware of the biblical parallel in this story, and they took it as added evidence of the story's accuracy. None suggested that it might be a reinterpretation of Christian teaching.

Distant Time stories were usually told by older people who had memorized the lengthy epics and could best interpret them. But children were also taught stories, simpler ones that they were encouraged to tell, especially as they began to catch game. Doing this after setting out their traps or snares would please the animals and make them willing to be caught.

Today's elders can recall the long evenings of their youth, when Distant Time stories made the hours of darkness pass easily. In those days houses were lit by burning bear grease in a shallow bowl with a wick, or by burning long wands of split wood, one after another. Bear grease was scarce, and the handheld wands were inconvenient, so in midwinter the dwellings were often dark after twilight faded. Faced with long wakeful hours in the blackness, people crawled into their warm beds and listened to the recounting of stories.

The narratives were reserved for late fall and the first half of winter, because they were tabooed after the days began lengthening. Not surprisingly, the teller finished each story by commenting that he or she had shortened the winter: "I thought that winter had just begun, but now I have chewed off part of it." Or, more optimistically, "When I woke up in the morning, my cabin was just dripping with water!" In this case the narrator implies that the spring thaw has suddenly begun.

Distant Time stories also provide the Koyukon with a foundation for understanding the natural world and humanity's proper relationship to it. When people discuss the plants, animals, or physical environment they often refer to the stories. Here they find explanations for the full range of natural phenomena, down to the smallest details. In one story a snowshoe hare was attacked by the hawk owl, which was so small that it only managed to make a little wound in its victim's shoulder. Koyukon people point out a tiny notch in the hare's scapula as evidence that the Distant Time events really took place.

The narratives also provide an extensive code of proper behavior toward the environment and its resources. They contain many episodes showing that certain kinds of actions toward nature can have bad consequences, and these are taken as guidelines to follow today. Stories therefore serve as a medium for instructing young people in the traditional code and as an infallible standard of conduct for everyone.

> *Nobody made it up, these things we're supposed to do. It came from the stories; it's just like our Bible. My grandfather said he told the stories because they would bring the people good luck, keep them healthy, and make a good life. When he came to songs in the stories, he sang them like they were hymns.*

The most important parts of the code are taboos (*hutłaanee*), prohibitions against acting certain ways toward nature. For example, in one

story a salmon-woman was scraping skins at night with her upper jaw, and while doing this she was killed. This is why it is taboo for women to scrape hides during the night. Hundreds of such taboos exist, and a person who violates them (or someone in the immediate family) may suffer bad luck in subsistence activities, clumsiness, illness, accident, or early death. In Koyukuk River villages it is a rare day when someone is not heard saying, "*Hutlanee!*" ("It's taboo!").

Personalities in Nature

Stories of the Distant Time often portray the animal-people as having distinctive personalities, and this affects the way a species is regarded today. Often these personalities can be known only through the stories, because the animals do not visibly express them any longer. People sometimes have strong positive or negative feelings about particular species because of the way they are portrayed in the stories.

The sucker fish, for example, was a great thief in the Distant Time and so it is not well thought of. One man told me he could never bring himself to eat this fish, knowing what it had been and fearing that it would make a thief of him:

> *Even in springtime, sometimes we run short of food. But if we catch a sucker in the net, I just can't eat him.*

People will sometimes characterize someone by referring to an animal's personality. In fact, Jetté … writes that Yukon River Koyukon may inquire about a person by asking, "What animal is he?" Someone known as a thief may be described as "just like a sucker fish." When a person talks big, promises a lot but accomplishes little, or gets ahead by trickery, he or she is said to be "just like a raven." Although Raven is the creator, he is portrayed in the stories as a lazy trickster who usually finds a way to get ahead by the efforts of others. The Koyukon have a kind of jocular respect for ravens, mocking their personality but still awed by their spirit power.

When I asked about relatedness among animals, people usually answered with reference to their social behavior and personality. For example, a Distant Time story reveals that bears and porcupines are cousins, and people cite as proof their occasional sharing of a den. When relatedness is not mentioned in a story it may be revealed by a tendency to "get along." Muskrats and beavers often live close together and they eat the same kinds of plants, so they are considered relatives. Wolves may kill a loose dog, which shows that the two are not related.

