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*Forests and Future*

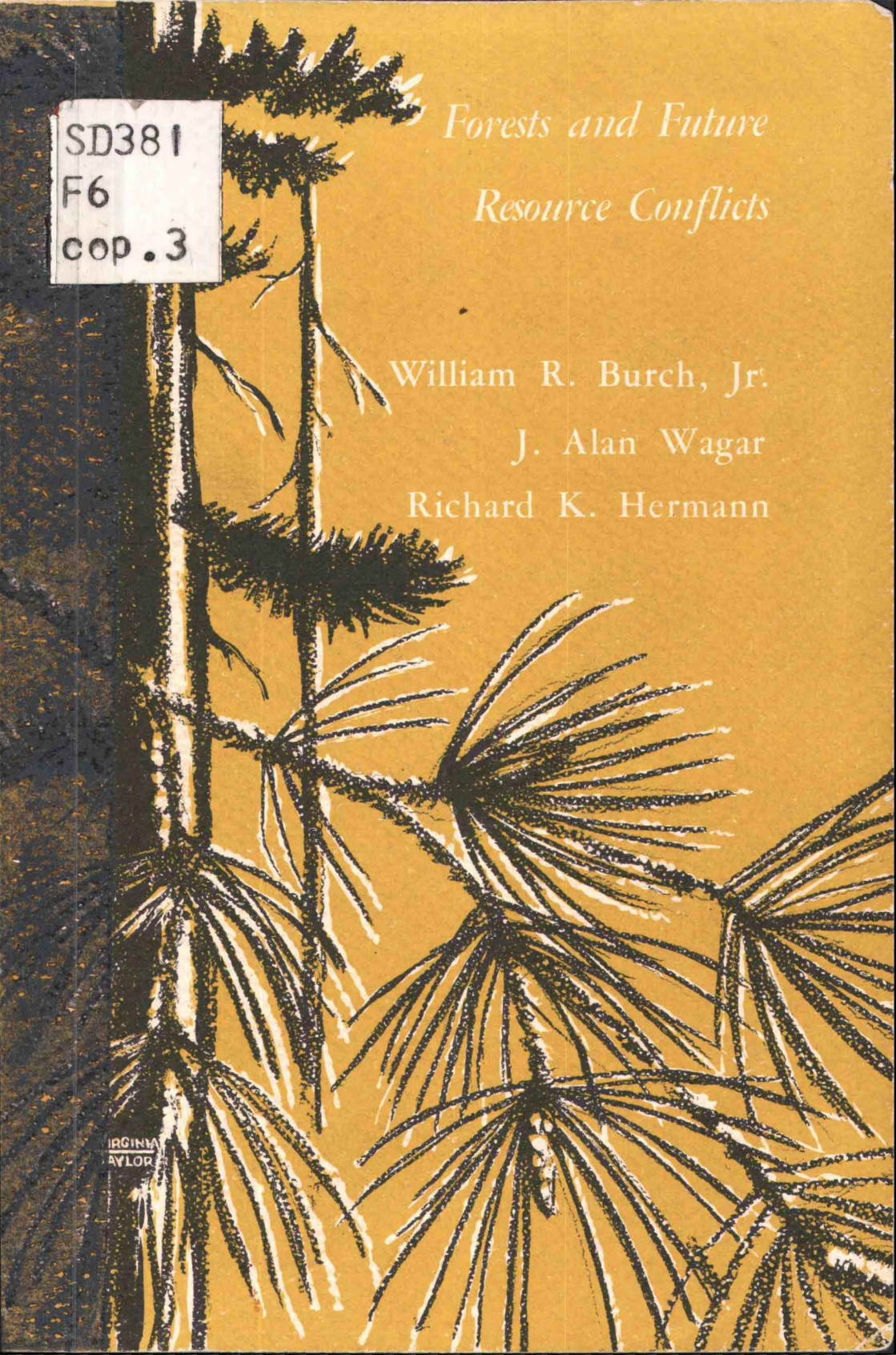
*Resource Conflicts*

William R. Burch, Jr.

J. Alan Wagar

Richard K. Hermann

VIRGINIA  
TAYLOR



# *Forests and Future Resource Conflicts*

## **TIME, LAND AND PEOPLE— OLD RESOURCES AND NEW INSTITUTIONS**

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## **THE “ADEQUACY” OF WORLD RECREATION RESOURCES**

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## **MAN AND FORESTS—A PRODIGAL RELATION**

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## Preface

In February of 1975, the School of Forestry sponsored a series of lectures and discussions on the topic, "Forests of the World—Future Resources Conflicts." The objectives of these presentations were to examine prospects for future forest use, the demands that will be made on forest resources of all sorts, the possibilities we have for meeting these demands, and what we must do to meet the ensuing problems.

We present here several of the papers having the most general and unusual interest.

William K. Ferrell  
Chairman, Organizing Committee



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# Time, Land, and People- Old Resources and New Social Institutions

William R. Burch, Jr.

In the last half of the twentieth century, any consideration of the disposition of land needs to take into account both old and new realities. The old reality is that land is a physical resource vested with a heavy load of symbolic meaning that shapes the identity of both individuals and nations. The new reality is that property institutions regulating the disposition of land are operating in a world of rapidly altering scarcities. We have an untidy and complex residue of rights and traditions inherited from the past, rights and traditions no longer viable under new conditions. An examination of our property institutions, the creations of our society, and our renewable and nonrenewable resources can reveal the extent of social change and help us find new directions.

## LAND—SOCIAL SYMBOL AND MORAL PARADOX

The fate of *Homo sapiens*, as of other animals, is bound to the land and its envelope of air and water. Yet, whether organized into tribal, feudal or industrial societies, our species remains curiously ambivalent toward the land. We worship the land, create deities from its living substance, write poems and sing songs that honor its grace and beauty. At the same time, we seek to minimize effort and maximize yield in exploiting the land and its resources. Often, the motherland gets patriotic songs and dustbowls in about equal measure (2).

Such a seeming paradox occurs because, aside from working the land for survival, human beings erect an edifice of

ritual, territory, and identity whose fund of symbolic meaning often supersedes the necessity of survival. Tribal and modern societies alike establish elaborate rituals in praise of and hope for the land's fertility. In tribal society these rituals consist of sacred chants, dances, and omens overseen by holy men. In modern society we have councils of economic advisors and seers of agribusiness who speak in strange tongues concerning forces unseen by the laity; we religiously sprinkle the magic of chemicals upon the land, our animals, and ourselves; and we perform the elaborate wizardry of feasibility studies, cost-benefit analyses, and, recently, environmental-impact statements. The charm of ritual is that it imposes certainty upon an uncertain world, reaffirms our conventional wisdom, and substitutes mindless routine for systematic action.

In both tribal and modern society, bloody wars are waged for bits of territory whose value is unknown or questionable except for the elaborate patriotic sentiments regarding the motherland. Destroying something in the name of saving it is not confined to our time. Indeed, the strong emphasis on sentiment rather than survival is one of the many ways in which human territoriality differs from that of other animals (7).

In the human scheme of things, land and space also serve to announce and validate an individual's identity. For example, offices of executives and country estates of the well-to-do are considerably larger than those less favored, not from functional but from symbolic necessity, just as the Tiv of Western Africa organize their land in accordance with the ancestral spirits embedded in it. Though industrial society pretends less interest in so linking present generations to those of the past and the future, its landscape is ribbed with historic parks, sites, and monuments. The American suburbanite, two generations out of rural origins, seeks a replica of colonial housing or pioneering on a half-acre ranchette and votes for those who promise all the verities of an imagined past.

In all of our seeming concern over the land, our central interest remains in its function as symbol. That is, our conceptions of the land are never experienced directly but are

filtered eternally through the established linguistic systems (what Kenneth Burke (3) calls the “trained incapacities”) of the social groups to which we belong. Because we belong to several such systems, what often seems inconsistent merely may reflect adherence to several consistencies. The person who sings the patriotic praises of the land is often unaware of inconsistency when profit motives send that same sacred land drifting in dust storms, eroding into the sea, or acidifying into sterility.

Most planning studies of the land’s carrying capacity assume that the same biological and physical factors that direct deer and insect populations affect human populations. That is, such studies attempt to standardize on the basis of only those measures that easily lend themselves to quantification and computer manipulation. But this attempt to develop standards for universal application denies the fact that ecological diversity seldom lends itself to standardization. The allegedly scientific plans, often simply the artifice of an alternative symbol system, really avoid difficult political realities and moral responsibilities.

