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The Ethno-Ecology of the Waswanipi Cree; or How Hunters Can Manage Their Resources

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It is a common assumption that game animal hunters exercise little control over the resources on which they depend or the environments in which they live. Peoples who have domesticated animals manage the environmental side of the man/nature relationship for they control, to varying degrees, the distribution and reproduction of some animals which they utilize. This control can be expressed by saying that they manage their resources. The lack of such management is often assumed to be virtually the *sine qua non* of hunting as opposed to other subsistence types. What powers hunters have are usually analysed in terms of how they exercise control over themselves, and how they are affected by the unintended ecological consequences of their own actions. Hunters regulate the man/nature relationship primarily by regulating man, by controlling the human population size, the human population density, and the distribution of goods and services, and human desire itself. Among the game hunters the very scarcity, mobility, unpredictibility and difficulty of capture of the animals leave the hunter with little to hope for, except that he kills the animals he needs and adjusts himself to the results. It has been repeated again and again, that there can be little planning, and little foresight because so much of the outcome of the hunt is chance.

Yet studies in contemporary wildlife management indicate that human hunting itself has significant effects on the standing crop, production, yield, age structure, sex balance, and often size and health of the harvested animal populations, and studies of fishing give similar results.[2] It is possible to anticipate the consequences of given hunting or harvesting patterns and it is therefore possible for hunters to control some of the critical parameters of the harvested population through their choice of resource utilization strategies. Hunters can then, at least theoretically, exercise some control over the distribution and reproduction of the animal populations which they harvest, and may in some sense manage their resources as well as themselves. This paper explores how one group of sub-arctic hunters, the Waswanipi Cree, utilize the resources available to them, in order to demonstrate the hypothesis that they are managing their resources. The ecological system of knowledge of Waswanipi hunters, their ethno-ecosystem, itself implies a process of management.

Some Features of Waswanipi Ethno-ecosystem

Waswanipi hunters say that they only catch an animal when the animal is given to them. They say that in winter the north wind, *chuetenshu*, and the animals themselves give them what they need to live. In the culturally constructed world of the Waswanipi the animals, the winds, and many other phenomena are thought of as being "like persons" in that they act intelligently and have wills and idiosyncracies, and understand and are understood by men. Causality, therefore, is personal, not mechanical or biological, and it is, in our experience, always appropriate to ask "who did it?" and "why?" rather than "how does that work?" The body of the animals the hunter receives nourishes him, but the soul returns to be reborn again, so that when men and animals are in balance, the animals are killed but not diminished and both men and animals survive. The balance is reciprocal, and in return for the gifts the hunter has obligations to the animals and *chuetenshu* to act responsibly; to use what he is given completely, and to act respectfully towards the bodies and souls of the animals by observing the highly structured procedures for retrieving the animal, butchering it, consuming the flesh and disposing of the bones and remains. It is expected that men will kill animals swiftly, and

avoid causing them undue suffering. It is also claimed that men have the skill and technology to kill many animals, too many, and it is part of the responsibility of the hunter not to kill more than he is given, not to "play" with animals by killing them for fun or self-aggrandizement.

This last stricture is critical in the Waswanipi ethno-ecology, because it means that, in their view, the hunter has a considerable influence over his hunting. While formally men only catch what is given to them, in practice what is given to them is a function of what they have done before. Thus much of the time when hunters are asked about why their hunt was good or bad, they reply in terms of how they hunted the year before. Failure to catch animals when expected is a critical concern of the Waswanipi. In their view, uncertainty always attaches to their activities, but lack of success is distinguished on the basis of duration. For example, beaver traps set at a lodge may not have any animals caught in them when they are checked after three or four days. This is usually because "the beaver don't want to be caught yet," and the traps are left for an additional three to four days. If however, there are no or few catches within a longer period of time, most informants suggest about two weeks, then a hunter is not just confronting the whims of the animal, he is having "bad luck." Bad luck is a result of a decision on the part of *chuetenshu* or the animals that a man should not get what he wants – usually because he has failed to fulfil one or more of his responsibilities. One of the most important responsibilities is not to kill too many animals. Thus the hunter is often confronting the consequences of his own activity when he goes hunting, and this confrontation occurs through the will of *chuetenshu* and the animals.

The relationships that are posited in the Waswanipi ethno-ecosystem make it possible for hunters to choose a number of different ways of hunting. Since it can be known more or less well in advance that animals will be "mad" at transgressions of the hunters' responsibilities and will bring "bad luck," a hunter can to some degree plan for this contingency.

