

PREDATORS AND COSMOLOGIES

Natalia Rybczynski

Department of Biological Anthropology
and Anatomy

Box 3170

Sands Building

Duke University Medical Center

Durham, NC

U.S.A. 27710

Abstract / Résumé

The concept of predation in Western society is very different from that which appears in many non-Western worldviews. Western society regards the predator-prey relationship as entirely antagonistic, and competition as the unit of interaction in the ecosystem. Traditional ecological knowledge holds the unit of interaction to be one of mutualism and interdependence. Recent advances in science confirm the traditional ecological knowledge and aspects of its associated cosmology. Traditional ecological knowledge, exists in a holistic cosmology and has produced sustainable economies in traditional hunting-gathering societies. Likewise, in order for sustainable resource use in the First World to develop, a holistic cosmology is required.

Le concept de prédation dans la société de l'Ouest n'est pas en accord avec celui qui se trouve dans plusieurs cosmologies non-occidentales. La société de l'Ouest considère que le rapport entre prédateur et proie est entièrement antagonistique, et que la concurrence est l'élément fondamental d'action réciproque dans l'écosystème. La connaissance écologique traditionnelle (CET) maintient que l'élément fondamental est celui de symbiose et d'interdépendance. Les récents progrès scientifiques confirment la CET et les aspects de sa cosmologie. La CET existe dans une cosmologie holistique et a produit des économies soutenables dans des sociétés de "chasseurs-ramasseurs" traditionnelles. Egalelement, une cosmologie holistique est nécessaire pour que l'utilisation soutenable de ressources dans le Premier Monde se développe.

Introduction

Predators have captivated the imagination of all peoples, however, the conceptualization of predator-prey interactions varies cross-culturally. This essay will first explore the representation of predation in western cultures, and secondly will contrast this representation with that seen in some traditional ecological knowledge (TEK) based cultures. In the third section, I will discuss how TEK and its associated cosmology may promote sustainable resource management practices. It will be argued that recent biological advances confirm TEK and even aspects of its worldview. Unfortunately, these recent advances have yet to influence the ecological worldview of popular western culture.

“Predation” and Western Cosmology

Any cursorial review of mainstream film industry movies will confirm the observation that in popular culture, predators are seen as ferocious and cunning, while the act of predation is perceived as destructive and violent. The movie *Predator* starring Arnold Schwarzenegger, delivers the tale of a commando (Arnold) in contest with a “kill-crazy creature” (Martin and Porter, 1992). In *Jurassic Park* meat-eating “raptor” dinosaurs are depicted as highly intelligent, vicious, pack hunters. The concept of predation is also allied with immorality. In the news we hear of “sexual predators” as a type of criminal offenders. Even portrayals of real animals in natural settings are biased. Film footage from some nature series would lead us to believe, for example, that the primary occupation of carnivores is killing, when, in fact, it comprises only a very small percentage of the carnivore’s activities (Janis and Wilhelm, 1993).

Because predators occupy the top of the food chain, predation is also associated with power. In popular Western culture it is the human that is pictured at the pinnacle of the entire food web. This is certainly an idea that is at least as old as the Bible. In Genesis God said:

Be fruitful and multiply, and replenish the earth, and subdue it;
and have dominion over the fish of the sea, and over the fowl
of the air, and over every living thing that moveth upon the earth
(Gen. 1:28).

Many aspects of our notions of human evolution also appear to have emerged from the human as “top predator” view. It is generally “understood” for instance, that the evolution of modern humans can be related to the development of hunting (predation) and tool-making.

In her article “Is Nature Really Red in Tooth and Claw,” Fausto-Sterling (1993) suggests that the cut-throat competitive view of nature has been

woven into, and perpetuated by, Western political ideologies. If nature is based on competition then the capitalist culture can be seen as only being natural.

Western science is clearly a derivative of western culture. A recent compilation of papers on predators, parasites and diseases, is entitled *Natural Enemies* (Crawley, 1992). Scientists have generally assumed that not just predator-prey interactions, but all interspecies interactions are primarily antagonistic. This view is often encapsulated in the widely accepted Darwinian paradigm of "survival of the fittest."