This modern deception makes us realize how the empirical realism of Frederic Law Olmsted, John Wesley Powell, Gifford Pinchot, and transcendentalists such as Emerson and Thoreau remain essential guides for today. Indeed, they are clearer guides for building a humane and ecologically balanced world than are ecological theologians such as Garrett Hardin, Paul Ehrlich, and William and Paul Paddock. No ideas from Olmsted, Powell, and company rage at man the evil weed. Nor is there a write-off of whole societies because their diverse and rich humanity cannot be understood in the simplistic metaphors of jet-set biologists. Rather, Olmsted and Powell view humanity as an essential and natural component of the ecosystem. Though never so naive as to ignore the potential dark impulses in *Homo sapiens*, they sought to emphasize and enhance his capacity for good. They attempted to understand how human social systems, physical systems, and ecosystems interpenetrate. They emphasized “use value” rather than “price value”. On this basis, they sought more fit metaphors and mechanisms for achieving social and ecological harmony. They emphasized homogeneity

at the level of niche and neighborhood and diversity at the level of ecosystem and community. In short, they were our first modern ecological visionaries.

Though one could argue that all science is an exercise in metaphorical leap frog, we should note that the holistic vision of ecology is almost entirely metaphorical. The work of Murray Buell, Eugene Odum, and Paul Sears, like that of many old-time silviculturists, illustrates that the understanding of whole ecosystems requires much of the method and all of the courage of a poet. For contrast, we need only reflect on the instrumentation and "hard" data of the molecular biologist, confidently reducing the world to its certain and measurable particularities, to realize that atomistic metaphors are not likely to return us to visions of the whole.

Working ecologists remind us that environmental arguments, which are often couched in terms of aesthetic differences, should be seen in terms of survival differences. A good part of the rhetoric of environmentalists concerning forest harvesting technique, size of wilderness areas, development of Alaska, quality of modern life, and use of automobiles is a statement of aesthetic preference. Such preferences have a strong element of patronizing snobbery and disguise the attempt to have someone else pay for the pleasures. Not surprisingly, the interlocking corporate structure that manages our economy has been fairly quick to pick this up and in its rhetoric to become an instant friend of the "little people."

Therefore, issues that are of direct relevance to all persons, and especially to the little people, are converted to seem merely aesthetic snobbery, which raises food prices and deprives us of gasoline to run our newly won auto and fuel to heat our newly purchased home. Of course, such an argument is patent nonsense. Yet the lesson is clear—in ignoring the humane views of Olmsted, Powell, the transcendentalists, and the working ecologists, the conservationist argument has often ignored and too often arrogantly debased the aspirations of the masses. What we must seek is a blueprint for a democracy where human aspirations and ecological constraint can find a meeting point. Events are too swift; it is false to assume that democratic drift

will ultimately evolve the appropriate solution. Intellectuals, as persons of uncommon, cumulative, and organized knowledge, have an obligation to create and explore metaphors of the future and to share in their implementation. Indeed, the lesson of Vietnam is not that it was a tragedy or an aberration in the American experience; rather, that it was the logical culmination of a system where the producers of dreadful knowledge were able to avoid the responsibility of moral choice.

Environmentalists—foresters, agronomists, hydrologists, ecologists, Friends of the Earth, and all the rest—can no longer remain in their specialized worlds. The establishment of a wilderness area, the choice of a silvicultural technique, or a watershed management decision are not simply technological choices, but are social and political issues with far reaching implications. The trial and conviction of advisors to Richard Nixon should remind men that each participant in a decision holds a significant residue of moral responsibility. We cannot leave decisions to “those politicians” while we make more elaborate footnotes on the margins of time. Perhaps in rediscovering our moral responsibility we may approach the wisdom of Powell, Olmsted, and others.

We need a renewed understanding of the key mechanisms by which a social order adjusts to changes in its environment. Such mechanisms regulate rates of fertility and mortality, of immigration and emigration, and of food production and consumption. Though in human society these mechanisms have a unique operation, they have consequences not unlike those found in other animal populations. The uniqueness seems to lie in the purely symbolic character of the mechanisms in human society, mechanisms seldom retimed without a great deal of ritualistic and rhetorical expression.

### **PROPERTY INSTITUTIONS AND THE REGULATION OF SOCIETAL “FITNESS”**

Property, and the rights and obligations surrounding its disposition, seems to be one of the clearest focal points where ecosystem, economy, and social system come together. Prop-

erty, we should remember, is primarily a social, not a physical, phenomenon because it is part of the normative structure of a given social group. Society defines and regulates the ownership of rights to potential enjoyment or use of those things that have some social or economic value. All those “potentials” that a person or group has rights in become property. Persons own the right-of-use for their homes, though someone else holds the mortgages. The holding of General Electric common stock gives one certain circumscribed rights to voting and dividends; one certainly does not own General Electric—people’s capitalism notwithstanding.

Contrary to our ideology, property rights are seldom neat and never finally settled. For example, the New England states reflect an accumulated residue of ownership rights compromised since the early 17th century from those that survived the Atlantic crossing. Thus, the State of Connecticut has purchased flowage rights on certain waters, and private persons retain bottom rights that exclude all trespass by the general public, such as fishermen. Additional lease rights must be secured before the public can fish in their publicly owned water for their publicly owned game.

For most species of wildlife, regardless of where they are found, the State claims exclusive ownership rights. But not only does our state wildlife property wander indifferently across public and private property, it also crosses the borders of Massachusetts and New York and thereby ends our property rights and becomes owned by someone else. The right to mobile, independent property, such as wildlife, might be expected to be confusing; but consider the situation wherein the state has rights in the salt water that rises and falls with the tides over wetlands where rights are held by private persons. Until recently, salt marshes were seen as wastelands to be occupied by garbage or drained and filled with marinas and suburban developments. In 1970, because of pressure by environmentalists, wetlands were recognized as essential components in a marine ecosystem that belonged to the public. The Connecticut General Assembly, morally excited and fiscally tightfisted, passed a wetlands conservation bill wherein the state

claims rights, without purchase or compensation, to tidal wetlands on which the fee holder continues to have the right to pay taxes but does not have the right to carry out certain activities. I will not mention the interesting possibilities associated with the fact that New England coastal lands have been subsiding for some time now at a seemingly accelerating rate.

The variations in property relations give us a reading of how stable a given social order is, how significant its patterns of change have been, and what is likely to be happening to a variety of other institutional clusters. Henry Sumner Maine's discussion of the shift from status to contract, Ferdinand Töennies' idea of a shift from *Gemeinschaft* (community) to *Gessellschaft* (society), Émile Durkheim's optimism regarding the change from the mechanical solidarity of tribal society to the organic solidarity of urban industrial society, Max Weber's analysis of men's "disenchantment" with the world in the rush to rationality, Karl Marx's concern with ownership of the means of production, and the analyses of other social theorists at the turn of the century were all attempts to account for the sharp changes that occurred in property rights as western society moved from tribal and feudal systems to an industrial political economy.

In tribal situations, property has use and status value and only marginally price value, and a central concern is to maintain continuity over generations. One of the most characteristic patterns of tribal groups is the tradition of food sharing (10). That is, all members of the group share equally in the food resource, regardless of who secured the food. Such patterns of social organization have importance for the species (11):

Cultural Man has been on earth for some 2,000,000 years; for over 99 percent of this period he has lived as a hunter-gatherer. Only in the last 10,000 years has man begun to domesticate plants and animals, to use metals, and to harness energy sources other than the human body. *Homo sapiens* assumed an essentially modern form at least 50,000 years before he managed to do anything about

improving his means of production. Of the estimated 50,000,000,000 men who have ever lived out a life span on earth, over 90 percent have lived as hunters and gatherers; about 6 percent have lived by agriculture and the remaining few percent have lived in industrial societies.

Because hunter-gatherer organizational forms—the clan, the band, the tribe—have been the major adaptive pattern for our species, their use of the time resource may tell us more about our species' regularities of behavior than we can learn from the brief moment of the industrial order. Until recently, we have either romanticized hunter-gatherer groups, the "noble savage," or excused the ills of the industrial order by depicting tribal life as short, nasty, and brutish, with the search for food constant. Happily, recent empirical research has satisfied neither polarized view, though major theories of social evolution such as those of Coon (5) and Lenski (13) will need substantial revision because the data indicate that longevity and leisure are essential characteristics of most hunter-gatherer groups.

The scholarly presumption of a dismal life style for hunter-gatherers is partially based on the acceptance of linear progress as an explanation of cultural variation. If "we," Victorian England or post-industrial U.S.A., who "are at the apex of human development" struggle so hard and are so unfulfilled, then certainly those at lower levels must be even worse off. If work is an unending burden to us, it must be even more so for hunter-gatherers. As Sahlins notes (18):

Scarcity is not an intrinsic property of technical means. It is a relation between means and ends. We might entertain the empirical possibility that hunters are in business for their health, a finite objective, and bow and arrow are adequate to that end. A fair case can be made that hunters often work much less than we do, and rather than a grind the quest is intermittent, leisure is abundant, and there is more sleep in the daytime per capita than in any other conditions of society. (Perhaps certain traditional formulae are better inverted, the amount of work per capita



increases with the evolution of culture and the amount of leisure per capita decreases.) Moreover, hunters seem neither harassed nor anxious. A certain confidence, at least in many cases, extends their economic attitudes and directions. The way they dispose of food on hand, for example—as if they had it made.

