

## Barriers to Understanding the Influence of Use of Fire by Aborigines on Vegetation

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THE evaluation of use of fire on vegetation by aborigines could be more succinctly phrased "evaluation of aboriginal burning," but the latter phrase can be misunderstood. One might ask, "How can burning of Indians influence grass?" with the questioner implying the torch was used to ignite the aborigines rather than thinking of aboriginal firebrands being applied to dry vegetation by aborigines. If I employ the shorter phrase from time to time, it must be clearly understood I never wish to imply setting fire to people.

The historic records from around the world leave no room to doubt that primitive hunting and gathering peoples, as well as ancient farmers and herders, for a number of reasons, frequently and intentionally set fire to almost all the vegetation around them which would burn. Thick forests provide very little of use to any primitive peoples. Having only simple stone tools, there was no lumbering industry and large trees provided nothing useful to most Stone Age people except ash to fertilize their fields. Since aborigines have been burning all vegetation that would burn for at least a half million years, one may appropriately ask why scientists have paid so little attention to such application of fire.

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The main barrier to understanding the role of ancient fires on vegetation is basically the same problem faced by all science. The science of ecology must overcome the unscientific beliefs of the general population in the same way that the astronomers have replaced popular ideas about the stars with careful observations, theories and measurements. The conflict between science and religion is present as a factor in ecology as with astronomy, to continue the analogy. Parenthetically, the power of persistence of ancient, outmoded and unscientific beliefs is exemplified by the popularity today of the ancient Babylonian religious complex called Astrology. One cannot attend many Christian church services without hearing developed the theme of God's wisdom in the beginning in arranging the world as it is.

As the ecologist overcomes the difficulties imposed on all science by old-fashioned religion and entrenched folkways, he almost inevitably acquires a very low opinion of all ancient beliefs. Scientific explanations so often differ from popular folklore about the same aspects of nature that it becomes accepted as proper and efficient to dismiss ancient ideas at the beginning and to build new, firm foundations of empirical observations and tested theories. This has been done in ecology and has generally proved to be a good and appropriate method. Yet the usual scientific procedures are not always sufficient. The solutions to some problems can be aided by extending the time perspective.

Ecology as one of the newer scientific disciplines, has a very short history, so that the observations made by ecologists are usually limited to a few years or decades. It is not surprising, of course, that the ecologists should assume that they started their scientific observation of natural phenomena as nature had arranged them. There were many who did have an historical perspective, nonetheless, and lengthened their time span to include conditions of the area under study as they were when first occupied, that is, when first occupied by white European settlers.

From my reading of hundreds of ecological studies, I know that most cover a period of one to five years. A few take the really long view to cover the length of the personal professional careers of the researchers. The personal observations of a few cover over half a

century. A small minority are interested in history and find it profitable to report what the first settlers found, and a few go back to the first explorers. Few ecologists have been tempted to inquire into aboriginal habits and their possible influence upon the landscape extending back for millenia.

The failure of ecologists to use ethnographic studies is related to the general rejection of folklore as a proper source for scientific data. There is, however, another important circumstance which extends and fortifies the practice of scientists to ignore popular beliefs concerning problems under scientific study. Views of peasants and country folk belonging to the same race and culture as the investigator are placed below consideration, but ancient practices and explanations of red Indians and black Negroes warrant no serious thought, even if known. Usually the white scientists refuse to learn the ways of the colored aborigines, whether New World or Old World, because it is assumed such "children of nature" could contribute nothing to modern scientific inquiry.

The fact that even the more historically minded American ecologists have started their evaluation of the influence of man upon nature with the landing of the Pilgrims follows from the view that American Indians were part of nature like other animals. Aborigines could be ignored more easily than buffalo as forces of nature. The error in such neglect results in the failure to evaluate fire as a force of human culture influencing vegetation which is many times greater than the natural force of lightning.

It may be interesting to consider some examples of misinterpretation of the role of aborigines and fire and consider further the reasons for such a state of affairs.

