THE AMERICAN INDIAN: A FIRE ECOLOGIST

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Anthropologists have long been interested in the cultures and customs of the aboriginal inhabitants of North America, and investigators have long sought to determine the type of society utilized by the American Indian, concentrating mainly on their origin and degree of civilization. The development of modern ecology, however, spawned new areas of interest and both anthropologists and biologists became aware of the fact that American Indian culture involved not only a type of civilization, but an intimate relationship with and an unsurpassed knowledge of the land on which he lived.

This ability to coexist with nature was never so evident as it has become within the past fifteen years, as a result of the deteriorating environment modern society has produced. Society has finally realized the preciousness of natural habitats and begun to develop a "back-to-nature" attitude with emphasis on the preservation of our natural resources. This new attitude has brought with it the realization that, before the coming of the white man, the American Indian had learned to live in harmony with nature and actually shaped the forests and prairies to his own benefits with little detrimental effect on the land. How he was able to do this has been a subject of controversy for many years and a subject that modern ecologists have found difficult to digest.

Today there is little doubt that the Indians were able to maintain their environment through the use of fire. Evidence is presented in the form of prescribed burning now being instituted in most U.S. parks and forests. The following discussion is a brief survey of the use of fire by American Indians as fire ecologists, and the ultimate decision to return to tradition.

Historical Background

The use of fire by man has been an integral part of the emergence of civilization even before man was able to make fire himself. Natural fires did much to benefit man in the form of shaping the vegetation, but with the ability to create fire came the ability to maintain his environment or shape it to his own specifications.

Anthropologists believe that man displayed the ability to control fire long before he was able to create it, and the discovery of igniting fire was truly one of his greatest acts. Dart[1] stated that the primate between apes and man, *Australopithecus prometheus*, actually kept fire in his cave. This theory has been rejected by most anthropologists, however, because of the lack of any concrete evidence to justify the statement, and most agree that *Sinanthropus pekinensis* who lived during the pleistocene was the first man to have controlled fire.[2] Excavation has uncovered relics of fossilized human bones alongside stone tools, solidified wood ash, and charcoal, leaving experts doubtless that the Peking man from Choukoutien possessed the ability to tend fire in his cave and probably carried it abroad.

During the period of development from *Sinanthropus* to *Homo sapien*, primates are thought to have wandered throughout the world from their natural tropical habitat. This great migration created the need for fires while away from the cave, such as on hunting trips, and hence came the necessity for the ability to create fire expeditiously whenever needed.

More modern aboriginals were able to devise methods of carrying fire while traveling in the form of hot coals, punks, or slow matches,[3] and most North American tribes are reported to have carried some type of slow match.[4] More probable, however, is the theory that fire sparks being such a premium, and the fire drill so tedious, the American Indian tended to ignite slow-burning roots which were left smoldering until needed, at which time they could be used to rekindle a campfire without use of the fire drill. This period of development in the history of the American Indian is the time in which fire emerged as an essential tool and developed into a prominent factor of Indian culture.

Fire as a Tool of American Indians

Until recently naturalists and ecologists believed the Indians to be true conservationists in terms of preserving their vegetative surroundings. They were thought to have perfected the secret of coexistence with nature—through centuries of living off the land—without altering the environment in any way. These beliefs have slowly given way to the now-accepted theories that they were not actually conservationists, but more like forest and range managers controlling the types and abundance of vegetation grown in specific regions through the application of fire.

This practice of fire application probably had its beginnings in the careless attitudes of the

Indians toward the use of fire. They were actually quite indifferent about extinguishing their campfires, which was attributable to the lack of concern they had for protecting the vegetation against fire. After all, it is most probable that since the development of ancient man the method employed for clearing the countryside of heavy undergrowth for travel and hunting has been to simply fire it, and it is only natural that the American Indian would continue to employ the same practice.