In contrast to subsistence political economies, the feudal system had a very elaborate set of property institutions. In Japan, the *Daimyo* was bound into a complex set of rights and obligations to the land and his dependent peasantry. He, in turn, was bound to the *Shogunate* who held in trust the lands for the Emperor, who, in theory, owned all the lands of Japan (8). In Europe, the Lord owned the land, but the land was bound into a set of reciprocal rights and obligations among the various elements of society. The Lord collected in-kind rents from the peasant and was, in turn, responsible for the protection and security of the peasant's welfare. The mixture of paternalism, reciprocity, and cooperation may explain why so many moderns of the left and the right romantically long for a return of the system.

The commons were an important sociological and ecological feature of the European Feudal system. As Earl Murphy describes it (15):

This complex of (agricultural) techniques, called "champion husbandry," required regular cycling of the land to provide for fallow periods. This cycling developed because of the shortage of draft animals, the prevalence of subsistence farming that made each manor self-sustaining, the limited variety of crops available, and the short supply of fertilizers. With its stress upon crop rotation and mutual effort, this tradition economically discouraged the servile tenant from establishing a large, independent unit in his own or family name. To do so would have cut him off from help by his fellows, limited him to the resources of his own plot, and exposed him to the full consequences of his servile state.

Thus, one of the accompaniments of the higher material standards of agrarian society is the greater amount of time spent on simply maintaining the system. There must be the saving of seeds for planting next season, the storing of surplus for off seasons, the saving for festivals and religious assurance, the preparation for droughts and pestilence, the saving for ultimate replacement of draft animals, the saving to support rulers, scholars, and noblemen who produce symbols of unity rather than bushels of grain; these and all the myriad other tasks of maintenance of a more complex social order leave little time for leisure for the masses of agrarians.

The market society that emerged from the feudal period was a dramatically new social form that transformed traditional property relations so that natural and human components of society were converted into commodities. As Polanyi notes (16):

But labor, land, and money are obviously not commodities; the postulate that anything that is bought and sold must have been produced for sale is emphatically untrue in regard to them. Labor is only another name for a human activity which goes with life itself, which in turn is not produced for sale but for entirely different reasons, nor can that activity be detached from the rest of life, be stored or mobilized; land is only another name for nature, which is not produced by man; actual money, finally, is merely a token of purchasing power which, as a rule, is not produced at all, but comes into being through the mechanism of banking or state finance. None of them is produced for sale. The commodity description of labor, land, and money is entirely fictitious.

Though the basic fictions of the market society continue to be solemnly honored by all who pretend to manage modern economies, there has been an eager attempt to avoid the consequences of honoring such fictions. Public, corporate, and private entities have sought property rights more congenial than

those offered by the market system—rights to control essential services and markets, rights to control specific occupations, and rights to control specific social problems. As Robert Lekachman noted in a recent article (12):

... American politics is a covert hunt for new privilege and Government-created property, an avid search for franchises, airline routes, television channels, acreage allotments, tax advantages, ingenious subsidies, and grazing privileges at concessionary rates. The pricing decisions of the major corporations which exercise substantial power over their market amount to still less supervised creations of new property in the shape of excess profit.

If there has been one consistent trend in North American life, it has been the steady attempt to remove resources and aesthetic issues from the whim of the market. Thus, forest preserve acts, municipal, county, state and federal parks, wildlife refuges, soil conservation acts, zoning regulations and contemporary wetland, agricultural protection and land-use laws all reflect attempts to socialize property rights and to control professionally resource allocation rather than to leave the allocation to commodity and real estate markets.

Such acts have required the creation of new types of professionals. For example, federal legislation, such as the 1954 Urban Planning Assistance Act, was most beneficial to the land-use planning profession. As Luther Carter notes, "in the early 1950s there were fewer than 250 active planning professionals in the United States; by mid-1972, there were more than 6,200. Furthermore, over the same period more than 200 metropolitan planning agencies were established and some 4,000 comprehensive development plans prepared" (4).

Certainly, many entrepreneurs of social and biological science have not missed the equal opportunity for money and jobs created by the environmental impact statement of the National Environmental Policy Act (NEPA). Because of this act, one can safely predict a steady growth in demand for ecologists

and social ecologists similar to the growth in demand for planners. Thus, disciplines and occupational groups develop property in the form of vocational tasks.

Moreover, a public agency, such as the Soil Conservation Service, the Tennessee Valley Authority, the Bureau of Reclamation, or the Corps of Engineers has a great stake in the perpetuation of the problems it services. Just as the policeman needs the criminal and, indeed, finds a rising crime wave helpful around budgeting time, so too do those conservation agencies that manage the timber famines, recreation explosions, water deficits, and energy crises have a property stake in their social problem. Consequently, such organizations seek to ensure problems to service even if this means violating the purpose of their original mission.

Property institutions designed to stabilize a market, an occupation, a bureaucracy, or a society, however, may have the unintended consequence of maintaining the forms while eroding the survival base. This might be illustrated best by considering rights of ownership in that oldest of abused natural resources—human beings.

Slavery has been wide in extent, covering all varieties of geography and culture in all times. The great West African civilizations, such as Benin and Timbuktu, benefited from this resource, as did the New Zealand Maori and other Polynesian groups, and Middle-Eastern and Mediterranean peoples. But slavery was given its most dramatic impetus by European mercantile societies. The cause was simple enough: the new lands of settlement in the Americas were labor deficient. The indigenous peoples could not be induced or forced to labor on the large-scale agricultural lands, and the indentured Scotch-Irish and other Europeans were hard to tell apart from their free counterparts. West African traders provided the solution.

Though both the Latin and Anglo-Dutch colonies exploited this human resource, it is important to note significant differences in treatment and present-day consequences. Frank Tannenbaum has argued that many of the contemporary differences in race relations between North and South America stem from different historical conditions (20). The Anglos had

no tradition of a slave code, but the Latins had a tradition tracing from Roman times. The Anglicans did not recognize slaves as baptizable human beings; further, the Protestants wanted individual converts to exhibit their conversion in worldly behavior. The Catholics saw slaves as human beings, accepted collective converts, and were able to accept local customs and personal deviations. For the Anglos, the rationale guiding the treatment of slaves was that they were innately inferior, and they were treated as another form of property. Among Anglos, the slave was bought or sold like any other property, had no moral or family rights, was denied human personality, and was condemned eternally to an inferior role. The Latins had a domestic concept of the slave: he could be adopted by the family, and he had family, moral, and personality rights that were respected so that he could earn freedom and then fully enter the company of free men. The Anglos believed property rights in the slave resource lay solely with the owner. Like taking over marshland without compensation, freeing a slave without compensation was stealing.

Eric Williams argued that the British abandoned slavery in the West Indies by 1833 because the change from mercantilism to capitalism made slavery unprofitable (21). Events after the conclusion of the Civil War in the United States, with the industrial north triumphant over an agrarian south, seem to support his argument. But this does not deny the moral paradox faced by Yankee abolitionists, who had to overcome the sacred shield of slavery, the right to private property, and argue that ownership rights were made invalid by higher moral rights. It is a significant model—not often announced by environmentalists—that theft in the interest of higher public value can be virtuous.

Property institutions exhibit tenacity, and they adapt to changed conditions or they bring down the whole social structure supporting them. The cotton culture reached its ecological and economic limits while the industrial culture moved toward ascendancy in other regions. The inability to untangle property rights in the face of new realities led the cotton culture to its own destruction.

## ADAPTING PROPERTY INSTITUTIONS TO THE REALITY OF THE CORPORATE SOCIETY

Fundamental changes in property institutions will be occurring in industrial societies. The traditional rights of private, public, and corporate entities no longer seem adaptable under conditions in which formerly free goods, such as water and air, become scarce, and formerly scarce goods, such as motor cars, skidoos, and high-fashion clothing, become abundant. This alteration of scarcities causes traditional market mechanisms disparately to create markets for nonessentials and to ignore the real depletion of essential resources. Private ownership was justified by the faith that self-interest would compel care in husbanding land and resources so as to pass on an improved estate to one's children. But if it ever functioned as planned, it no longer does. There is great spatial and occupational mobility between and within generations. The ever-present interest in gain through speculation, rather than work, has encouraged a rapid turnover of land and a greater interest in doing "with my property as I wish." Today, the predominant number of landowners (not to be confused with the few who control most of the land) holds tracts of land which serve dormitory rather than productive functions. And styles of dormitory functions seem as subject to fashion and fad as clothing. Consequently, the change of American housing taste and the march of slums can be read in the census tracts of metropolitan areas. Tracts where the newest single-family houses were constructed in the 1920-30 decade foretell the fate of those constructed in the 1960-70 decade. Our patterns of growth and mobility produce disposable housing stocks rather than a private castle for everyman.