Animal relationships are also shown by shared characteristics, but usually not those chosen by Western taxonomists. One story of the Distant Time says that all the smaller animals were related as sisters who lived together in an underground house. These included red squirrel, mink, fox, several owl species, short-tailed weasel, ptarmigan, and others. Another related group includes the four water mammals: otter, mink, beaver, and muskrat. Stories also reveal that the raven is mink's uncle. And in obviously paired species, the larger is considered the older brother to the smaller – brown bear to the black bear, for example, and flicker to the woodpecker.

The Koyukon people conceptualize a natural order, but its structure and foundation are quite different from our own. No one described to me a system of phylogeny or biological interrelatedness, but I did not probe this matter exhaustively and may have failed to ask the right questions. Such a system might exist, or perhaps the world's makeup is sufficiently explained in the stories.

The Place of Humans in a Natural Order

When Raven created humans, he first used rock for the raw materials, and people never died. But this was too easy so he recreated them, using dust instead. In this way humans became mortal, as they remain today.

How does humanity fit into the world of nature and the scheme of living things? For the Koyukon, humans and animals are clearly and qualitatively separated. Only the human possesses a soul (*nukk'ubidza*, "eye flutterer"), which people say is different from the animals' spirits. I never understood the differences, except that the human soul seems less vengeful and it alone enjoys immortality in a special place after death. The distinction between animals and people is less sharply drawn than in Western thought – the human organism, after all, was created by an animal's power.

The Koyukon seem to conceptualize humans and animals as very similar beings. This derives not so much from the animal nature of humans as from the human nature of animals. I noted earlier, for example, that today's animals once belonged to an essentially human society, and that transmutations between human and animal form were common. One of my Koyukon teachers said, however, that after the Distant Time people and animals became completely separate and unrelated.

Animals still possess qualities that Westerners consider exclusively human, though – they have a range of emotions, they have distinct per-

sonalities, they communicate among themselves, and they understand human behavior and language. They are constantly aware of what people say and do, and their presiding spirits are easily offended by disrespectful behavior. The interaction here is very intense, and the two orders of being coexist far more closely than in our own tradition. But animals do not use human language among themselves. They communicate with sounds which are considered their own form of language.

The closeness of animals to humans is reinforced by the fact that some animals are given funeral rituals following the basic form of those held for people, only on a smaller scale …. In these cases, at least, animal spirits are placated much as human souls are after death.

Most interesting of all is animal behavior interpreted to be religious. "Even animals have their taboos," a woman once told me. From her grandfather, she learned that gestating female beavers will not eat bark from the fork of a branch, because it is apparently tabooed for them. The late Chief Henry had told her of seeing a brown bear kill a ground squirrel, then tear out its heart, lungs, and windpipe and leave them on a rock. Again, the organs must have been taboo (*hutłaanee*) ….

Nature Spirits and Their Treatment

From the Distant Time stories, Koyukon people learn rules for proper conduct toward nature. But punishment for offenses against these rules is given by powerful spirits that are part of the living, present-day world. All animals, some plants, and some inanimate things have spirits, vaguely conceptualized essences that protect the welfare of their material counterparts. They are especially watchful for irreverent, insulting, or wasteful behavior toward living things. The spirits are not offended when people kill animals and use them, but they insist that these beings (or their remains) be treated with the deference owed to the sources of human life.

Not all spirits are possessed of equal power. Some animal species have very potent spirits called *biyeega hoolaanh*, which are easily provoked and highly vindictive. These dangerous spirits can bring serious harm to anyone who offends them, taking away luck in hunting or trapping and sometimes causing illness, disability, or even death. Animals possessed of such spirits include the brown bear, black bear, wolverine, lynx, wolf, and otter. The beaver and marmot have similarly powerful spirits but are not so vengeful.

The remaining mammals, birds, fish, and some plants and inanimate things have less powerful spirits. Although these are very real and

can inflict punishment (usually bad luck in taking the species), all my instructors agreed that no Koyukon word exists for this kind of spirit. In response to my perplexed questioning, one person explained:

> *The animal and its spirit are one in the same thing. When you name the animal you're also naming its spirit. That's why some animal names are hutłaanee – like the ones women shouldn't say – because calling the animal's name is like calling its spirit. Just like we don't say a person's name after they die … it would be calling their spirit and could be dangerous for whoever did it.*

While most Koyukon adults seem to concur on the basic premises of their ideology, they vary widely in their opinions about the specifics and apparently do not feel inclined toward a rigid, systematized theology. This often left me confused, no doubt because of my Judeo-Christian background; and if my account of certain concepts is amorphous or inconsistent it properly reflects my learning experience. Koyukon people must find us painfully compulsive and conformist about our systems of belief.

