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Research Paper

THE MYTH OF THE SUSTAINABLE LIFESTYLE

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"Documenting human impacts on genetic diversity in forest trees and other wildland plants is a difficult matter; little quantitative data exist. Most evidence is anecdotal, and only in the extreme case of extinction can we unequivocally demonstrate a reduction in diversity. ... Research is particularly needed to document changes in allele frequency under various types of forest management; very few studies exist on the impact of harvest methods on genetic diversity." (Ledig, pp.87-8)
"Comparison of pre- and post-harvest gene pools indicated a substantial loss of genetic diversity as a result of harvesting. ... In postharvest stand A about one-half of the 30 lost alleles were rare ... and one-half were low frequency alleles. ... Eighty percent of all rare alleles were lost from the two gene pools, whereas about 40% of all low frequency alleles were lost. ... 'Private' alleles, or those unique to either stand A or stand B, were especially vulnerable to harvest-induced elimination from the gene pools. ... This suggests genetic diversity losses of 25% or more may be common when forests of this type are harvested at these intensities. ... The loss of private alleles from both stands gives concern for the integrity of locally-adapted gene pools after harvesting." (Buchert et al, pp.751-4)

"Sustainability" is the Holy Grail of the twenty-first century. Everyone and his brother claim to have found it, or at least to be able to describe what it would look like. We are told that sustainable recreation, agriculture, fishing, hunting, and even logging are within reach. But, like all such "campaign promises", they aren't fulfilled, and, in fact, cannot be fulfilled!

In order to understand this, we first have to put the subject on a solid foundation. "Sustainable" means "indefinitely repeatable, without harm". Take "sustainable logging", for example. The implication is that a proper method and rate of logging can be continued forever, without diminishing the forest's resources -- in other words, without harming it. It is implied (and usually not explicitly stated) that the quantity of trees would be the same, with or without logging. But if the logged species of tree would, absent logging, naturally increase its population, holding it at a fixed population would constitute a "harm" (at least from the point of view of that species).

But population size is a rather subjective value. Humans are very good at rationalizing any level they see as convenient. So let's take a more concrete value: biodiversity, as exemplified by genetic diversity. I think that biodiversity is a generally accepted value, maybe even our highest value. Biodiversity supplies almost everything that we like: satisfying, attractive foods, clean air, clean water, effective medicines, beautiful places to live and recreate, etc.

Biodiversity is also finite. Although new (unique) genes are continually being created, the rate of creation of new genes (that survive) is far lower than the rate at which we are able to destroy them. Thus, the number of different genes (or alleles) on the Earth is a large, but finite, number. (By the way, the creation of new genes does not "compensate" for the loss of other genes, except in a simple mathematical sense; this is like comparing apples and oranges. The

creation of a new variety of apple doesn't "compensate" for the loss of a variety of orange. We like the species that we have, and are not consoled, upon their loss, by the creation of new ones.)

How does biodiversity get created? By mutation. Where does it get created? In individuals. The very first time that a new gene (or allele) is created, it most likely exists in a single individual. The probability that the same genetic "accident" would happen simultaneously in more than one individual is even lower than the already low probability of its occurrence in the first individual. Suppose, for example, that one of our to-be-logged trees contains a mutation that would allow the species to survive global warming. Then by killing even one tree, we could destroy biodiversity (a gene or allele that exists nowhere else in the world), and have a significant negative effect on the species!

Thus, logging (and any other killing of reproducing organisms) can never be "sustainable": one can never guarantee that it won't destroy a piece of that finite set, the world's store of genetic biodiversity. Repeated often enough, it could, and probably would, reduce the genetic diversity of the logged species, or even drive it to extinction. If you continually destroy members of a finite set, however large, it will eventually be empty. The probability of destroying a unique gene may be low, but the consequences can be very serious, so the killing of reproducing organisms must not be taken lightly.

To bring this closer to home, look at the set of all humans, alive or dead. (Assume that we have a concrete way of determining, e.g. genetically, whether a given organism is a human being -- call it gene H. Personally, I think that this distinguishing factor probably involves a leap in memory capacity.) This is a finite set. Therefore, it has a first member. There was a first organism having the H gene. What if that first human were killed? Then it would be extremely unlikely that humans would have evolved, at least in the relatively short 6 (?) million years that we have been here.

Every biology textbook identifies "overharvesting" as one of the major causes of the loss of biodiversity. However, as far as I know, none of them define "over", and none of them discuss the loss of biodiversity caused by harvesting that is not "overharvesting". If they did, they would have to include the practice of "collecting" (killing) organisms for scientific study. To the contrary, as recently as 1979 (Wilkins and Peterson, p. 178), we find statements like “Populations of wild animals can have the annual surplus cropped without harm”. Insect field guides, e.g. Powell and Hogue (1979), recommend collecting insects as “an exciting and satisfying hobby for anyone” (p. 359). An entomologist at the University of Phoenix told me that collecting insects causes students to become excited about studying biology. Okay, but I wonder how many of them end up benefiting the species that they killed, and how many of them, on the contrary, end up supporting practices (e.g. pest control) that harm it? Is there really a net benefit to the organisms whose lives are sacrificed to research? I doubt it.

Promoting the collecting of living organisms, besides teaching biology, also teaches people (nonverbally -- the most powerful way of teaching) that the killing of other species is to be taken lightly, and that human concerns take precedence over the lives and wishes of those species. That learning goes on even if the teacher verbally expresses regret over the need to kill. (If a smoking parent tells his children not to use drugs, what do the children actually learn?) Who knows what other consequences it may have?

My intention, however, is not to single out any one form of killing, but to explain why there can be no such thing as a sustainable lifestyle: we all kill to eat, and therefore we risk doing significant harm. At a minimum, the killing of living organisms, especially reproducing organisms, should never be taken lightly. Furthermore, the notion of a "sustainable yield" is a myth. It assumes that the preservation of species is all that is important, and ignores loss of diversity below the species level.

And there are other reasons why sustainability is unattainable: for example, all organisms produce wastes that are incompatible with their own existence. Trees produce oxygen. That seems like a good thing, but oxygen is poisonous to many organisms. And if there weren't mechanisms to remove excess oxygen from the atmosphere, all of our forests would spontaneously combust ("An increase in oxygen of only 4 percent could ignite the entire atmosphere", James Lovelock in Newbold, p.9). I also wonder what would happen to species of trees whose fallen leaves (and dead ancestors) were not broken down by animals and fungi. So even a tree can't sustain itself without the help of other organisms.

I think that the best we can say about sustainability is that it is a worthy goal, approachable, but not actually attainable.

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