Private or state corporate groups capture for private persons profit rights to offshore fisheries, airsheds, watersheds, commutersheds, noise avenues, and other communal property, yet the scale of and differences in these systems transcend our ability to assign responsibility. The study by Likens, Bormann, and Johnson of increasing acidification of water and soil in New Hampshire from industry-caused air pollution in New York and

Connecticut illustrates how poorly costs and gains are being distributed (14). Another example is apparent on the commons of airports, where costs are distributed so that it is more gainful for each airline to place partially filled airplanes on runways in closely ranked order than to combine passengers in a single plane; more gainful because crowding costs are borne by other airlines, passengers, municipalities, ground transport, and that great majority—the general nonflying public.

We should not forget that in corporations the persons who manage the enterprise do not own it. The desire of executives for personal gain often takes priority over the desire for gain for the corporation. Further, there is a tendency for corporate groups to have a trained incapacity such that costs and benefits other than those in their direct interest are not part of cost accounting. Hence, parklands and working-class neighborhoods are seen as inexpensive places for airports or highways and their sacred functions. Finally, power and concentration tend to force small operators, such as Wisconsin farmers, local industrial firms, or small logging operators out of operation and, thereby, to remove interest in husbanding the resources for heirs and to remove the enterprise from local accountability.

In our times, only the “economic goods” of the industrial system have clearly defined property rights and responsibilities. On the other hand, the “bads” of the system are lonesome step-children who belong to no one—and therefore to everyone. Such are the ironies of our times, that the only solutions we can conceive are more of the same—expand the market system, sell pollution rights, tinker with technology, pass more laws, identify those responsible for the grossest deterioration of the environment, and give them the largest subsidies to stop. Under these conditions, the first function of land-use planning has been the **validation** of exponential growth in machines, sprawl, and junk; in this way, planning legitimates the speculator hiding in us all. Hence, my first law of planning—each new plan incorporates all the failures of previous plans.

Because of the weight of traditions, it is certain that there will be a struggle to retain traditional patterns, just as it is certain that the trend must be toward radical rearrangement in

the distribution of property rights and responsibilities, a rearrangement that will require more than a dreamy slip into Consciousness III and a better expression of patriotism than decal flags and “love it or leave it” bumper stickers.

Rather, we will require completely new property institutions that will pinpoint responsibility between persons and across several generations as clearly as those of tribal societies. And further, such institutions must recognize the really important property rights of all of us at the tail end of the twentieth century. Though the media will continue to proclaim our need for rights to newer and more forms of consumer property, the junkyards, auto graveyards, and sanitary landfills speak eloquently of our contempt for what the media proclaims as our “needs.” Those property considerations that are, and will become, most important will relate not to **things** but to **services** essential for a good life. As individuals, we need rights of equal access to the creations of our society—its food, shelter, health services, information, means of mobility, amenities, protection, and meaningful employment. Communally, we need rights to renewable resources such as air, water, wildlife, and forests, and we need imaginative planning to conserve energy sources and nonrenewable resources such as the land.

## CONCLUSION

Throughout his history, *Homo sapiens* has been concerned acutely with survival but has behaved as though that survival were primarily dependent upon placating omnipotent gods of infinity and retribution, or upon following the modern secular shaman with his promise of unending “friendly skies” and eternal hedonistic bliss. Our tendency is to carry on as in the past. Yet for the first time in the history of the species, there are no tranquil isles, no vinelands into which to expand. The world has become finite and emptied of fertile Oregons beyond the desert.

Our leadership seems unable to recognize the finiteness of our earth. It does not recognize that we have reached the end of unlimited and cheap energy supply, that we will no longer be



able to spend fossil fuels to gain cheap food, and that the green revolution was a cultural and ecological fizzle.

We continue to act like the Donner party in its early stages, privately selling and buying under ever rising inflation and the increasing animosity of the poor. Like those solid New England merchants facing an unknown Sierra winter, we delude ourselves into thinking the old system will work even though the environment has changed radically. We avoid cooperation and sharing and mutual aid. We look to the other person to make the sacrifice and do the work. We expect the present distribution of wealth and prestige to remain intact. The Donner party held firm to the old enterprising values. They ended by devouring one another.

Is it not time that the oldest democracy in the world, celebrating its second century of existence, stopped acting like a petulant adolescent in regard to the primary producing regions of the world? The Organization of Petroleum Exporting Countries (OPEC) owes us nothing, did exactly what we would have done in a similar situation, and is not the central cause of our present problems. Indeed, we owe the OPEC countries gratitude for forcefully reminding us of our gluttony.

Certainly those learned professors who mutter about armed intervention to “save our economy” must not have noted the stupidity of the one-hour commute in the 8-miles-per-gallon dreamboat that maintains developers, construction unions, real estate agencies, Exxon, and the automobile industry as growth industries. Is an economy that can survive only through exponential growth in garbage and waste an economy really worth saving? Because of increased consumption of processed and fast food (MacDonald’s and so forth) and other basic shifts in our diet, we now give an 8- to 10-fold caloric subsidy of energy for every calorie we consume (9, 17, 19). What kind of crackpot view of reality assumes that the survival of a fast-food chain is important enough to seek war in the Middle East?

We know that the most efficient energy converter is the human being himself (6)—yet, at the very time when we are grumbling about the policy of the OPEC countries, we can think of nothing better for our unemployed workers than the

dole. We strengthen our rejection of the healthy older citizen, the minority citizen, and the female citizen as part of our energy resource. Yet we know they are essential resources; during every war we suddenly discover their vitality, intelligence, and skill, and we encourage them to reenter the labor force. Indeed, as Eric Hoffer argues, the strength of our nation is our people—independent, creative, flexible, and hardworking. Hoffer has said on television that he could take any group of Americans and in a short while accomplish almost any task. We know he is right.

If we are to love land, let us really love it. We must let no more agricultural land be planted to parking lot, supermarket, suburbia, “condominiumania”, or second-home Swiss chalets. Indeed, we must have an aggressive policy of reclaiming much of the sprawl for agriculture again. Let us make the farmer, not the promoter, our national hero. Let us recognize that forestry, and other renewable resource practices, requires investment. Forestry cannot sustain itself on money from timber harvest alone—the result of this myopia is that we think more about present markets than about future reproduction.

Our people and our land are unequalled in the ability to produce food and fiber. Wisely encouraged, our agriculture and forestry have the enduring capacity and world worth to sustain our influence and promise of good hope.

Though all the voices of the media will continue to proclaim that the highest achievements of our civilization are spray deodorizers, flip-top beer cans, electric toothbrushes, and color television, such absurdity may be endured as long as we remember that the only basic resources of any society are its people, its history, and its land. In this sense, we have abundant and strong resources and an optimistic future. We but need to reclaim our property.

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# The "Adequacy" of World Recreation Resources

J. Alan Wagar

Because we do not "live by bread alone," we want to know the potential of resources for meeting current and projected recreation needs. In examining this it has been useful, here in the United States, to classify recreation resources as locally, regionally, or nationally important. The temptation is great to add "internationally important" as an even higher classification. But, although we have various reasons for being interested in the recreation resources of other nations, we must avoid defining them from our particular set of assumptions.

The importance of recreation and recreation resources is relative rather than absolute, and when we move from one nation to another, we often find a people's priorities dramatically affected by beliefs, attitudes, conditions, and possibilities that differ substantially from ours. The idea that we in the United States can define what is or is not an adequate recreation resource in Africa or Afghanistan or the Philippines, or some such place, is nonsense. Even worse, it is probably ethnocentric arrogance.

Contrary to popular belief, resources are not fixed entities that have existed for thousands of years and have universal meaning. Rather, resources appear whenever our insights, desires, and technology lead us to evaluate selected parts of our environment as useful. For example, coal was not considered a resource 700 years ago in the British Isles. It was simply a black rock that made plowing difficult. During the 1700's, our western forests and mountains were not a recreation resource to American settlers. In the early 1800's, petroleum was not a resource of any consequence. And during the 1930's, uranium, beryllium, and titanium were of no commercial importance and were not considered resources. The point is simply this: what can be

considered a resource depends greatly on the value systems, the knowledge and technology, the relative abundance, and the options prevailing at a specific time and place. This is especially true for recreation resources.

Because recreation is a matter of experiences and preferences that differ from person to person and from culture to culture, recreation resources are even less definite than such commodity resources as timber supplies, crop land, and iron ore. The usual measures such as acres, gallons, and board feet simply have no application to either the quality or the quantity of recreation. Consider, within our own society, the contrasts between water skiers and canoeists, wilderness hikers and trail bikers, rock-and-roll fans and opera buffs. Then expect even greater differences in taste and perception between our society and others.

We must not judge the adequacy of other people's recreation resources by our own value orientations and experiences. Many societies lack our traditions of hiking and camping and our idea of wilderness. A dichotomy between man and nature is not assumed by all cultures, and most societies do not have romantic notions about "roughing it out West." For recreation, our ideas of adequacy have been conditioned by such general abundance that what we consider adequate is beyond the wildest dreams of a majority of the world's citizens. These people are too poor to travel anywhere for leisure pursuits, and recent events suggest that they probably will remain so. Amid poverty, the tradeoffs between recreation and other needs are quite different than amid plenty.