… When an animal is mistreated, I was told, its individual spirit is affronted but all members of its species may become aloof from the offender. In former times, shamans could manipulate spirits for the opposite effect. They made dream visits to "animal houses" that were filled with spirits of a particular animal, then attracted them to certain parts of the country to enrich the harvest there.

Many other supernatural beings inhabit the traditional Koyukon world … but these seem to have little importance today. Perhaps Christian teachings displaced or undermined these beliefs, unlike those concerned with spirits of natural entities. Devices used to catch and kill animals – such as nets, snares, and deadfalls – also have powerful spirits (*biy-eega hoolaanh*) with many associated taboos. Like the spirits of natural entities, these are still considered important today. For example, if a person borrows someone else's snare, he or she may take sick or die from its spirit power. Similarly, stealing a snared animal exposes the thief to grave danger from the spirits of both the snare and its catch.

Proper treatment of natural spirits involves hundreds of rules or taboos (*hutłaanee*), some applying to just one species and others having much more general effects. The rules fall into three main categories – first, treatment of living organisms; second, treatment of organisms (or parts of organisms) that are no longer alive; and third, treatment of nonliving entities or objects. I will briefly summarize these rules ….

Treatment of Living Organisms

Koyukon people follow some general rules in their behavior toward living animals. They avoid pointing at them, for example, because it shows disrespect, "like pointing or staring at a stranger." They also speak carefully about animals, especially avoiding boastful talk about hunting or trapping exploits.

A man who said he would trap many beavers was suddenly unable to catch any; and someone who bragged about bear hunting was later attacked and seriously hurt. In fact, bears are so powerful that every word spoken about them is carefully chosen. Trapped animals are also treated respectfully, and powerful ones like the wolf or wolverine may be addressed in special ways before they are killed. One man said that he always asks trapped animals for luck: "My animal, I hope that more of you will come my way."

Keeping wild animals as pets is also prohibited, except for species whose personality traits are valued in humans. A child who keeps a red fox will become mischievous, but if a boy raises a hawk owl he will acquire its hunting skill and cleanliness. People seldom keep pets, because they are likely to suffer, offending their spirits and causing illness or bad luck for those involved in their captivity. A woman told me of losing her small child about a year after the death of a baby hawk owl her family had kept. The tragic connection was clear.

Taking individual animals away to zoos, even catching and releasing them alive as part of studies, is a spiritual affront that can cause a species to shun the area. For this reason Koyukon people are opposed to wildlife research in their country if it involves live capture of animals.

> *We have respect for the animals. We don't keep them in cages or torture them, because we know the background of animals from the Distant Time. We know that the animal has a spirit – it used to be human – and we know all the things it did. It's not just an animal; it's lots more than that.*

Following from this, Koyukon people believe that animals must be treated humanely. The spirits are not offended because humans live by hunting, but people must try to kill without causing suffering and to avoid losing wounded animals. A starving moose, mired in deep snow near Huslia, was fed daily until it regained strength and could walk away. Once a man found a black bear with cubs, driven from their den by groundwater, hopelessly starving in the deep snow. He ended their suffering, then dismembered and covered their unusable carcasses,

lest he offend their spirits by killing without at least symbolic utilization. "We'll come back for this later," he told his companion, a placating remark that he knew he would not abide by.

Treatment of Killed Game

The rules for showing respect to killed animals and harvested plants are myriad. I will give some general principles and a few illustrations here.

> Today I was told about a man who had once jokingly stuffed debris into the opened jaws of a dried pike head nailed on a cabin door to ward off bad spirits. His companions were horrified that he would open himself to retaliation from the animal's spirit. "When you do something like that – when you don't show respect for animals – it's just like making fun of the Bible."
>
> [Huslia journal, March 1977]

The remains of animals and plants are treated with the deference owed to something sacred. For example, when fur animals (such as mink, beaver, or wolf) are brought inside the house for skinning, their names should not be mentioned, nothing should be burned lest the smell offend their spirits, metallic noises should be avoided, and even if it is unfrozen and skinned the carcass should be kept indoors overnight. One way to prevent difficulties is to plug the nostrils of smell-sensitive animals like mink by smearing lard on them. Cloth may also be wrapped around an animal's head to protect it from offensive noises.