We might start with the United States Department of Agriculture Yearbook for 1949 entitled *Trees*. In the section devoted to questions and answers (p. 20) the following appeared:

"Q. 'Why did the Indians start fires in forests?'

"A. 'Tradition says that they did so to drive game, but we have no positive proof that they did this as a regular custom over any area. The Indians had no matches and they used small campfires that they tended carefully; so, it is improbable that they set many fires.'"

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I do not know what Mr. Bergoffen, the author of the "Question and Answer" section quoted, considers "positive proof" or "regular custom" but he was mistaken. An employee trying to justify and support the no burning policy of the Forest Service had to strain hard to produce such a misrepresentation of the facts.

It is true, of course, that the American Indians did not have phosphorus tipped, or even sulphur tipped, matches before they were invented in Europe about 1840. In fact before Columbus' voyage of discovery few aborigines of the New World had "strike-a-lights" of flint and metal. The Eskimo and a few other tribes manufactured fire by striking flint and pyrites ("fool's gold"). American Indians, in general, including the very advanced Maya and Aztec of Central America and the Inca of Peru, used the fire drill for fire making. Most common was the simple drill, consisting of a straight stick of hard wood to be twirled between the hands while being pressed into a shallow depression, or hearth, on the edge of a flat piece of soft wood. Pressure and friction produced a spark which was caught in some highly inflammable material and blown into a flame. Under the best of circumstances producing fire with a fire drill is usually a laborious and time consuming job. In fact, to produce a flame with a fire drill is so difficult it is the rule that peoples all over the world went to considerable trouble to preserve fire rather than manufacture it. A hunting and gathering people with the simplest of structures for housing made their fires outside of their shelters and always left them banked with ashes or dirt, or burning into a large log, or into the roots of a bush, so that a spark would be available upon their return. They sometimes carried a "slow match," a tightly rolled rope of bark which would stay alight but would burn very slowly at one end, or would carry a large hot ember in a horn container with very little air admitted.

In view of the facts outlined above, it was the very absence of friction matches which caused the aborigines to allow forest and grass fires to get started. It is now well known that leaving campfires unextinguished is the cause of many wildfires. American Indians did not extinguish their campfires often because they wished to have a chance to get fire easily if their "slow match" became extinguished. Also, Indians just left their fires because they did not recognize any real harm coming from igniting any vegetation which would burn.

The full extent of the force of fires by aborigines can be measured only by considering the fact that during most of human existence mankind used, maintained, and carried fire about, yet did not know how to manufacture it. Man appears to have learned to produce fire only between ten and twenty thousand years ago. Yet man has used and controlled fire for about a half million years. During those hundreds of thousands of years when humanity carried and maintained fire, but did not know how to make it, their constant concern was to keep fires alight. A family moving across the landscape in the temperate zone would try to leave each fire banked and burning for a long time against the possibility of disaster which would extinguish the "slow match" or spark being carried along for daily use. A flood or accidental fall into a river might mean a family was without fire until another friendly family could be met, or until a live spark might be found in some old log left alight or until fresh fire could be obtained from a lightning strike or volcano. With the vision of fires intentionally left alight to be accidentally blown into surrounding vegetation over a period of nearly a half million years, the influence of campfires left by aborigines looms large indeed.

Not only scientists, but all whites of European ancestry have always found it difficult to take the Indians seriously enough to learn from them. The relationship between Indians and whites started with the assumption that the Indians were only part of the natural environment. This logically led to the point of view that the American natives had nothing to teach sophisticated Europeans. One would not ask the deer and antelope about scientific problems! Europeans whether still living in Europe or in colonies in America, Australia or New Zealand, have similar attitudes toward all aborigines.