"Predation" and Traditional Ecological Knowledge

In contrast with mainstream western science, traditional ecological knowledge (TEK) emphasizes the mutualistic aspect of predator-prey relationships. In the Montangais myth "The Caribou-Man" a mutualistic relationship is described between the wolves and the caribou. The caribou ask the wolves to perform two tasks: 1) make the mouths of the caribou wider, and 2) defecate on the feet of the caribou, so that the wolves can always find them. Clement's (1991) ethnoscience interpretation of the myth sees the requests in terms of the biology of the organisms in question. When fleeing, caribou breathe heavily through their mouths. Widening the mouth would help the healthy prey escape. On the other hand, the wolves defecating on the feet of the caribou is associated with scent glands located in the heel of the caribous' feet. The scent glands produce an oviferous secretion which yellows the surrounding hairs. The wolves are able to use the scent to track down the caribou. Hence the myth expresses the delicate equilibrium which exists between the predator and prey.

Peoples of TEK based cultures see themselves as existing in symbiosis with animals. Feit (1986) describes a Cree hunting ritual involving the beaver. In the ritual both species recognizes that it benefits from the other: The humans need the beaver for food, clothing, etc., while the beaver, benefits from the hunters who focus their harvest on beaver subpopulations which are overcrowded. Bite marks near the beaver's tail and depletion of certain plant species are signs of overcrowding recognized by the Cree (Berkes *et al.*, 1993).

The intimate relationship between the hunter and his prey is acknowledged in mythology. In the adoption of an animal totem, for example, Andrew (1993) advises that one examine the qualities of its predator and prey, as applicable. In Plains Indian mythology, the bison was seen as once having been the predator of the humans (Freedman, 1988). Bison and humans are perceived as having been always joined through connections of energy flow. Furthermore, the humans are portrayed in this myth as

existing within the system of energy flow, not at its pinnacle. The Cree recognize that they themselves form part of the ecosystem (Berkes *et al.*, 1993).

Eating is one mechanism by which energy is moved through an ecosystem. Eating is also linked to death, as death is often a prerequisite to, or a result of feeding. The Bororo of Brazil credit the *bope*, a category of supernatural forces, with providing the life-force in all things. The *bope* are connected with organic flux and are associated equally with birth and death (Crocker, 1984). The people of Sumba (Indonesia) speak of "one's debt to death and one's debt to life" (Maybury-Lewis, 1992). That death is required before birth is cognized through myth and ritual. For example, before a young man is allowed to marry and father children, he must perform a sacred killing—a head hunt (Flowers, 1988).

When predation is seen as energy flow, and one recognizes the interconnectedness of the elements of the biosphere, it becomes possible to regard the entire planet as a living organism. The Dene, some Siberian tribes, and in fact many Aboriginal populations, regard the earth as a living organism (Johnson, 1992; Prattis, personal communication; Schlesier, 1987:25). In Western society this view has appeared recently as the "Gaia hypothesis."

It appears to be a further feature of many TEK societies that the behavior of elements in the ecosystem are considered to be largely indeterministic. The Chukchi of northern Siberia recognized a creativity of life in which every material object was seen as being able to act according to its own will (Schlesier, 1987:31). The Cahuilla world view conceived of the source of all things as being unpredictable. Similarly, from his experience with the Cree and Ojibway people of Northern Ontario, Ross (1992:51) concluded that they viewed all phenomena as behaving according to the wills of supernatural forces and not occurring as the result of recognizable and controllable chains of cause and effect. As a result, humans are not able to control their surroundings.

A final example comes from the Bororo of Brazil. The *bope* was mentioned earlier in association with the maintenance of the flow of the life-force in all things; it is also accredited with chaotic disruption of the natural world (Crocker, 1984).

The appearance of indeterminism in world views has yet to be fully explored cross-culturally. Bean (1972:188-189) attributes the inability of anthropologists to examine such questions to their own cultural biases. He suggests that coming from highly stable cultures, scientists tend to favor equilibrium models. World views which incorporate indeterministic principles are overlooked. The neglect of anthropologists to examine this aspect

of cosmology is unfortunate since it plays a large part in the adaptability of hunter-gatherer societies. Cycles in nature exist only as probabilities. To be adaptive, cosmologies have necessarily been developed that acknowledge the unpredictability of many ecological processes.