> *I had bad luck with fox this year. Come to think of it, I was using noisy power tools while I had a fox in the house. Guess that's why … it's got really sensitive ears. When you get bad luck like this you just have to let it wear off. There's nothing else you can do.*

There are also rules for proper butchering of game – for example, certain cuts that should be made or avoided for a particular species. There are rules for proper care of meat, such as keeping all meat covered when it is outside, protecting it from scavengers or from any insinuation that it is not respected. And a multitude of rules govern who eats an animal or parts of it. Young adults and especially women of childbearing age are subject to a wide array of these ….

Finally, there are regulations to ensure that unusable parts of animals are respectfully disposed of. For example, bones of water animals such as beaver, muskrat, and mink should be cast into a lake or river. Bones of large land animals should be put in a dry place away from the village or

completely burned in a remote spot. And the remains of small animals ought to be hung in bushes or burned …. Adherence has declined today, but many people scrupulously avoid leaving animal remains to rot on the ground (especially where someone might walkover them) or mixing them with household trash.

Punishment for ignoring or violating these regulations depends on the power of the living thing and the gravity of the offense. Spirit vengeance can be as severe as death or decades of bad luck in catching a species. Disregarding the prohibitions against eating certain foods usually causes clumsiness or other physical problems. Only old people who no longer hunt can eat red-necked grebe, for instance, because this bird is awkward on land. A young person who ate it would become slow and clumsy or would have children with these shortcomings. I never understood whether animal spirits cause such "contagious" reactions, but the innumerable food taboos are generally respected as an important way of protecting health and well-being.

Many of the rules apply to everyone, regardless of age or sex. But a large number of special restrictions apply to women between puberty and menopause. Koyukon women are skilled and active providers – they hunt, fish, trap, and gather on their own or along with men. Although they are competent and productive, they are somewhat limited by their possession of special power that can easily alienate or offend natural spirits.

The menses (*hutlaa*) has its own spirit that contains the essence of femininity, and it can bring bad luck with animals, feminize men and alienate animals from them, or even cause sickness or death. To avoid these dangers, Koyukon women were traditionally secluded during menstruation (some pubescent girls are still briefly sequestered at the first menstruation), and they continue to follow a multitude of special taboos regulating their use of animals and their behavior toward them.

Spirits of the Physical World

Elements of the earth and sky are imbued with spirits and consciousness, much in the way of living things, and there are codes of proper behavior toward them. Certain landforms have special powers that must be placated or shown deference, for example. Even the weather is aware: if a man brags that storms or cold cannot stop him from doing something, "the weather will take care of him good!" It will humble him with its power, "because it knows."

In falltime you'll hear the lakes make loud cracking noises after they freeze. It means they're asking for snow to cover them up, to protect them from the cold. When my father told me this, he said everything has life in it. He always used to tell us that.

The earth itself is the source of a preeminent spiritual power called *sinh taala'* in Koyukon. This is the foundation of medicine power once used by shamans, and because of it the earth must be shown utmost respect. One person who was cured by medicine power years ago, for example, still abides by the shaman's instructions to avoid digging in the earth. Berry plants have special power because they are nurtured directly from the earth. "People are careful about things that grow close to the ground," I was told, "because the earth is so great."

The Manifestations of Luck

Luck is the powerful force that binds humanity to the nature spirits and their moral imperatives. For the Koyukon people, luck is a nearly tangible essence, an aura or condition that is "with" someone in certain circumstances or for particular purposes. Luck can be held permanently or it can be fleeting and elusive. It is an essential qualification for success – regardless of a person's skill, in the absence of luck there is no destiny except failure.

The source of luck is not clearly explained, but most people are apparently born with a certain measure of it. The difficulty is not so much in getting it as in keeping it. Luck is sustained by strictly following the rules of conduct toward natural things. People who lose their luck have clearly been punished by an offended spirit; people who possess luck are the beneficiaries of some force that creates it. Koyukon people express luck in the hunt by saying *bik'uhnaatltonh* – literally, "he has been taken care of."

If a person has good luck, catches game, it is because something created the world, and that is helping him to get what he needs.

Luck, or the absence of it, is specific to particular animals or even certain activities. A woman who violates tanning taboos may fail in preparing hides. Each person is possessed (or dispossessed) of luck for all the entities he or she interacts with. Thus a man told me that he had always been lucky hunting bears until he inadvertently treated one the wrong way. For many years afterward his luck was gone – he never took a

single bear. Finally the effect wore off and since regaining his luck he has killed at least one bear each season.