Of course, the red Indians are not the only natives whose opinions and explanations should be ignored, according to the reasoning of the usual scientist. The backwoodsmen or hill folk are just as lacking in understanding. One result of such thinking in official quarters was the sending of a psychologist to the Southern Appalachians to try to learn the *real* reason why the local people set the woods on fire, especially why they did so with such frequency. When asked, the farmers and herders said they burned through the woods frequently to keep down brush, to destroy snakes and rodents, to improve grass, and to maintain valuable timber. Since the official policy of the Forest Serv-

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ice maintained that all fires in the forests were bad, dangerous and destructive of lumber, game and feed, any notion by the local rural folk of the South that burning the woods could possibly produce any benefits was evidence of either stupidity or mental aberration, or both. A psychologist was dispatched to probe into the souls of the southern farmers to discover the real motives for the obviously irrational behavior of such a large number of rural folk, because the fire rates have always been higher for the rural southern states than for other states.

In 1940, Dr. Shea reported the results of his psychological research into the strange habits of southern forest-burners in an article in *American Forests* under the title, "Our pappies burned the woods!" The title was misleading because Dr. Shea was not satisfied to report that present day farmers used fire as a tool because their fathers and grandfathers had discovered and proved in actual practice that burning had a practical application. In fact, the title was used facetiously. Dr. Shea reported that the only justification the hill-billys could think of was the statement, "Our pappies burned the woods."

The so-called real reason for the unusual and unreasonable incendiarism was discovered by Dr. Shea deep in the unconscious of the people. It was for excitement. Life in the southern forest area was so dull and the people so poor they could find nothing to do for amusement except setting the woods on fire. As a matter of fact, the U. S. Forest Service might have learned a great deal of useful scientific information if its employees had gone about seeking information from the local people.

We must be patient with officials, especially those scientifically trained, who completely ignore the explanations of local populations. Folklore usually gives false explanations of natural phenomena. It is a very difficult step from assuming the local yokel is blinded by ancient superstitions, like Astrology, to asking him for observations and explanations beneficial to modern science.

The amount of change needed in the point of view of the researcher is very great if he is to be able to accept any information from the white peasant or slightly educated rural rancher. Imagine how much more training and how much more modification in the point of view of the researcher is needed to honestly seek knowledge from the

colored aborigines to be used in modern scientific research. Anthropologists, of course, are really unique among the scientific fraternity in dedicating themselves to learning how natives all over the world act and why they act as they do from the natives' own point of view.

It may not seem such an important or unusual attitude or method, at first glance, yet a little reflection soon brings to mind the fact that most whites who have dealings with aborigines spend all of their time and energy "telling the natives," and not asking them anything. Missionaries tell them to change their faith and morals. Traders tell the native what to buy and how to use it. Farmers or ranchers explain to the natives their duties. Officials order the natives to do certain things, like pay taxes, or to refrain from other things, like head hunting, and guide them in ways to suit the officials. The fact that thousands of European and American missionaries, traders, officials, *et al.*, have devoted many years of labor among obscure and isolated peoples without learning much about those same populations comes about because of their duties and inclinations to "instruct the natives."

I do not wish to give the impression that only anthropologists have recognized that aborigines have used fire as a tool. Historical accounts by explorers and early settlers record the facts about Indians setting fire to prairies and forests. In the first volume of the *American Journal of Science*, in 1819, Bourne and Wells report that Indians fired grassland and forests to aid traveling and hunting and to improve pasturage for wild game as well as to drive game during hunting. Wells concluded that the tall grass prairies between the Mississippi River and the Appalachians were caused by repeated intentional burning-over by Indians.

Although hundreds of early travelers and explorers describe grass and forest fires caused by Indians, it is rare indeed when such reporters also included statements to the effect that the natives explain why fires were set. Ethnological publications, on the other hand, frequently record the natives' own justification for starting fires. Non-anthropological writers who mention grass and forest fires among aborigines are not reluctant to attribute motives for the fires to the natives. Where it is not explicit that the reasons for the fires were learned from the natives, the explanations for their occurrence must be taken with great caution.