Because organic cycles exist as probabilities, much of traditional ecological knowledge involves learning to interpret signs that indicate the likely state of the system. It is not enough to consider only the state of the population to be harvested. Attention must also be paid to all populations associated with the prey population. Predator-prey interactions, including herbivore, are most important. Cree hunter's for example are aware of details of a beaver colony such as size and age distribution, shyness to traps, rates of wolf predation and availability of food for the beaver (Feit, 1986).

Freeman (1993) describes the nature of Inuit ecological knowledge. The Inuit understand narwhal behavior and also monitor environmental factors which bear on the narwhal's life, including the movements of its predator, the killer whale. The Inuk hunter is equally trained in the observation of interactions of eiders and their predatory gulls, even though these organisms appear less economically important. Such detailed observations allow the hunter-gatherers to recognize the onset of ecological changes.

The reliability of TEK is well documented among the Cree and peoples of the North (Freeman, 1993; Feit, 1986; Berkes *et al.*, 1992). Freeman (1992) suggests that TEK be considered seriously in environmental assessment and management. He cites many examples in support. Populations of Beaufort Sea bowhead whales and barren-ground caribou were estimated by scientists to be much lower than Native predictions. Once the censuses were carried out using population distribution information provided by Inuit hunters, the numbers were found to agree with the original Indigenous claim. The reliability of traditional knowledge has led to the suggestion that it should be considered science in its own right (Hobson, 1992).

TEK and Resource Management

There is much evidence to indicate that TEK is able to form the bases of sustainable resource management practices in part because it is reflexive, but also because it exists within a cosmology of ecological consciousness.

TEK based, hunter-gatherer societies have been able to develop prey "management systems" that have stabilizing effects on the prey populations. Switching behavior is exhibited when a predator concentrates its efforts on the most locally abundant prey species. This behavior acts to

stabilize a system (May and Watts, 1992). The Great Basin Shoshonean employ this stabilizing principal in their hunting. Collective hunts of antelope and rabbits were held only when there were judged to be sufficient prey numbers (Steward, 1974). This form of management is also used by the Sami Fjord fisherman (Norway) in their hunting and fishing activities (Eythorsson, 1992).

The James Bay Cree "resource management knowledge system" is especially well documented. James Bay Cree hunting is described by Feit (1986) as being organized around a system of hunting territories. Each territory is supervised by an Elder (*the okimah*) who is knowledgeable enough to direct the hunting of all major game on that territory. The Elders ensure than no more than two thirds of the hunting territories are being used, and that the territories are used on a rotational basis. Fallow periods allow populations to rebuild. Management is further refined through close monitoring of prey populations. When decreases in game populations are detected hunting effort is reduced. The effectiveness of each method was confirmed by the author through close monitoring of game populations and harvesting.

The Dene also respond similarly to declines in game populations:

A person always has to observe the animal population. Even if there is a slight decrease, it's best to go somewhere else for the time being. If an area doesn't have a healthy (large) population, it should be left for about two years or even three (Johnson, 1992).

Beyond "resource management" the *okimah* has a role as a social-spiritual leader (Berkes et al., 1992). Berkes et al., (1992) describes one of the responsibilities of the *okimah* as that of moral guidance in human-human as well as human-animal relationships. Both of these relationships are sustained through numerous ethical considerations as well as being outlined in myth (Prattis, personal communication). TEK exists in concert with a sense of responsibility for the environment. A man from Sumba expressed it this way:

There is nothing at all on this earth that is not paired. Everything must have its counterpart... You must work especially hard to overcome one's debt to death and one's debt to life—for they too are a pair (Maybury-Lewis, 1992:126).

To conclude, studies of resource management practices in TEK based cultures demonstrate that both a detailed understanding of the ecosystem as well as a deep sense of responsibility are required for sustainable resource management. TEK is more than an accumulated body of ecological data, it is a cosmology derived from a holistic perspective.

TEK and Changing the Western Worldview

As Cleveland (1994) rightly points out, we should not accept an "ideology of Indigenous sustainability" without testing the hypothesis. In the case of the Cree, the hypothesis has been tested. The biological evidence shows that the natural populations managed according to TEK are being used in a sustainable manner (Feit, 1986).