Luck can be passed along to others, but it is a lot like money. The one who gives it up may be left with nothing. To illustrate, when beaver snaring was made legal years ago, it was very hard for young people to learn how to do it. The older men knew but were reluctant to reveal their ways, because telling someone how to make a trapping set also gives him your luck. Eventually people reach an age of inactivity, when their measure of luck becomes superfluous. Then they can confer their luck on others by simply wishing it so. This is why children often present their first-killed game to elders, and why young hunters give liberal shares of their catch to old men who no longer go out onto the land.

Possessions like sleds, fishnets, rifles, or snowshoes are also infused with luck. A man lamented to me that one of his high-caliber rifles had failed to kill a bear coming out of its den although it was at close range. He had to use another gun to finish the animal. This gun was "out of luck," he explained, and he suspected that a young woman had rendered it useless by stepping over it.

Putting on another person's mittens can either take away his luck or give him yours. Once I was traveling with a man whose hands became painfully cold, so I offered him my extra mittens. He finally took them, explaining that since I was leaving Huslia I could get along without luck in things like trapping. But a short while later he decided to take them off and endure the cold instead.

Luck is a finite entity, specific to each natural thing or even to certain activities. It can be lost, transferred, and recovered. Luck binds people to the code of proper behavior toward the natural world. And so success in living on the land involves far more than a mastery of technical skills. It requires that a sensitive balance be maintained between each person and the conscious forces of the environment ….

The Koyukon View of Nature

For traditional Koyukon people, the environment is both a natural and a supernatural realm. All that exists in nature is imbued with awareness and power; all events in nature are potentially manifestations of this power; all actions toward nature are mediated by consideration of its consciousness and sensitivity. The interchange between humans and environment is based on an elaborate code of respect and morality, without which survival would be jeopardized. The Koyukon, while they are bound by the strictures of this system, can also manipulate its powers

for their own benefit. Nature is a second society in which people live, a watchful and possessive one whose bounty is wrested as much by placation as by cleverness and craft.

Moving across the sprawl of wildland, through the forest and open muskeg, Koyukon people are ever conscious that they are among spirits. Each animal is far more than what can be seen; it is a personage and a personality, known from its legacy in stories of the Distant Time. It is a figure in the community of beings, once at least partially human, and even now possessed of attributes beyond outsiders' perception.

Not only the animals, but also the plants, the earth and landforms, the air, weather, and sky are spiritually invested. For each, the hunter knows an array of respectful gestures and deferential taboos that demand obedience. Violations against them will offend and alienate their spirits, bringing bad luck or illness, or worse if a powerful and vindictive being is treated irreverently.

Aware of these invisible forces and their manifestations, the Koyukon can protect and enhance their good fortune, can understand signs or warnings given them through natural events, and can sometimes influence the complexion of the environment to suit their desires. Everything in the Koyukon world lies partly in the realm beyond the senses, in the realm we would call supernatural.

Gilbert Wilson, Buffalo Bird Woman's Garden

While European and Euro-American conquerors preferred to see all Indians as hunters, in fact, many American Indians were also formidable agriculturalists. Indeed, a whole range of wild plants were domesticated by American Indians, and their legacy is with us today. Maize, most beans, squash (including pumpkins), tomatoes, avocadoes, chocolate, and tobacco – to name just a few – developed from centuries of careful effort by Indians, most of them women, to make wild plants more useful to people. Buffalo Bird Woman was of the Hidatsa people, from the upper Missouri River in what is now North Dakota. Her people lived in this region for centuries before their conquest by the United States. Her reminiscence of cultivating the river bottoms in the latter 1800s is more than just one woman's personal story. It is testimony to centuries of planting and cultivating on the American continent. Various Native American peoples farmed and hunted along the Missouri River, in the well-watered eastern part of the continent, from southern Maine to Florida, and in the southwest, along the Rio Grande. To make a living by growing corn amidst the Great Plains, where a dry climate and ferocious winters conspire to frustrate

even many modern farmers, was no mean feat. Many people lived by a mix of farming, hunting, gathering, and trade. Most appear to have thought about animals in ways similar to the Koyukon of the late twentieth century. Plants also had spiritual powers. Compare Buffalo Bird Woman's account to the excerpt from *Make Prayers to the Raven*. The garden is a woman's world. What conflicts did Hidatsa farmers have with one another? How did they resolve them? How did access to iron tools change Hidatsa farming?

* * *

(Extract from *Buffalo Bird Woman's Garden: Agriculture of the Hidatsa Indians*. St Paul: Minnesota Historical Society Press, 1987.)