The use of fire ultimately became such an essential part of Indian culture that the reasons for burning were numerous and dependent upon the region in which they lived. The more prominent reasons for burning were the following:[5]

1. Drive game
2. Improve pasture
3. Improve visibility
4. Remove brush to facilitate travel
5. Collect insects and lizards
6. Increase yield of seeds and berries
7. Clear land for agriculture
8. Stimulate growth of wild tobacco
9. Use as a weapon or to cover retreat
10. Protect from snakes, insects, and other vermin

Records show that, aside from the American Indian, aborigines worldwide have used fire as a tool by setting fire to the vegetation and hence, making themselves ecological agents on vegetative growth.[6] Reports of huge fires, verifying this assertion, have been made since the arrival of the first white man on the continent and have continued until modern times. Steffanson,[7] for instance, reported the burning of forests by Indians along the MacKenzie River to improve hunting, and Day[8] presented documentation of burning by the Iroquois and the Algonquin to clear fields for agriculture and remove brush for hunting in New England. Wells[9] had stated, many years before, his opinion for burning of the woods which was much more than just for the taking of game. This was simply one of many related reasons for the use of fire. Wells also stated that if the woods were not burned frequently the original vegetation would return and pasture would assume the appearance of a forest.

Bourne[10] agreed with Wells in reporting that the Indians frequently set vegetation on fire to insure a good crop of grass for pasture land during the summer. He also reported that when white settlers invaded an area and the fires ceased, a young growth of trees would soon spring up.

It is believed that Indians were responsible for the maintenance of a Douglas fir forest along the coast of the Pacific Northwest. The reason this forest is considered to be a fire forest is that it is extremely wet and difficult to burn; it is a subclimax species, and without intentionally set fires the climax species of cedar and hemlock would surely have overtaken the area; and finally, lightning in the area is insufficient to assume that lightning-caused fires were responsible for maintaining the fir forest.[11]

The redwood forest of northern California also displays evidence of being maintained by Indians. The trees display fire scars centuries old over an area too wide to be maintained by too little lightning. The trees are obviously fire-adapted as evidenced by their thick bark and gigantic heights, and Indians tell of their annual burns to maintain the park-like appearance for ease of travel and hunting.[12]

Through personal communications I have been told by natives of central Oregon that the Indians would frequently allow the forests to burn, destroying deadfall, young trees, and brush, thus accomplishing two purposes. First, it prevented major forest fires by disallowing the accumulation of fuel on the forest floor, and secondly, it gave rise to fire vegetation in the form of the fire-adapted ponderosa pine.

The Great Plains Shaped by Fire

Early hunters and trappers frequently told of seeing large fires, set by the Indians, that burned for days. These frequent reports indicate the practice was common, not only regionally, but from coast to coast and from tribe to tribe. It also indicates that fire was employed not only to clear and maintain forests, but to maintain the prairies by preventing the growth of trees and shrubs. These reports have given credence to the theories that the great plains were not always the great plains, nor were they created by natural causes, but may in fact have been altered to their present state and maintained by the Indians' burning practices.

Wagner[13] mentioned that the North American forests of the 1600s were so extensive that a squirrel could easily have traveled from the Hudson to the Mississippi rivers without having to touch ground. This suggests that the forests could possibly have stretched across the continent to the rocky mountains. If this is so, how does one explain the existence of the great plains?

Some say the great plains region was never covered with forests because the climate of the region is unfavorable to tree growth and offer as evidence the absence of roots or stumps. Shantz[14] believed otherwise, stating that fires were

probably responsible for preventing tree growth because they destroy trees and shrubs, enabling grass to grow where a forest could exist. In fact, since the settlement of the grassland by pioneers and the adoption of fire prevention, tree growth has gradually extended throughout the prairie. Kellogg[15] published a paper describing the natural forest growth of the Kansas uplands as pine and cedar. He went on to say that many areas could be forested at no greater cost than is entailed in keeping cattle and fire from the land. Davis[16] reports that the Nebraska National Forest, an unnatural forest, has been successfully maintained since 1910 through the use of a system of firebreaks, without which the forest could probably have not survived.

The evidence points to the possibility that fire has had a direct effect in maintaining the great plains by preventing the growth of trees, which in turn directly affects the type of vegetation grown and the type of animal able to survive in such a fire environment.[17] The question is, what was the source of the fires? Stewart[18] believes that the American Indian used fire to such an extent that America at the time of discovery was covered with fire vegetation, and aside from lightning, the Indian is responsible for maintaining the great plains. His explanation for the continued existence of the great plains since fire prevention is the continued existence of prairie fires, and although intentional fires are rare, accidental burnings are not, and they occur in sufficient numbers to assure the continued existence of the prairies.