All this has direct implications for any discussion of worldwide recreation resources. Instead of examining world recreation resources as an extension of the ethic of **Outdoor Recreation Resources Review** (1), it is more appropriate to consider how recreation seems to be perceived in different places now, and how this perception might change. Thus the criterion for "adequacy" will be the expectations of local populations rather than the standards developed in the United States. For a rough examination of this adequacy, we can divide the world's

nations into three broad categories: rich and uncrowded countries, rich and crowded countries, and poor countries.

### **RICH AND UNCROWDED COUNTRIES**

The easiest countries to consider are those most like us, the rather rich and uncrowded nations. These include Canada, Australia, New Zealand, Sweden, Norway, and perhaps the Soviet Union. Here our own values and preconceptions are at least somewhat valid. Here also, we have the most options and flexibility. The major recreational regions of these countries are often distant from their big population concentrations. These countries all have extensive areas of forests or other open lands, however, many of which are in public ownership.

With some foresight and zoning, recreation resources in these countries likely will be ample. In many instances, areas are still being set aside specifically for recreation. Current ideas of free access and quality probably cannot be maintained, especially for wilderness recreation in which the quality of individual experiences is often inverse to the total amount of use. But evaluation of quality tends to shift with what is available, and the richest and least crowded countries probably will continue to enjoy a better variety of recreation options than will ever be available in most other countries.

### **RICH AND CROWDED COUNTRIES**

The industrialized but more crowded countries, such as England, Japan, and most of western Europe, are regions that probably have reached a fair equilibrium in terms of recreation resources. In crowded parts of Europe, for example, it is unlikely that a great amount of additional land will be set aside for recreation. The recreation areas that these nations now have are about all they will ever have.

I have found the recreation habits of Holland, Germany, and Switzerland to be quite instructive. For example, sales of tents, trailers, and other camping equipment have boomed in recent

years. But campers don't expect wilderness when they camp. The quarter-million-acre Veluwe Region of Holland, for example, has more campsites than all of Switzerland. But most of these campgrounds are really closely spaced and self-contained resort communities. Although people live in tents or trailers, many of the sites have swimming pools, playgrounds, recreation halls, and pet farm animals so that people can vacation entirely on the site.

People in much of Europe, like urbanites in this country, do not seem to distinguish greatly between outdoor recreation and other recreation. They tend to seek pleasant settings without great emphasis on heroic challenges or getting away from people. Vacations usually center in villages located in such pleasant regions as Switzerland, the English Lake District, and the seaside. The many restaurants in scenic settings suggest an ethic of enjoying nature in comfort rather than "meeting it on its own terms." In the parts of Europe I have seen most trails seem to be walking trails rather than hiking trails—designed for a pleasant stroll rather than a test of one's capabilities. Also, although the word "natural" has much the same emotional load in Europe as in the United States, criteria for naturalness are considerably looser. For example, a Dutch colleague accepted the idea that national parks should be "natural" but was horrified by the fact that all the dead trees in Yellowstone were not being utilized. In Holland's Hoge Veluwe National Park, timber sales help provide operating income, and the Dutch idea of "nature" seems to be intensively managed land.

Although many Europeans have a higher tolerance toward crowds than we do, they have evolved some mechanisms to create uncrowded places. In Holland, at least, you can join an organization that leases areas for walking and excludes nonmembers. Also, the Dutch Forest Service has set up "passport campgrounds," open only to those who have earned their passports by passing an examination. In England, a national park is a scenic amenity area, usually in agriculture, pastoral but not natural.

Recreation patterns in the more crowded parts of Europe are, in many respects, an extension of the trends we see in going from west to east in the United States. With increased crowding,



we probably can expect to see our recreation patterns evolve toward those of Europe.

### THE POOR COUNTRIES

The world's poor countries have highly varied cultures and governments that usually differ substantially from our own. Some of the oil-producing nations recently have become rich rather than poor, and other countries with rich lands and minerals are undeveloped but potentially rich. Such areas as India and much of the Middle East, tropical Africa, and South America, however, are undeveloped and overpopulated. That is, their populations are already too high to be supported by their cropland, other resources, and foreseeable levels of technology. Many of these countries have been kept backward by a feudalistic stratification of society and probably will stay backward because their rapid growth in population continually consumes the surplus needed for economic development.

In general, recreation in the poorer countries is of low priority, especially for the average person. Among the poorest countries, concern with survival must exclude all else. The few people who can afford recreation often take foreign vacations and tend to have European attitudes, with outdoor recreation being a pleasant diversion. In the poor countries, little sentimental fervor seems to exist for wilderness and the treatment of natural wonders as sacred trusts or shrines.

If expectations rise, they probably will be shaped so strongly by what is possible that, in a rather simple sense, we can expect supply to be adequate to meet demand. In the United States, general abundance has permitted us to demand recreation without the discipline of conscious payments or tradeoffs. With similar reasoning, the "demand" for Jaguar automobiles would be nearly infinite. In a worldwide sense, "adequacy" of recreation resources is largely a matter of human expectation rather than physical supply.

Rather than drop the matter of adequacy with this explanation, we should consider other commonly expressed ideas related to recreation in the poorer countries. Several need

examination. These include the idea of providing opportunities for international tourism, maintaining options for a later stage in the country's development, and preserving samples of a nation's heritage.

### **Tourism**

Consider international tourism in East Africa, where survival of the tremendous herds of ungulates is in question. The Africans are under pressure to preserve this spectacle as an attraction of worldwide significance. Human populations are pressing so hard upon the land that many Africans think the wildlife must go. Supposedly, when a Britisher was scolding an African for such an attitude, he was asked in turn, "Where are the wolves in England?" In *The Mountain People*, Turnbull (2) provides a chilling account of the choices involved. He describes the Ik, a tribe living on the Kenya-Uganda border whose way of life was shattered when their traditional hunting lands were taken for Kidepo National Park. At starvation level, they seem to have lost all social integrity and all concern for each other.

Ultimately, the matter of East African wildlife as an international tourist attraction probably will be settled on the basis of human nutrition. If tourism provides enough dependable income to feed people better than would alternative uses for the same land, wildlife will be preserved. But if international tourism falters on energy shortages, international unrest, or some other problem, the wildlife probably will be lost. Conceivably, a middle ground exists. The native grazing animals of East Africa can produce several times as much protein per acre per year as can domestic stock and might be cropped as a food source. Intensive farming of the same land probably is not ecologically viable, but may be tried as human populations rise.

In other areas, tourism might be more viable. Until recently, for example, Ecuador apparently questioned establishment of a national park in the Galapagos Islands as only benefiting others. Now, however, Ecuador is moving ahead with a park and seems to have set up mechanisms to capture the foreign exchange generated by it. The islands probably can return more to Ecuador in tourist trade than in other uses.

### **Maintaining Options**

The idea of maintaining options for later development is an appealing rationalization. But it is an idea that has merit for poor countries only if they evolve into rich nations. For the poorest nations, this seems highly unlikely. The "Green Revolution" has fizzled. Margins of surplus are extremely limited, and immediate needs are so pressing that future cultural and esthetic benefits seldom are given much weight.

### **Preserving Samples of Heritage**

Although preservation is not the same as provision for recreation areas, the two often become tangled—especially in regard to national parks. During 1970 and 1971, I had the good fortune to visit several national parks in Chile and to consider the values of such parks. Average Chileans have little concept of the size of their more than 50 parks, some of which are quite large and impressive. Rather than thinking of a park as a large area, most Chilean visitors think of it as the small cluster of facilities they actually use—the hotel, campground, and picnic site. Thus, thoughtful zoning might permit heavy recreation that would generate public support for a park without much interfering with preservation.

In Chile, and in many other countries, the crucial reason for preserving natural areas is to provide benchmarks by which to judge what is happening to the rest of the land. In parts of Chile, land use is horrendous, with forests burned to provide pasture, which is then overgrazed until it slides off the mountainsides, to the detriment of both land and rivers. The issue is not an esthetic one, but one of helping people see what they are doing to themselves. The basic problem is to maintain viable ecosystems that will support people into the future.

## **CONCLUSION**

The supply and demand for recreation are going to meet at whatever point a society says "This is what we can afford." In the rich countries, we let "demand" increase because we can afford to do so, and we have cultural traditions that encourage us to

demand ever more. But in the poor countries, demand will be limited because many other priorities come far ahead of recreation. Thus, their "demand" may be comparable to that for snowmobiles in the United States fifty years ago.

I do not subscribe to theories that the world's nations generally will evolve toward the abundance we take for granted. Many persons are starving to death right now, and the situation may become much worse. I even consider it probable that rich countries will become substantially poorer by the end of this century. In the rich nations, I think we will still enjoy rather abundant opportunities for recreation. But worldwide, I expect recreation to yield to more basic problems of survival in the planning and allocation of resources.

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# Man and Forests- A Prodigal Relation

Richard K. Hermann

**A**s long as man has been on this planet, forests have been part of his environment. They have shaped his destiny as he has shaped theirs. Today, because of a rapidly expanding human population, forests will become more important than ever as contributors to mankind's livelihood. Therefore, it is timely for us to pause and to consider how forests came into being, how they developed, and how they have been depleted.