Soon after they came to Like-a-fishhook bend, the families of my tribe began to clear fields, for gardens, like those they had at Five Villages. Rich black soil was to be found in the timbered bottom lands of the Missouri. Most of the work of clearing was done by the women ….

In old times we Hidatsas never made our gardens on the untimbered, prairie land, because the soil there is too hard and dry. In the bottom lands by the Missouri, the soil is soft and easy to work….

Dispute and Its Settlement

About two years after the first ground was broken in our field, a dispute I remember arose between my mothers and two of their neighbors, Lone Woman and Goes-to-next-timber.

These two women were clearing fields adjoining that of my mothers; … the three fields met at a corner …. [M]y father, to set up claim to his field, had placed marks, one of them in the corner at which met the fields of Lone Woman and Goes-to-next-timber; but while my mothers were busy clearing and digging up the other end of their field, their two neighbors invaded this marked-off corner; Lone Woman had even dug up a small part before she was discovered.

However, when they were shown the mark my father had placed, the two women yielded and accepted payment for any rights they might have.

It was our Indian rule to keep our fields very sacred. We did not like to quarrel about our garden lands. One's title to a field once set up, no one ever thought of disputing it; for if one were selfish and quarrelsome, and tried to seize land belonging to another, we thought some evil would come upon him, as that some one of his family would die. There is a story

of a black bear who got into a pit that was not his own, and had his mind taken away from him for doing so! …

Beginning a Field in Later Times

As I grew up, I learned to work in the garden, as every Hidatsa woman was expected to learn; but iron axes and hoes, bought of the traders, were now used by everybody, and the work of clearing and breaking a new field was less difficult than it had been in our grandfathers' times. A family had also greater freedom in choosing where they should have their garden, since with iron axes they could more easily cut down any small trees and bushes that might be on the land. However, to avoid having to cut down big trees, a rather open place was usually chosen.

A family, then, having chosen a place for a field, cleared off the ground as much as they could, cutting down small trees and bushes in such way that the trees fell all in one direction. Some of the timber that was fit might be taken home for firewood; the rest was let lie to dry until spring, when it was fired. The object of felling the trees in one direction was to make them cover the ground as much as possible, since firing them softened the soil and left it loose and mellow for planting. We sought always to burn over all the ground, if we could.

Before firing, the family carefully raked off the dry grass and leaves from the edge of the field, and cut down any brush wood. This was done that the fire might not spread to the surrounding timber, nor out on the prairie. Prairie fires and forest fires are even yet not unknown on our reservation.

Planting season having come, the women of the household planted the field in corn. The hills were in rows, and about four feet or a little less apart. They were rather irregularly placed the first year. It was easy to make a hill in the ashes where a brush heap had been fired, or in soil that was free of roots and stumps; but there were many stumps in the field, left over from the previous summer's clearing. If the planter found a stump stood where a hill should be, she placed the hill on this side [of] the stump or beyond it, no matter how close this brought the hill to the next in the row. Thus, the corn hills did not stand at even distances in the row the first year; but the rows were always kept even and straight.

While the corn was coming up, the women worked at clearing out the roots and smaller stumps between the hills; but a stump of any considerable size was left to rot, especially if it stood midway between two corn hills, where it did not interfere with their cultivation.

Figure 1.1 Drawn from specimen made by Yellow Hair. Length of specimen, following curvature of tines, 36 $^{1}/_{2}$ inches.

My mothers and I used to labor in a similar way to enlarge our fields. With our iron hoes we made hills along the edge of the field and planted corn; then, as we had opportunity, we worked with our hoes between the corn hills to loosen up the soil.

Although our tribe now had iron axes and hoes from the traders, they still used their native made rakes. These were of wood (Figure 1.1), or of the antler of a black-tailed deer (Figure 1.2). It was with such rakes that the edges of a newly opened field were cleaned of leaves for the firing of the brush, in the spring.

Trees in the Garden

Trees were not left standing in the garden, except perhaps one to shade the watchers' stage. If a tree stood in the field, it shaded the corn; and that on the north side of the tree never grew up strong, and the stalks would be yellow.

Figure 1.2 Drawn from specimen made by Buffalo Bird Woman. Length of wooden handle, 42 inches; spread of tines of antler, 15 $^{1}/_{2}$ inches.

Cottonwood trees were apt to grow up in the field, unless the young shoots were plucked up as they appeared ….

The Watchers

The season for watching the fields began early in August when green corn began to come in; for this was the time when the ripening ears were apt to be stolen by horses, or birds, or boys. We did not watch the fields in the spring and early summer, to keep the crows from pulling up the newly sprouted grain; such damage we were content to repair by replanting.