The striking feature of this account is that while the mode of explanation, the causality that animates the Waswanipi ethno-ecosystem model, is very different from a scientific account, the structural relationships described are for the most part isomorphic with those of a scientific account of the relationships of hunter to animal population. Despite the difference in world views, the Waswanipi are recognizably concerned

about what we would call ecological relationships, and their views incorporate recognizable ecological principles. Prominent among these are the equivalents of the concepts that men/animal relationships are systemic and that a sustained yield use of the animal populations is possible, through a process of management. But, is choice, in fact, possible in the sub-arctic region known for its relatively large unpredictability?

Waswanipi Hunting Recipes

Waswanipi hunters utilize a variety of animal resources, the most important being moose and beaver, followed by various species of fish (particularly pickerel, whitefish, pike, sturgeon and burbot), hare and various species of grouse (spruce grouse, ruffed grouse, and willow ptarmigan). Beaver, moose and fish are the most important subsistence resources, providing an average of 34, 30 and 7 percent of the total calories available for human consumption during the winter hunting season, the remainder being primarily purchased foods, with some hare, small fur-bearing animals and fowl. Beaver and fish are relatively stable resources. The sedentariness, predictability and success of the trapping techniques available for beaver are well suited to management as has been recognized for some time.[3] Moose, however, have generally been considered mobile, erratic and sparsely distributed and moose hunting itself considered a very unreliable activity.[4] It is therefore appropriate to analyze the Waswanipi recipes for moose hunting. The problem is set well by the statements of Waswanipi themselves who say that, when they want a moose they get a moose, and when asked what happens if they don't get a moose on a given day, they say they try again later, and they will get a moose.

Waswanipi hunters say that it is *chuetenshu* the north wind who controls winter precipitation and who is especially important for the moose hunts. During the early winter as the snow accumulates the moose begin to have trouble walking through deep snows as their legs penetrate deeply and their bodies start to drag. Moose, therefore, move to locations that have relatively lower snow accumulations because of their vegetational cover and topographic conditions. Waswanipi say that the moose move to the hardwood covered hills which are exposed to the wind. By early January such conditions have normally occurred, the moose are concentrated in these suitable areas, and within them they generally confine themselves to the established paths of snow packed by repeated use. Once this has happened hunters say it is easy to hunt moose. To locate moose they search the hills for signs, and when tracks or signs are found many hunters report that they are happy because they "will be eating moose." The tracks can be followed to find the moose. If the hunter is heard or scented, the moose will flee, but the depth of the snow will quickly tire the moose out and it will frequently stop to rest giving the hunter a chance to catch up. At most, the people say, after one and a half or two hours of steady walking on snowshoes a man will have completely exhausted a moose running in high snow, and the animal will stand his ground and be killed. However, many hunters say that given the snow conditions they can predict the flight of the moose. Furthermore, Waswanipi prefer to hunt on "moose days" when there is a slight wind that covers low noises made by the hunter, when the temperature is cold so that wet snow does not stick to their snowshoes and make walking difficult, but not too cold so that the snowshoes do not make excessive noise on the hardened snow and so the branches of trees and shrubs are not brittle and easily cracked. Under these conditions it is often possible to avoid a pursuit of the moose entirely or to terminate it quickly.

That moose give themselves to men is also indicated, we believe, by the very behaviour patterns of moose themselves. When moose are alerted by a noise they respond not by taking flight immediately but by standing up and looking towards the direction of the sound, trying to see or scent its source.[5] If successful, the moose will then flee. This is the moment the moose offers himself to the hunter and it is the moment to kill the moose. If it is not shot then, it will run some distance, the length depending on snow conditions, and then stop and look back in the direction from which it has come.

There are also, according to the Waswanipi, even better conditions for hunting moose although these only occur briefly towards the end of the winter. In late March and early April the sun melts the topmost layer of snow and during the nights and on colder days an icy crust is formed over the snow. Moose break through this crust as they walk and cut their legs against the edges of the holes they make in the ice. Moose can hardly run under these conditions and often simply will not – even in full view of men. Under these conditions Waswanipi say moose hunting is easy and they are often assisted by dogs which are trained to bring a moose to bay or to run a semi-circle around

the moose so that the moose caught between man and dogs "freezes".

Waswanipi hunters then have a detailed knowledge of moose behaviour and so can hunt moose specifically when the animals are concentrated in few locations which can be easily searched, when the moose are immobile, or less mobile than the hunter, and at times when moose behaviour is relatively predictable. Most of the relationships Waswanipi recipes depends on have been reported by scientists although many have only been scientifically described in the last decade.

Waswanipi then have a very substantial knowledge of the environment in which they live and this knowledge makes plausible their claims for the reliability, efficiency and affluence of their subsistence system; their expertise also suggests that it is possible to choose when to use resources. For each animal species the Waswanipi harvest, they attempt, like for the moose, to utilize it at times when chances of success are highest and the efficiency of capture is maximized. The Waswanipi account of their annual cycle is a model for integrating the various harvesting activities so that each resource is used at periods of maximum vulnerability and efficiency, and ideally so that at least two resources are available at each period throughout the hunting season. But, given the low productivity of sub-arctic ecological systems, can decisions on the time and place of resource utilization actually manage the resource system, can hunters control some critical parameters of the resources on which they depend?