Forests have had a long and often turbulent history. Written records cover only the most recent portion of this history. Our knowledge of the forests of prehistoric times contains many gaps. Inferences from the archeological and fossil record, however, permit us to draw a broad outline of past events.

## FORESTS BEFORE THE ADVENT OF MAN

Forests began to appear in the Silurian period about 350 million years ago. Their development reached a peak during the Carboniferous period, 270 to 220 million years ago, when the climate was completely frost free between latitudes 60° N and 60° S (7). Although evidence is lacking that the forests of the Carboniferous period contributed anything to the development of modern arborescent types, these ancient forests are important in relation to the use and ultimate preservation of our present-day forests. Wood was the principal source of fuel before the widespread use of coal. When we look at our dwindling forest resources, we may be thankful that the forests of Carboniferous time, entombed in the strata of the coal

measures, have relieved our modern forests of much of a great and potentially destructive burden.

After the Carboniferous period came the Permian, about 200 million years ago, during which the world experienced a period of glaciation that dwarfed any of the glacial cycles of the Pleistocene epoch. The result was widespread destruction of old forms of plant and animal life and the beginning of the development of new forms. At the opening of the Tertiary period some 50 million years ago, trees as we know them today were already present (47). Early Tertiary time was marked by a favorable climate, but by mid-Tertiary time the climatic pendulum was swinging back again, and after the close of the Tertiary period the globe experienced once more a series of glaciations. The impact of the Pleistocene glaciations was less marked than that of the great Permian glaciation, and the floras of the world appear to have recovered lost territory with considerable ease, except in Europe. Many genera and species characteristic of the Tertiary forests of that continent disappeared permanently (23).

Looking back over the history of forests before the advent of man, one marvels at their biological resiliency. Forests persisted through tremendous geologic upheavals and catastrophic climatic changes. Perhaps there is hope that forests also will survive the destructive impact of man.

### THE ADVENT OF MAN

How long *Homo sapiens* and other hominoid species have been active on earth is a matter of dispute, but we may safely assume that the million years of the Pleistocene epoch encompasses all truly human activity. Man's role in changing the face of the earth is of even shorter duration and probably does not extend for more than the last 20,000 years.

Early man was primarily a food gatherer and hunter. We can only surmise how he affected the forest. Paleolithic man had discovered fire as a tool. The extent to which he used it is unknown. But more and more evidence has accumulated to indicate that preagricultural men had a major effect upon their

environment by burning, both deliberately and accidentally (48). The existence of great forest fires is documented by thick layers of charcoal and even carbonized trunks at several sites in the Netherlands and in northern Germany. These strata frequently contain artifacts, fireplaces, and other refuse of the camps of Stone-Age hunters (36). Man's use of fire most likely brought about major changes in vegetation, but they were changes making earth more livable for him (10). Destructive changes that reduce basic resources and injure the capacity of the earth to provide for man come with later cultural developments. For Paleolithic man, conservation problems did not exist, except the difficult one of preserving himself in a vast and often hostile world.

The most important change in the relation of man to forests came with the domestication of plants and animals and the rise of agriculture somewhere between 7000 and 5000 B.C. (43). Activities of man in the millenia since then have reduced the area of the world's forests at least one-third, and perhaps more than one-half, to about 8 billion acres. The three main reasons for human pressure on the forests have been, and continue to be, demand for fuel, for industrial timber, and for crop and pasture lands.

## FUELWOOD

Gathering and cutting firewood in preagricultural times probably had little or no impact on forests. Demand for firewood increased greatly when farming permitted significant increases in human populations. Invention of the pottery kiln, fired bricks, ore reduction, glassmaking, and other industrial processes made further heavy demands on the forests for fuel, a demand that has continued unabated to this day in many countries.

Statistics for fuelwood consumption in the past are lacking. But we can obtain some idea of present demands on forests by considering these facts. Of all the wood cut in the forests of the world, nearly one-half is still burned as domestic fuel. As recently as 1945, two-thirds of the people of the world,

mostly in tropical countries, still used wood for cooking their food (4). In this respect, wood and the land that produces it have been, and still are, an integral part of the world's food supply.

There is still another relation between fuelwood and food production. In parts of the world where living standards are low and forests have been cleared to the point of destruction, the common practice is to collect and dry animal dung for fuel. This practice would not be harmful except for the adverse effect on food production. Regions already devoid of trees suffer steady deterioration of soil fertility as a result of overgrazing and erosion in the wake of wholesale forest clearance (13). When dung of grazing animals is removed rather than returned to the soil to help maintain fertility, the cumulative process of deterioration is accelerated. The problem of land deterioration has become particularly severe in parts of the Indian subcontinent (18), and establishment of fuelwood plantations is sought as a remedial measure (8).

The importance of fuelwood is shown by a dramatic example from ancient Ethiopia. The custom was to move the capital city from time to time as the readily available supply of fuelwood became exhausted. Not until the time of King Menelik II were there any changes. When his capital, Addis Ababa, was threatened with a wood famine, he brought in fast-growing eucalyptus trees from Australia and thus saved his capital from relocation (58).

As early as 3000 B.C., the forests of Cyprus were depleted to provide fuel for copper and silver smelting. Wood remained the sole source of smelter fuel until the 17th Century when coke came into use (16). Beginning in Roman times and continuing through the Middle ages, large tracts of forest were felled throughout Europe because of need for industrial fuelwood. It was perhaps the iron industry that had made the greatest single demand, particularly in wooded valleys of the uplands of France and central Europe, where endless series of small metal establishments were to be found (38). As clearing progressed, huts of the charcoal burners moved on to still untapped forests.



## INDUSTRIAL WOOD

The demand for timber as building and industrial material by ancient and modern civilizations put even greater pressure on the forests than did cutting of fuelwood. Wood played an important role in construction of buildings even in ancient times. It was King Solomon, nearly 3,000 years ago, who made an agreement with Hiram, King of Tyre, to furnish him cypress and cedars for the construction of the temple at Jerusalem (58). Solomon supplied 80,000 lumberjacks to cut the timber and 70,000 to skid the logs to the sea. Of the forest once covering 2,000 square miles, only four small groves are left today.

Wood was a common building material in Roman times, and the cities and villages of medieval Europe were built almost exclusively of wood, save for walls and cathedrals. In this country, the white pine stands of the Great Lakes were destroyed to build the farms and towns of the Corn Belt.

Demand for mining timbers was one of the significant reasons for early deforestation in southwestern Asia, mainland Greece, Cyprus, the Sierra Nevada and Sierra Morena of southern Spain, the Ore and Harz Mountains of central Germany, the Low Tatras of Slovakia, and the mining regions of North and South America. The forest destruction wrought by mining leads William Wright (59), in his discussion of mining in Nevada, to say that the Comstock Lode can in truth be called the tomb of the forests of the Sierras.

Abandonment of mines in the Spanish colonies of the New World was often forced by exhaustion of the necessary fuel and timber rather than the body of ore (57). Deforestation near mines in Mexico became so serious that the first viceroy of New Spain warned his successor in 1546 of an impending wood shortage (44). The result was the promulgation in 1550 of a forest regulation, probably the oldest in the New World (41). In Europe, too, regulation of forest use was begun early in regions where mining made heavy demands for props and charcoal. The Salzburg forest ordinance of 1237, one of the oldest in Europe, prohibited clearings in the interest of the salt mines "so that the

cut forests may grow up to wood again” (20. Because of the close connection between mines and forests, their administration was often combined under one man in the Middle Ages. Thus, it is no coincidence that *Sylvicultura oeconomica*, perhaps the oldest technical treatise on forestry in central Europe, was written in 1713 by Hans Carl von Carlowitz, then director of mines in Saxony (45).

The shipbuilding industry has extracted a heavy toll from ancient forests, particularly in Europe, and most of all around the Mediterranean Sea (1). The forest was one of the casualties in the naval wars fought by the Phoenicians, Persians, Greeks, Romans, Arabs, Venetians, Turks, Spaniards, Dutch, French, and British, to name only the most important naval powers of bygone days. The mountains of Greece were nearly stripped of trees by the 5th century B.C. Thucydides (54) informs us that one of the purposes of the Sicilian expedition of Athens in 415 B.C. was to gain control of the abundant supply of ship timber in the forests of Italy. A century later, Theophrastus (52) observed that ship timber was scarce everywhere in the eastern Mediterranean. The western forests apparently did not last long either, because by the first century A.D., Pliny (39) refers to exhaustion of the timber supply from the Atlas Mountains.

Some forests in the Mediterranean, such as the famous cedar forests of Lebanon and the Taurus Mountains of southern Turkey, the forests of Cyprus, and the forests along the Adriatic coast, lasted well into the Middle Ages. The Turks were responsible for final destruction of the forests of Lebanon and Cyprus in the 16th century. The forests in Istria and Dalmatia along the Adriatic coast were still in existence, although in poor condition, when Venice acquired the region in the 15th century. The Venetians declared all forests national property reserved for ship timber and placed them under management. They instituted a forest service, regulated grazing, and prohibited clearing. A reorganization of this service and division into districts took place in the 16th century. But the underpaid district officers became black marketeers in timber and failed to enforce grazing regulations, so that by the close of the 18th

century the forests were completely ruined in spite of the attempts at reform (20).