Girls began to go on the watchers' stage to watch the corn and sing when they were about 10 or 12 years of age. They continued the custom even after they had grown up and married; and old women, working in the garden and stopping to rest, often went on the stage and sang.

Two girls usually watched and sang together. The village gardens were laid out close to one another; and a girl of one family would be joined by the girl of the family who owned the garden adjoining. Sometimes three, or even four, girls got on the stage and sang together; but never more than four. A drum was not used to accompany the singing.

The watchers sometimes rose and stood upon the stage as they looked to see if any boys or horses were in the field, stealing corn. Older girls and young married women, and even old women, often worked at porcupine embroidery as they watched. Very young girls did not embroider.

Boys of nine to eleven years of age were sometimes rather troublesome thieves. They were fond of stealing green ears to roast by a fire in the woods. Sometimes – not every day, however – we had to guard our corn alertly. A boy caught stealing was merely scolded. "You must not steal here again!" we would say to him. His parents were not asked to pay damage for the theft.

We went to the watchers' stage quite early in the day, before sunrise, or near it, and we came home at sunset.

The watching season continued until the corn was all gathered and harvested. My grandmother, Turtle, was a familiar figure in our family's field, in this season. I can remember her staying out in the field daily, picking out the ripening ears and braiding them in a string.

Images of Florida Indians Planting and Making an Offering of a Stag to the Sun

(Extract from Trustees of the British Museum, *The Work of Jacques Le Moyne de Morgues*, Vols I and II. London: British Museum Publications, 1977.)

The remaining items are engravings and captions by a Flemish artist, Theodore de Bry, who based his images on paintings by Jacques Le Moyne de Morgues, an artist who accompanied a French expedition to Florida in the 1560s. Le Moyne had come to know the Timucua people, who are the subject of these images. De Bry published these engravings in 1591, with the captions presented here. Look for the ways that different features of Timucuan economy connect to each other and to the earth. The first image (Figure 1.3) is of Timucuan men and women planting a field. Although the engraving is not always accurate (since

these people did not have plows, the field would have been planted in hillocks, not rows), it remains one of the best pieces of evidence we have about Indians and the earth in the 1500s. How did men assist women in the preparation of these fields? Note the way that men fashioned hoes from fish bone. Who did the fishing? To what degree was fishing a vital part of the economy of these people as a source of food, and as a source of farm implements?

Then note the second image (Figure 1.4), which depicts a ceremonial offering. Here, the Indians have filled the body of a deer with produce and raised it to the spirits in hopes that the spirits will respond by making "grow

Figure 1.3 Method of tilling the ground and sowing seed. The Indians cultivate the soil carefully. The men know how to construct hoes out of fish bones for this purpose, to which wooden handles are fitted, and they dig the ground easily enough since it is rather light. Then, when it is thoroughly broken up and levelled, the women sow beans and millet or maize, several of them going ahead and making holes by prodding a stick into the ground, into which are dropped beans and millet grains. The sowing finished, they leave the fields in order to avoid the winter time which is rather cold – inasmuch as the region lies between west and north – and lasts for about three months from December 24 to March 15. Since they go naked they take themselves off to the woods. When winter is over they go back home and wait for the crops to ripen. After gathering the harvest they store the produce for consumption all the year round, not using it for any commercial purpose except perhaps bartering it for some common household article.

H.S. Photos/Alamy Stock Photo.

Figure 1.4 The offering of a stag to the sun. Every year, a little before their spring (at the end of February, in fact), the chief Outina's subjects take the skin, complete with antlers, of the biggest stag they have been able to catch (Source: Alamy Images). They stuff it with all kinds of the choicest plants that their land produces, sew it up again, and deck the horns, the throat, and the rest of the body with their more special fruits made up into wreaths or long garlands. Thus decorated, it is carried away to the music of pipes and singing into a very wide and beautiful plain, and there it is placed on a very tall tree trunk, with its head and chest turned towards the sunrise, prayers being repeatedly uttered to the sun that he should cause to grow again in their kingdom good things similar to those offered to him.