It is clear that the resource "management" practices of the First World is not sustainable. Many interdisciplinary studies, integrating biology and anthropology have concluded that Native science and Western science can be (and in some cases have been) synthesized to bring western society a step closer to more sustainable patterns of resource use (Berkes, 1993; Berkes et al., 1992; Feit, 1986; Lalonde, 1993). It is equally noted by such authors that TEK is more than a set of data that can be used to compliment western scientific research. TEK is holistic. For TEK based cultures, ecological knowledge includes a distinct cosmology (Berkes, 1993; Berkes et al., 1992).

For sustainable resource practices to develop in the First World, we need more than ecological data. There must exist a world view, a cosmology, which informs us of the unbroken wholeness of the universe. Only then will a sense of responsibility for the environment emerge.

Although popular representatives of predation indicates that we are far from this ideal, recent advances in biology have produced ideas that converge with TEK perspectives. Consider, for instance, the appearance of ecological models in the scientific literature: models of mutualistic interactions has been increasing over recent years. The first published model describing mutualistic interactions appeared in 1935. From that time until about 1965, only competitive models have been described. In contrast, over the last 30 years models of mutualistic interactions have appeared in the literature in increasing numbers (Fausto-Sterling, 1993).

Accompanying these theoretical advances have been empirical studies of mutualistic interactions. Most studies of mutualism examine micro-organisms. In one such study it was found that when the bacterium, *Escherichia coli*, was grown with its viral predators, the T3 and T4 bacteriophages, both evolved heritable traits as a result of the coexistence: Not only did the host become less susceptible to "illness" but the pathogen evolved to reduce its impact on the host (Taylor, 1984:133). In retroviruses it is theorized, that given enough time, a host-virus system will evolve resulting in the virus becoming entirely integrated into the host genome without pathogenicity (Doolittle, 1989). Similar systems in the past have produced symbiotic relationships with tremendous evolutionary implications. Such was the case with the eukaryotic cell, realized by Margulis (1987). The mitochondria, an

organelle of the eukaryotic cell, is now recognized as once having been a free living bacteria.

Partnership between cells once foreign and even enemies to each other are at the very roots of our being. They are the basis of the continually outward expansion of life on earth (Margulis, 1987:109).

There are also numerous examples of symbiotic relationships between unicellular and multicellular organisms, as well as between multicellular organisms. It is well known, for instance, that herbivores, ranging from cows to termites, depend on gut microorganisms to be able to digest the cellulose in their diet. Fausto-Sterling (1993) cited a recent study that found that conifer tree seedlings grew five times better if they were allowed to grow in association with large numbers of fungi.

With the increased realization of the large mutualistic component species inter-relationships it has become possible to view the entire earth as a living organism, a notion equivalent to that expressed in TEK societies. The recently conceived "Gaia hypothesis" began with Lovelock's recognition that the earth could be seen as living organism. The hypothesis has since been undergoing reaffirmation as a "scientifically productive hypothesis" (Margulis and Hinkle, 1991).

Ecologists have also begun to discover the unpredictability inherent in ecosystems. Mathematical models that include the interactions of only three species (ex. one predator and two prey) were found to demonstrate unexpected properties, properties that were not blends of the component interactions (Begon *et al.*, 1990:360). Ecological models of increasing complexity exhibit properties that are at the very best unpredictable from the nature of their parts, or at the "worst" chaotic. Hence even when predator-prey interactions are regarded as simple antagonistic relationships the outcome of their interactions are not predictable. That at some level many (all?) interspecies interactions may also exhibit mutualistic properties, further complicates the system.

To conclude, recent advances in modern biology are producing an understanding of ecology that is a reflection of that seen in TEK. The importance of mutualistic interactions in the evolution and maintenance of ecological systems, the view that the entire planet is alive, and the unpredictability of the system are all features that have long been aspects of TEK and are only now appearing in modern biology.

Paradigm shifts in the sciences may eventually reach the public consciousness within our society through the education system. Presently, however, the material taught in elementary, high-school and even university level courses is tremendously outdated. Textbooks, and courses, emphasize competitive rather than mutualistic interactions (Fausto-Sterling, 1993)

and describe evolution from the perspective of "survival of the fittest." Not only are these ideas not up-to-date, but they maintain an ecological cosmology that contributes to the destruction and desecration of the environment.

To conclude, the representation of predation in Western Society is a manifestation of an ecologically irresponsible world view. If one of our goals as a society is to better adapt to our environment, we would be best to inform ourselves using an integration of TEK and science.

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