With the overseas expansion of Europe, need for shipbuilding timber was increased greatly. In Britain, naval wars with the Dutch in the 17th century, and with the French in the 18th and early 19th century, put such a strain on the English oak forests that they have never recovered (15). Dutch fleets of the early 17th century were built mostly with timber from the oak forests of Germany, which were heavily logged to raise money for indemnities after the Thirty Years War. The rise of the Dutch Navy was even more dependent upon the forests of the Baltic countries, which also served as sources of supply to the British and Spanish navies (1). The timber and "naval stores" of these northern countries were as important to sea power in the 17th and 18th centuries as heavy industry was to be in more modern times. In the words of Darby (16), the timber problem remained acute for the navies of Europe until March 9, 1862. It was on that day that the Battle of Hampton Roads in the U.S. Civil War demonstrated the superiority of the ironclad ship. The era of wooden ships had suddenly ended, and it left a permanent mark upon the countryside of Europe.

### CROPLAND AND PASTURE

Concerning the third major cause of forest reduction, we can state without exaggeration that forests have yielded far more ground to the agricultural pressures of expanding populations than to any other demand. About one-third of the original forest in the United States has been cleared, and much of this once-timbered land is now under cultivation (11). Brazil has lost 40 percent of her forest area, most of it to agriculture (56). The forests of India, China, and Europe have shrunk to less than one-fourth of their size since the beginning of agriculture. All over the world, farmers and herdsmen have won most of their land at the expense of the forest, and there is good reason to think that the forest will continue to lose ground. Through much of history the farmer has regarded the forest as his

enemy, a conflict already described by the Roman writer Secundus (21) when he asked "*Quid est agricola?*" (Who is the farmer?) and answered "*Silvae adversarius!*" (The enemy of the forest). We find the same attitude in the Middle Ages when we hear an Anglo-Saxon poet describe the plowman as the "Grey enemy of the wood" (22).

The tradition of converting forest into farm land is several thousand years old. Early agricultural practice probably was similar in both tropical and temperate regions. A piece of forest would be felled, burned, and the ashes used to fertilize the soil. The farmer would make holes with a stick and put in tubers or grains, protect the cultivated plants from wild animals, and reap. Because the supply of fertilizer provided by the ashes was usually sufficient for only a crop or two, these primitive farmers were forced to move on to a newly cleared and burned area and let the abandoned plots revert to forest. Such a shifting, forest-clearing system of agriculture developed on every continent and has persisted in large portions of the world to this day.

Neolithic and Bronze Age farmers in Europe practiced a migratory slash-and-burn agriculture (9). In Denmark, layers of charcoal have been observed in some of the bogs in horizons poor in tree pollen, indicating forest clearance, but rich in the pollen of grains, cereals, and weeds—especially the tell-tale ribwort plantain (*Plantago lanceolata*). Regeneration of the forest is attested to by the predominance of birch, alder, and hazel pollen in the succeeding layer of peat (26). Shifting agriculture and the burning of forest land, known as *Brandwirtschaft* in Germany and *Svedjebruk* in Sweden, continued in parts of central Europe (45), Scandinavia (33, 35), and Russia (19) well into the 19th century. In the Ardennes and French Alps, temporary clearing and burning, "*l'essartage*," were encouraged by a 1766 edict that exempted newly cleared land from taxation for fifteen years (5). In parts of Finland, the mosaic of patches of birch and alder, trees of the pioneer stage in succession, are indicative of areas where shifting cultivation has been practiced until recent times.

The shifting, forest-clearing system known as *ladang* in Southeast Asia and *milpa* in South America is well adapted to

tropical lands as long as the pressure of human populations is low and cleared areas can revert to forest and have fertility restored after agricultural use (24). The system breaks down when populations grow too rapidly and the land does not receive the rest and regeneration it needs for fertility. Collapse of the Mayan civilization that was supported by milpa agriculture has been attributed to this sequence of events (12). Population growth and adherence to shifting cultivation once again have created serious problems in parts of Latin America because of permanent forest destruction and subsequent erosion and depletion of soil fertility (56).

Perhaps the best studied example of the destruction of tropical forests by fire, primitive agriculture, and grazing is the island of Madagascar, which has lost nearly all of its forests in the last millenium (3). Shantz (49) reached the conclusion that forests in tropical Africa occupy today only one-third of their original area as a result of the use of fire in primitive agriculture. Expansion of the Sahara Desert is thought to be caused largely by a combination of shifting cultivation and heavy grazing pressure. Three thousand years ago the whole western part of the Sahara was covered by parkland savanna and as late as the 16th century the southern border of the Sahara was about 250 miles farther north than today (25).

The history of land use in Africa is perhaps best known for the northernmost parts broadly referred to as the Mediterranean. This region has the dubious distinction of being almost everywhere the textbook example of destructive land-use practices. Indeed, the character of the land in the Mediterranean region has changed since the days of the great empires of Sumer, Assyria, Greece, and Imperial Rome (46). Why is it that Mesopotamia, the land between the rivers, once the agricultural center of some of the world's oldest civilizations, is today a desert? What has turned North Africa, once known as the granary of the Roman Empire, into a desert? The often advanced hypothesis that a climatic shift toward a drier and warmer climate caused the changes is untenable in light of our present knowledge. We have overwhelming evidence that man and not climate must be held accountable for the encroachment

of desert upon the formerly fertile lands of the ancient empires (44).

The forests of northern Africa from Morocco to Egypt, of Syria, Israel, Lebanon, and the Adriatic coast have been largely destroyed. On the average, about 15 percent of the land of Spain, Italy, Greece, and Turkey are still forested, but much of the forest is degraded. The process of land destruction, with minor variations, has followed the same course all over the Mediterranean. Forests were cut to provide more grazing land (27, 55), mostly for sheep and goats, and to provide wood for fuel and a wide variety of construction. Regrowth of the cutover land was prevented by heavy grazing, periodic burning, and continued cutting for fuelwood. The soil was left unprotected and was washed and blown away. As denudation reached advanced stages, an ever-increasing amount of detritus was carried from the mountains into the cultivated plains, covering them with thick layers of alluvium.

A comparison of the Nile and the Tigris and Euphrates river regions is enlightening when one ponders land deterioration around the Mediterranean. The agricultural lands of Egypt, irrigated by flood waters of the Nile, have been farmed for at least 6,000 years and have remained productive. Egypt still is densely populated, but the lands of Mesopotamia are mostly desert and now support only a small fraction of their former population. A look at the headwaters of the two river systems helps explain the differences between these two regions. The headwaters of the Nile lie in the highlands of Uganda and Ethiopia, areas that have remained largely undisturbed by human use. By contrast, the headwaters of the Tigris and Euphrates lie in the highlands of Armenia, which have been in the path of wave after wave of migration of nomadic tribes from the plains of Asia. The Armenian highlands have been deforested to provide grazing land for livestock and wood for the growing cities (42). Resulting erosion has caused an ever-increasing load of silt to be carried by the Tigris and Euphrates. As long as strong empires centered in the lands between the two rivers, the irrigation canals were kept open. But in the 13th century, invading Mongols destroyed the

irrigation systems and the silt-laden flood waters carried soil without interruption from the highlands to the sea. The silt has filled the Persian Gulf a distance of 180 miles from the point where the rivers emptied in Sumerian times (18). Thus, the population decline in Mesopotamia was not caused by loss of Mesopotamian soil through erosion. The fertile lands are still in place and life-giving waters still flow in the Euphrates and Tigris (31). But erosion in the deforested hinterlands caused silt to choke the ancient irrigation canals in the lowlands.

### THE ATTRITION OF CHINA'S FORESTS

Perhaps one of the most impressive, although seldom mentioned, examples of reduction in forest area is provided by China (29). It is a large country, occupying about one-twelfth of the land surface of the world. The regions in northern and northwestern China along the Yellow River, where the Chinese first settled, once were wooded extensively (51). The early settlers apparently did little clearing and tribal chiefs set aside woodlands as hunting preserves called *yu*. About 2700 B.C., however, a period of extensive forest clearing began that lasted for nearly 1500 years until establishment of the Chou Dynasty.

The period of the Chou (1127-255 B.C.) was a golden age in Chinese history, both in general cultural achievement and land-use policy. A highly efficient forest administration was established under the Chou Dynasty, representing probably the first forest service to come into existence, and forest management was well organized and competent. After the Chou Dynasty, a general period of decline set in. Wars laid waste much of the settled land along the Yellow River, and forests were reduced to such an extent that wood for public buildings had to be brought from remote mountain areas in central China. As D. Y. Lin (30), former Director of Forestry of China, has phrased it "The demolition of forests by ax and fire has formed a sad theme for poets and historians, who have described the ruthless destruction and its devastating effects of which "China's Sorrow," flooding by the Yellow River, was one." During the Tan (A.D. 618-907) and Sung (A.D. 960-1128)

dynasties, some efforts were made at forest preservation. In succeeding centuries, however, destruction of forests accelerated as a result of dynastic wars and of a growing population's need for farmland, and the destruction soon extended from the Yellow River basin to the basins of the Yangtze and Pearl Rivers.