The chief with his sorcerer is nearest to the tree and gives the lead in what is said, with the people who are farther away responding. When they have greeted the sun the chief and the rest of the people go away leaving the skin there until the following year. This sort of ceremony is repeated each year. Artefact/Alamy Stock Photo.

again in their kingdom good things similar to those offered." Notice how the hunting of deer (these people were superlative hunters *and* farmers) is vital to the success of the harvest. Without hunting, there would be no offering to the spirits who make the crops grow. Without farming, there would be no gifts to place inside the offering. In this way, Native American hunters and farmers worked within the same villages to connect the nature of the hunt and the nature of the garden, balancing the spirits' gifts, and making balanced offerings to the spirits in return.

Map of Bitterroot Forest Reserve

Our last document is a US Geological Survey map of Bitterroot Forest Reserve (today's Bitterroot National Forest) in the Northern Rocky Mountains, along the Idaho–Montana state line. The surveyor who compiled the map, J. B. Leiberg, noted the extent of old fire scarring and woodland regrowth over hundreds of thousands of acres. Leiberg dated some fires as far back as 1719, long

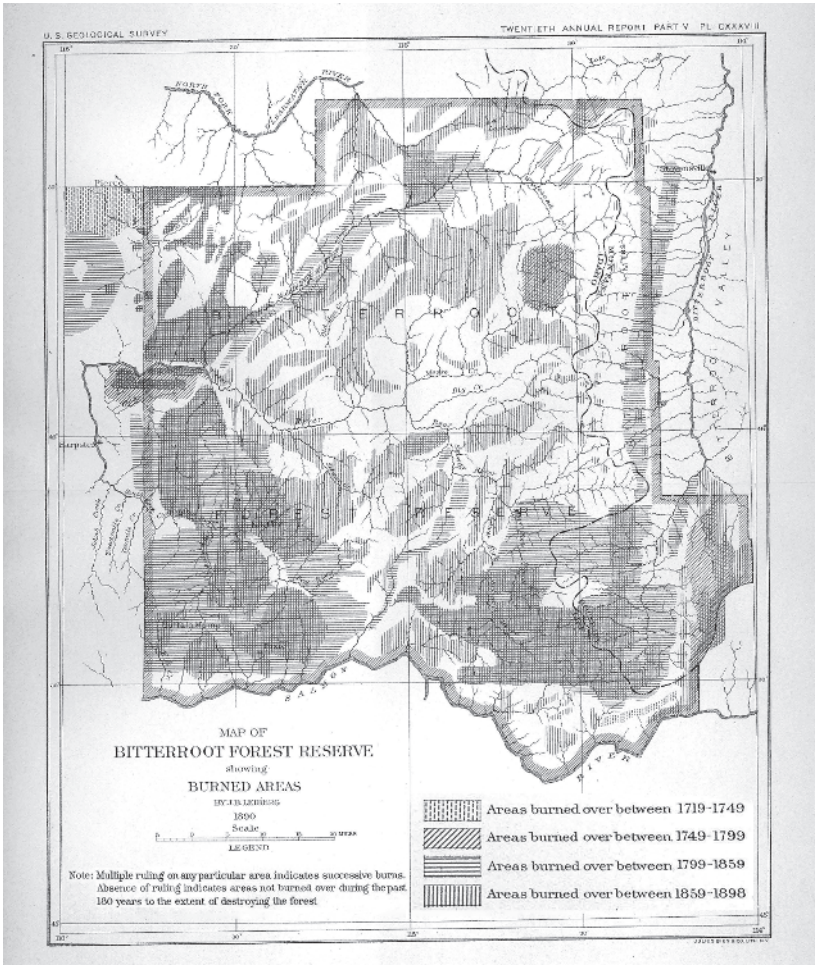

Figure 1.5 Map of Bitterroot Forest Reserve showing burned areas by J. B. Leiberg 1890.

(Source: US Geological Survey, *Twentieth Annual Report* (1990), pp. 384–385. Public Domain.)

before American settlers arrived in the region. The area with multiple lines drawn through had seen successive burns. Some of these fires were doubtless the result of lightning, but many more were likely to have been ignited by Indians, who used fire to clear out dense undergrowth, encourage new growth of grasses for game, and preserve mountain mweadows from forest encroachment, among other reasons. How much was America's "virgin wilderness" in fact a landscape maintained by Indians?

Further Reading

M. Kat Anderson, *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources* (2013). University of California Press, Berkeley.

Karl W. Butzer, ed., "The Americas Before and After 1492: Current Geographical Research." Special issue, *Annals of the Association of American Geographers* 82(3) September 1992: 343–568.

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Stephen Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (1982; rev. edn 1997). University of Washington Press, Seattle.

Adrian Tanner, *Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters* (1979). Memorial University Institute of Social and Economic Research, Newfoundland.