Waswanipi Resource Management

During the 1968–69 hunting seasons an analysis of moose and beaver caught by all Waswanipi hunting groups indicated that most groups caught moose and beaver in surplus of their subsistence requirements, that no group was short of food, and that some groups caught more than double their subsistence requirements. A majority of bush hunting groups provided significant quantities of meat for other Waswanipi residents near towns, and many groups cached meat caught in winter to add variety to their summer diet. However, despite this affluence, there is considerable variation in the dependence of different Waswanipi hunting groups on different resources available to them. In a detailed sample of all the foods available for human consumption in four hunting groups, during the 1968–69 hunting season, beaver varied from approximately 20 to 45

percent of the total calories available for human consumption, moose varied from 15 to 40 percent, fish from 1 to 13 percent. These variations suggest that a number of different harvesting strategies are in use among different hunting groups, and that a multi-dimensional management process may exist.

We are still in the process of getting rough estimates of the production of the primary resources available to Waswanipi hunters, the efficiency of their harvesting techniques, and their human subsistence requirements, but the relative values are available and are presented here as an initial approximation which is of use because updating of the values is not expected to alter the order of magnitude differences. The production of the major animal resources used by Waswanipi hunters and measured as calories for human consumption produced per square mile per annum, indicates that fish are substantially more productive than beaver, and that beaver are twice as productive as moose. The production of hare is not yet clear, but obviously varies over a considerable range because of the great amplitude of its population cycles. On the other hand, the efficiency of harvesting activities, assuming the present range of harvesting time and intensity, varies differently. Moose hunting is by far the most efficient harvesting technique ranging over 100,000 Calories for human consumption per man-day of work; beaver efficiency varies with season, but the seasonal averages are 16,000 to 24,000 Cal./man-day, while fishing produces 10,000 Cal./man-day, and small game capture 3,000 Cal./man-day. For comparison averages of human subsistence requirements at Waswanipi for the winter bush population are estimated using maximalist assumptions to be 4,500 Calories per person per day, of which a minimum of approximately 1,000 calories is provided by purchased foods.

Given these parameters, it is clear that there are a number of alternate sources of subsistence that could be chosen in a large number of combinations, to meet human subsistence requirements. However since the production of moose and beaver are relatively low, the critical feature of such a system is managing the harvest of moose and beaver so that the populations of these species are not depleted. This is necessary because it is clear from experience elsewhere that beaver are easily over-hunted, and it seems likely from our account of Waswanipi moose hunting that this species too could be over-hunted. The Waswanipi themselves, as reported earlier, say that limiting the kill is a part of their responsibility.

One important way that Waswanipi regulate the harvests of the animals and the production and distribution of animals as well, is by rotational hunting. By not occupying a given hunting territory every year the hunters allow the populations and harvests of animals to grow. Some men regularly rotate their use of land, others let their grounds rest occasionally, and some practice rotation by dividing the territory up into subsections, so that each section can be used in turn. Of the twenty-two territories in use in 1968–69 or 1969–70 there were only six cases where men actually hunted on the same territory or sub-section both years. From year to year hunters constantly evaluate the state of the animal populations on the land they hunt, and any drop in the success of the hunt, the number of animals sighted or the number of animal signs seen, is taken as an indication of over-hunting or of other transgressions by the hunter. The state of the animal populations on a given territory is constantly known and Waswanipi always can discuss the trend in the population on their territories, and compare the populations to what they were last year, ten years ago, or when they first started hunting. Rotation of territories then is a critical mechanism for managing the size of the animal population. The size of the harvests are directly related to the frequency of hunting on a territory. During our study, hunters who were on territories that *were used* the year previous to the recorded year (either 1968–69 or 1969–70) caught fewer moose per square mile and fewer beaver per square mile than men hunting on territories *not used* one year previous to the recorded year, and these men had a lower catch density than men who hunted on ground *not used for two or more years* previous to the recorded year. In short, the catch densities increased with the expected increases in the animal population densities.

The value of a short-term rotation system is that it allows hunting activity to be concentrated within a more limited geographical area, than if an area were used continuously, thereby maximizing harvesting efficiency; and, it may also serve to keep the animal population at a high rate of productivity characteristic of expanding populations, by periodically reducing the population significantly and then allowing it to expand for two or three years before re-harvesting.

On territories that were rotated the average harvests of moose and of beaver were well below predicted population increments for one and two years of non use for each of these species. Furthermore, all groups that were on territories that had been rotated caught high levels of moose and beaver relative to their subsistence requirements.