So, after more than 5,500 years of destructive action, interrupted mainly by the enlightened conservation of the Chou, the forests of today's China are no longer "boundless stretches" and have shrunk to about 9 percent of the total land area of the country, ranking China among the most severely deforested countries of the world.

### FOREST CLEARING IN EUROPE

Development of agricultural practices in western and central Europe took a different course from that in other parts of the world and had a different impact on forests. Although neolithic man practiced shifting cultivation, a more stable type of agriculture emerged as populations increased. Because forests covered most of the land and because natural range land was scarce, conditions were unfavorable for the development of pastoralism apart from agriculture. Thus, from early times livestock were kept close to the farm lands and growing feed for stock became as important a part of farming as growing food for man. Although agricultural practices expanded, heavy forests served as a barrier against too rapid extension of farming lands.

Nonetheless, extensive forest clearing has taken place over the last 2,000 years. In Roman times, Europe still was covered with immense forests. The "Hercynian Forest" of classical writers such as Tacitus (50) stretched eastward from the Rhine river for a vast distance. And in his account of the Gallic Wars, Caesar (6) tells of men who had journeyed through this forest without reaching its end.

The first great period of forest clearing in western Europe began after the breakup of the Roman Empire in the 4th Century and ended under the reign of Charlemagne about 800



A.D. The second great wave of forest clearing came in the 11th and 12th centuries, receiving its greatest impetus from two historic developments. One was the establishment of new monastic orders, especially the Cistercian, which saw conversion of wilderness into arable land as its God-given mission. The other was the advance of the Germanic people eastward into Slavic lands (28). This advance, under the impetus of both economic and missionary motives, led to clearing of tremendous forest areas. The eastward movement of the Germanic people in the Middle Ages has been compared to the expansion of the American people westward from the Atlantic Seaboard. What the new west was to Americans of the 19th century, the new east meant to Germans in the Middle Ages (53). Although historical analogies are often misleading, this comparison does emphasize the colonial character of much of medieval Germany.

The great medieval period of clearing did not continue uninterruptedly into modern times. A period of economic stagnation and marked population decline occurred between 1350 and 1450, during which many villages were deserted and field and pastures abandoned. The reasons for this recession are not fully known, but war and the "Black Death" undoubtedly contributed to it (40). The Hussite Wars (1419-1436) in Bohemia and the Hundred Years' War (1337-1453) between France and England reduced populations in many places by half or more. How common the return of woody vegetation to the untilled fields must have been is indicated by an old saying of people in southwestern France that "the forests came back to France with the English." In Germany, the Thirty Years' War (1618-1648) left a staggering legacy of devastation, and forests reclaimed much of the once cleared land.

Although considerable forest areas were left in Europe, shortage of wood became an increasingly serious problem beginning with the 16th century. Economic recovery and population growth in the late Middle ages were accompanied by an ever-increasing appetite for wood. Fear of a timber famine led locally to restriction of wood use and timber exports. An amusing restriction of this kind has been reported from a small town in Germany where the bakers were forbidden to bake

bread for any but the citizens of the town (20). By the middle of the 17th century the threat of a timber shortage had become so imminent that learned societies throughout Europe were asked to look for solutions. For instance, the British Admiralty in its alarm over the timber shortage consulted the newly founded Royal Society, which in turn asked John Evelyn to report upon the matter. The result was the appearance of his *Sylva* or a **Discourse of Forest Trees and the Propagation of Timber in His Majesty's Domain** in 1664. But it was not until the end of the 18th century that orderly forest management and the task of rehabilitating the forests of western and central Europe was begun (38).

That so much forest had remained in the heartland of Europe in spite of the many centuries of clearing and exploitation is surprising. The survival can be attributed, at least in part, to a conflict of interests that arose in the 10th century. Set against the advantages of obtaining agricultural land were the interests of the chase and the wish to preserve forests as hunting parks. Many of today's publicly owned forests are such former hunting preserves. Among the best known are the Forest of Dean, the New Forest (formed in 1079 by William the Conqueror who named it the New Forest because it was an addition to the already existing crown forests), the famous Spessart oak forests, and Bialowieza National Park in Poland. Until the end of World War II, nearly half of the forests in central Europe were on the large estates of private owners, who had acquired these lands in the late Middle Ages and managed them for a long time, primarily as hunting grounds. On occasion, however, we find forests that have been preserved and managed through centuries for timber production. Perhaps unique in this group is the *Murgschifferschaftswald* in the Black Forest, acquired as a mortgage lien by a group of woodsmen in the 13th century (58). They were known as rafters because they floated great rafts of fir down the Murg and Rhine rivers to Holland for sale to shipbuilders. To the present day, the original 12,000-acre mortgage has remained in the hands of some of their descendants. It may well be the only forest in the world

that in single private ownership has had an uninterrupted producing record for 700 years.

### FORESTS OF THE "NEW CONTINENT"

Finally, we look at the part of the world that is most familiar—North America. It is interesting that wherever a few colonists have gone into countries of primitive culture, they have dropped largely to a primitive level of agriculture. This is well demonstrated by the history of colonization of the eastern United States, where land was ruthlessly cleared, which wasted the forest and eventually wasted much of the soil by erosion. With a forgotten history of land use and abuse behind them, the American settlers in a short time repeated every mistake that man has made since the first Neolithic farmer sank a digging stick into the ground. Through the southern states went waves of settlers, clearing and burning the forests to plant corn and tobacco and later cotton. Their crops made great demands on the soil and offered it little protection. Combined with careless husbandry, these practices were to leave a permanent mark on the American South.

Much of the hardwood forest of the eastern United States disappeared before the settlers' axes. North of the hardwood belt, the march of the lumbermen from Maine in the 1700's, to New York in 1850, to Michigan in 1870, to Wisconsin in 1880, and finally to Minnesota in 1890 was primarily a quest for white pine (14). The white pine loggers, with the destructive fires that followed in their wake, created a desolation so impressive that Americans finally realized that forests even in a new continent are not inexhaustible.

### THE CONSEQUENCES

In discussing the major types of human pressure on the forest resource, I have drawn an often bleak picture. One may well ask whether anybody realized the magnitude of what was happening, and whether there is any hope for change. We know

that attempts have been made since ancient times to preserve forests—an example is the establishment of a forest reserve in the northern part of the Lebanon Mountains by the Roman Emperor Hadrian in the second century A.D. (34)—but these efforts were localized and generally without lasting effect. Not until the 19th century were actions taken toward establishing safeguards against mindless forest destruction. In the 19th century, the first really progressive forest laws were passed in Europe. In this country, a milestone was reached with the submission of a report to Congress in 1874 by the Franklin B. Hough Committee of the American Association for the Advancement of Science (2). This report emphasized the need for withdrawing and protecting forests on public land, a process that began with passage of the Organic Forestry Act of 1897.

An “ecological conscience” is by no means an idea that originated in our time. Indeed, one of the first to recognize that man was often irrational in his treatment of the environment and thus might ultimately destroy the very base of his subsistence was an American, George Perkins Marsh, lawyer, member of Congress, and minister to Turkey and Italy. He set forth his ideas about man’s alteration of the earth in **Man and Nature or Physical Geography as Modified by Human Action** (32), which first appeared in 1864. His solution for environmental problems was that man should moderate his activities and develop a morality in respect to his use of the earth. He had some very concrete proposals, such as maintenance of certain proportions of land in forest and national control of natural resources. Above all, he thought it important to ascertain the probable effects of action before acting.

Marsh was a famous and widely recognized man both in Europe and in America. The House of Commons referred to his writings in connection with the alarming deforestation of India. He helped compile the irrigation laws of France, Italy, Spain, and California. Yet his work was submerged in the tide of opinion that everywhere saw progress in the command man had attained over nature.

Looking back over “7,000 years of conquest of the land,” as Walter Lowdermilk (31) phrased it, we can see that the rise

of our species from savage to civilized man has come at great expense to the resources of the world, and particularly to its forests. One cannot argue that we should cease to utilize our forests, but one can argue that ruthless destruction for only temporary advantage, followed by permanent depreciation of our forest resources, will have catastrophic consequences. In a way we have come full circle. We have paid for advanced civilization and technology with destruction of much of our natural resources and, thus, have returned to a problem not serious since Paleolithic time, the problem of the survival of man himself. Raymond Dasmann (17) says, "Until industrial man, armed with powers greater than his ancestors could imagine, makes use of the wisdom which his ancestors so painfully acquired, he remains in peril. Like the gods of old, he can make the earth into a paradise if he so chooses, or he can destroy it."

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