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In Colorado, for example, early travelers and settlers almost always attributed grass and forest fires started by Indians to pure unadulterated, mean destructiveness and to an evil desire to harm the white surveyors, hunters or settlers. Often the travelers saw the fires but did not see how they were started and, of course, could not ask for the motives of the individuals who ignited them. From our perspective and with our knowledge, it is clear that even in those days fires were widely scattered and most often in remote regions where no white men were present to be inconvenienced. While floating down the Colorado River, Powell noted smoke from a number of forest and grass fires in many directions and in remote, still unexplored regions. The earliest reports of the area by Escalante in 1776, Gunnison in 1853, and Powell in 1875 indicate a regular pattern of use of fire as a tool.

Although anthropologists have recorded incidents of aboriginal use of fire as a tool world-wide and have learned a great deal about the various motivations and rationalizations for the burning practices reported, anthropologists have been most reluctant to follow out the implications of numerous examples of use of fire by aborigines. So far as I am aware, I am the only anthropologist who has wished to try to evaluate the effects on the vegetation of repeated intentional burning. When one attempts to control enough information in a scientific field rather distinct and distant from the one in which one has specialized sufficiently to obtain a Ph.D and to carry on university teaching, the potential for getting into trouble is astronomical. Both anthropologists and ecologists look down their academic noses at me and they fail miserably in their intentions to hide their disgust at my efforts.

I feel more concern for my anthropological colleagues than for ecologists who disparage or worse, ignore my efforts. Since I am convinced by a massive amount of evidence that primitive man with fire as a tool has been the deciding factor in determining the types of vegetation covering about a fourth of the globe, I judge primitive man's role in the ecological equations of utmost importance. Anthropology, defined as the science of man, should lead the effort to determine how and when fire has been used by man to influence vegetation and other forms of life. Furthermore, they should be strong advocates

for man to see to it that the human factor is always given its appropriate weight when calculating climate, soil, plant life and animal life which have interacted to produce any particular landscape at any given period.

When I reviewed the anthropological literature for a paper on ethnogeography published in a volume entitled *Method and Perspective in Anthropology* (Papers in Honor of Wilson D. Wallis, University of Minnesota, 1954), I was appalled by the complete absence of anthropological work demonstrating how aborigines had influenced the formation of some pure stands of vegetation. In 1926, Clark Wissler, one of America's foremost ethnologists and specialists on Plains Indians at the American Museum of Natural History in New York City, published a book entitled *The Relation of Nature to Man in Aboriginal America*. What a disappointment! Wissler had earlier reproduced a long description of use of fire on the prairies, yet in considering the "prairie peninsula" which extended into the forest environment of Indiana and Ohio, all Wissler could contribute was the observation that Indians living on that grassland intruding into a forest climate lived like other Indians on the prairies.

My disappointment was deepened when I came to realize that Wissler was writing about the same prairies which Atwater, Wells and Bourne had debated about in the first volume of the *American Journal of Science* in 1818 and 1819. By 1926, nearly all ecologists gave aboriginal fire the dubious honor of being the critical factor in grassland maintenance in that moist forest environment.

Aborigines set fire to vegetation for a number of reasons which vary in their importance depending on other geographic conditions. In flat temperate zones with a regular dry period fires were used to drive game, to improve pasture for wild game, to improve visibility by removing brush and trees, to facilitate travel and approach to game and to kill insects, rodents and reptiles for protection and for food. In tropical forests fire is an indispensable adjunct to agriculture for primitive horticulturists. Fire removed the forest and provided fertilizer. Often the trees had to be cut or killed by girdling before they could be burned. Even in the tropics if there is regularly a short dry period, fire can maintain grassland at the expense of trees.

In some areas like the West Coast of the United States and Canada,

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fire aided the production of nuts, berries, wild tobacco, wild seeds and wild tubers. Finally fire was occasionally used by aborigines in warfare.

To evaluate all of these purposes in all of the environments of the world should have kept me busy for the last 25 years. But I have been distracted by other obligations. I am anxious to return to my primary academic calling and publish more of my theories and supporting evidence concerned with the way aborigines have employed fire to change the face of the earth.