Possible Climatic Changes

The evidence now appears sufficient to conclude that the American Indian was the master of his environment and through the skillful use of fire may have been responsible for shaping the type of flora and fauna originally found in North America. This undoubtedly had its effects on the local climate and may have even dictated the type of climate found in a particular region. This line of thought is contrary, of course, to the accepted law that the climate determines the vegetation, but it is worth mentioning here.

Hursh and Connaughton[19] studied the local climate of 19,000 acres of deforested land and the surrounding hardwood forest of Copper Basin, Tennessee. After a two-year period they found that air temperatures averaged 3 to 4 degrees higher on the bare grassy area than in the adjacent forest. The wind velocity was 7 to 10 times greater in winter and 34 to 40 times greater in summer, and precipitation was 25 percent less on the open grassland.

The suggestion is that with the cessation of Indian burnings and the alteration of the land from prairie to forest and vice versa, the local climate will definitely be altered. These slight alterations may ultimately produce drastic effects over an area during a period of centuries in the way of climatic changes; hence, we should keep this under consideration when and if we do allow the forests to invade grasslands or when deforesting an area.

Evidence of Encroachment

In attempting to gather evidence verifying the theory that without periodic burning of the vegetation our forests will become a mass of deadfall and undergrowth while our prairies are replaced with sagebrush, we have only to turn to history books and old journals describing the vegetation when the first Europeans arrived and compare it with what we see today.

Fray Juan Crespi[20] traveled from San Diego to San Francisco in the 1700s and described grassy hills and valleys in areas now covered with chaparral. He also reported sightings of Indian burnings in the California grasslands that now are covered with sagebrush. Storer,[21] years later, reported that the restriction of burning is resulting in the replacement of grasslands by chaparral. Cooper[22] later reiterated by writing that large portions of the United States grasslands are being usurped by shrubs such as mesquite, juniper, and sagebrush due to fire suppression. He went on to emphasize that the American Indian prevented this by burning, as evidenced by visible fire scars. Daubenmire,[23] in attempting to relate the ecology of grassland fires to environmental alteration and its effects on vegetation and animals, verified that grass fires have been indeed advantageous to man.

History books tell us that the high plains of Wyoming and northern Colorado were once completely grass-covered, although they are presently occupied by sagebrush. The same is true of the central portion of Oregon, in a region known as the Crooked River Valley. The presence of cattle led to overgrazing which diminished the effectiveness of fire to the point that, today, one would be hard-pressed to intentionally start a fire. What was once good grassland has become overrun with sagebrush and encroached upon by juniper trees. Moreover, such vegetation is difficult to remove because it grows very sparsely and will not easily burn; hence fire is not a good removal device.

The conclusion can be drawn that the prevention of fire has drastically altered the U.S. vegetation. This alteration has been detrimental rather than advantageous in diminishing grazing land and presenting fire hazards to our forests.

Modern Fire Policies

Since the defeat of the American Indian and the overtaking of the country by the white man, policy has been dictated with a European attitude. If it is not done in Europe, it will not be done here. This policy has resulted in the complete suppression of any customs performed by the aboriginals, fire use especially. Fire prevention was first adopted by the settlers because they needed wood for domestic purposes. Later, the U.S. government found the timber industry to be highly profitable and developed an all-out campaign to prevent fires. The following is a brief discussion of the difficulty involved in changing the public's attitude once a topic has become solidly ingrained.

The U.S. Forest Service and Park Service were responsible for waging the war against fire and instituting the fire prevention policy to the point of brainwashing the American public. The reason for such an all-out assault was simply a matter of economics. The Park Service is in the business of recreation. In order to entice vacationers to their areas, the Park Service sought to present the public with a park full of beauty and wildlife totally protected from outside harm, especially including fire. The theory was that fire would destroy the aesthetic value of the parks and kill the wildlife, which were the two drawing cards of the parks' existence and without which business would be ruined. This attitude led to years of fire suppression which was progressively developing into a time bomb.

Economics was also the motive of the Forest Service, when it adopted a mascot named Smokey the Bear to use in advertising as a warning against the dangers of forest fires. The Forest Service maintained that fires not only destroyed the forests but were also harmful to wildlife. This campaign has lasted until the present time, constantly condemning fire and emphasizing the devastation and ruination related with it. The real concern, of course, was for the profits reaped through the sale of timber. The U.S. Forest Service has developed forestry as a science, which has become a highly profitable industry for the U.S. government.