In the four hunting groups for which we have detailed samples it is clear that when moose and beaver catches are high relative to subsistence requirements, over the 2,500 to 3,500 Cal./adult-day range, fish and small game do not amount to over five percent of the total calories available for human consumption, and purchased foods do not amount to over 20 percent. Moose and beaver together averaged seventy-five percent of the calories available for human consumption.

But not all men can rotate their territories, or sections thereof, because of the size of their families or because of a lack of access to other territories. These men must hunt the same land each year. Those territories in our study that were hunted the year previous to the recorded year then represent the critical test case of how Waswanipi manage the resources. Unfortunately, the aerial surveys of moose and beaver available to us for the region are not intensive enough to compare populations on individual territories. The averaged figures however give valuable results. On these territories the average density of animals killed as a percentage of the average density of the surveyed population is the same or within the range of the estimated production for both moose and beaver. The density of moose kills averaged 27 percent of the overall average moose population density. The production of moose, based on the percentage of calves among the killed animals (which we believe is not skewed as it would be with White hunters) was 29 percent. For beaver, the harvest on these territories averages 1.25 beaver per lodge, based on the density of lodges and the density of beaver kills. Given that the populations are believed to be generally growing, this is below the 1.5 per lodge harvest limits that have been found to allow for maintenance of the populations in northern Quebec. Beaver lodge counts have remained relatively steady over the past fifteen years, while Waswanipi report a decline in the moose population during the same period of about fifty per cent, probably due to changes in the vegetational cover of the region. The average harvests of moose and beaver on territories that were hunted the year previous to the recorded year are apparently limited to the production of the populations.

It is interesting to note that it was only among groups using a territory hunted the year previous to the recorded year

that some groups did not have sufficient moose and beaver to meet basic subsistence demands. From our four group sample it is clear that when the catches of moose and beaver drop below the 2,500 to 3,500 Cal./adult-day range dependance on fish, or small game increases to over 10 percent of the total calories available for human consumption and purchased foods may rise to approximately 40 percent of the total, moose and beaver providing an average of only 50 percent of the total. The Waswanipi then use the most efficiently harvestable resources, namely moose and beaver, first, and then they shift to other less efficiently harvestable but more productive resources, particularly fish and/or to a greater use of less valued purchased foods.

Conclusions

The data we collected supports the interpretation that Waswanipi hunters do manage their harvests of moose and beaver and the distribution and reproduction of the harvested populations, either by rotational use of the territories, or by an increased use of alternate resources to supplement moose and beaver in the subsistence diet.[6]

Waswanipi hunters use the animal resources available to them on a sustained yield basis while maximizing the efficiency and security of their subsistence activities insofar as this is compatible with maximum sustainable yields.

Afterword

The priority Waswanipi men give to ecological factors can serve as a model for the Whites who plan to utilize other resources in the sub-arctic region. All use should be based on a multiple-use management plan. Such a plan would necessitate that Whites recognize that rational management of the animal resources of the region is already practised, and if these resources are affected it will be necessary that the Indian people themselves be represented on the planning body. The Indian people of the region must be allowed to articulate their own needs and to help evaluate the impact of other uses on the resources of the region. Their agreement should be obtained

before the resources which they are now managing and utilizing.

1. This paper is a resume of portions of a larger study now in preparation, the research for which was supported by grants from the National Museum of Man, 1969–71; the Northern Research Committee of McGill University, 1968–71; and the Steinberg Summer Research Fellowships, 1968–9. The larger study has benefited from the comments and advice of Richard F. Salisbury, many of which are incorporated in the present paper.
2. R. F. Dasmann, *Wildlife Biology* (New York, 1964); K. E. F. Watt, *Ecology and Resource Management* (New York, 1968).
3. F. G. Speck and L. C. Eiseley, "Montagnais-Naskapi Bands and Family Hunting Districts of the Central and Southeastern Labrador Peninsula" (*American Philosophical Society Proceedings* 85(2):1942).
4. R. Knight, "A Re-examination of Hunting, Trapping and Territoriality Among the Northeastern Algonkian Indians" in A. Leeds and A. P. Vayda, eds., *Man, Culture and Animals* (American Association for the Advancement of Science, 1965).
5. R. H. Denniston, II, "Ecology, Behaviour and Population Dynamics of the Wyoming or Rocky Mountain Moose, *Alces alces shirasi*" (*Zoologica* 41(2), no. 14:1956).
6. It will be realized by ecologists familiar with the subarctic that this evaluation is based on the principles presently used by various game management personnel as operational rules of thumb, rather than on scientifically acceptable evaluations of the actual production and hunting yields of the animal populations. However the results are striking, and it would require a research team composed of a variety of specialists to test the relations between harvests and production in greater detail, which hopefully will be done in the future.

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