In addition to developing a money-making industry, the U.S. Forest Service prides itself in its training of highly skilled fire fighters, perhaps the best in the world. This tradition is surpassed only by that of the Armed Forces, and it has become one the U.S. Forest Service does not wish to relinquish. Moser[24] describes this tradition as one that has been emphasized to the point that fire fighters find it extremely difficult to observe a forest fire passively, even when the fire is deliberate.

This combination of reasons has produced U.S. forests so littered with deadfall and, where not thinned, so cluttered with underbrush, that whenever a fire does begin accidentally the chances of its burning out of control are extremely high. Komarek[25] reported that most, if not all, catastrophic fires resulted from man-caused unnatural accumulations of large quantities of highly flammable plant material. Johnston[26] goes even further in her belief that both lightning and Indian fires were methods of maintaining the forests and were responsible for shaping the Sierran forests of today.

The use of manual labor the U.S. Forest Service employs to clear the forests is a poor substitute for the method of annual burnings used by the Indians. Years ago the Klamath Indians of Oregon complained bitterly of the practices of modern forestry, which allowed the brush and trees to grow uncontrolled, depriving them of valuable hunting grounds. "When the brush got as thick as it is now, we would burn it off."[27]

Finally, we have begun to listen to the complaints and wisdom of the American Indian. After 200 years, the no-burn policy may be going the way of the Dodo bird, but it has been a long and difficult struggle in convincing the bureaucrats to rescind their long-established policy.

Return to Tradition

The use of prescribed burning has been practiced in portions of the U.S. for many years, but the willingness of foresters and ecologists to accept this method has been slow. The evidence had to be overwhelming before a change in attitude toward burning would occur. Weaver[28] successfully carried out controlled-burning experiments on the Colville Indian Reservation in central Washington in the 1940s, which caused many people to take notice. Among these were employees of the Bureau of Indian Affairs in Phoenix, Arizona, which implemented a similar program on the Fort Apache Indian Reservation in 1948.

The Bureau is responsible for management and protection of millions of acres with limited

operating funds on the Fort Apache Reservation. They viewed the prescribed-burning program as an investment in fire protection designed to limit or preclude loss. Their objectives were twofold: vegetative type conversion and hazard reduction of forest fuels. To date there has never been a fire larger than ten acres on the reservation within seven years of initial or subsequent treatment of an area with prescribed burning. Kallander[29] reported also that with controlled burning the ponderosa pine areas resulted in the reduction of wildfire due to the elimination of litter and intermediate foliage, thereby decreasing the possibility of crown fires. Knorr[30] confirmed this with a study performed during the years 1953 through 1961 on fires in the untreated area and in the controlled-burn area. He concluded that fuel reduction by controlled fire is the most decisive action forest land managers can take, and presuppression activity is much more economical than the formerly used method.

Prescribed burning was also found to be more economical than manual or technological labor; for example, land cleared by bulldozer and chain cost between $3.00 and $5.00 per acre, while burning costs $0.50 per acre and does a much cleaner job.[31] Where the vegetation was sparse, technology was used, but the two methods were used to complement each other.

Within the past decade government agencies have reluctantly begun to adopt a new let-burn policy in designated areas of federal lands. The first to do so were the Kings Canyon and Sequoia National Parks of California, with numerous other parks now following suit. More reluctant was the U.S. Forest Service, which held out until 1973 when the Selway-Bitterroot National Forest initiated a no-burn policy through the persistence of one of its employees.[32] If the trend continues, which I believe it will, even in the face of much opposition, the next century might bring us closer to the natural habitat which existed when the country was covered with fire vegetation.

Conclusions

It need no longer be theorized that the American Indian was a true conservationist, in the strictest sense, with the evidence we have available today. It is obvious the Indian had the ability to shape his environment to fit his needs with the use of fire and was not merely another animal who had discovered how to adapt and to coexist with a master he was unable to control. In fact it was the Indian who could, to a certain extent, control nature.

The arrival of the white man and the prevention of fire reversed the results the Indian had long sought to obtain, and after 200 years of this reversal of nature, the environment has been brought close to destruction. Hopefully, we now realize that progress has been so detrimental to our natural habitats that if we do not return to tradition, our forests, prairies, and natural resources are doomed.

NOTES

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