

In a quick assessment of the matter this does indeed appear to be an oversight. Yet with some thoughtful reflection we can see that this rather widely held question is symptomatic of our past aimless drift of accelerating environmental degradation. It starts from two false premises: a) that the forms of pollution we now suffer under are essential and inescapable byproducts of modern industrial living, and b) that man and a very few domestic plants and animals are the only creatures on earth we need worry about.

Setting aside my strong moral and ethical reservations over the latter, let us consider the logic of these two premises.

It has been stated many times that pollution is really one or more resources out of place. Sewage-contaminated water is not only degraded water, it also represents potentially usable inorganic nutrients. Further the heat pollution from our power plants might with a bit of creative engineering be usable in one or more other phases of the water pollution problem. A systems look at the overall pollution mix could well yield real technological breakthroughs intrinsically useful quite apart from their improvements in environmental quality. We need to reach free of the narrow technological strait-jackets in which our current crop of problem solvers was trained. We need not tolerate existing pollution—we clearly should not expend scarce public funds to increase tolerances to today's stupidities.

Generating even more trauma in ecologically aware persons, however, is the widely-held nonsense that man and a veritable handful of domesticated plants and animals are all that are essential to the ecosystems that sustain man. If this were true *we* might learn to love pollution, breed our domesticants to resist it and evade forever the responsibility and expense of halting the acceleration in the fouling of our nest.

A moment's reflection suggests clearly that we cannot have the option of permitting the demise of large numbers of the earth's essential but poorly known organisms. A rather spine-chilling observation is that no man, no group of men, can tell us this moment how many of the earth's species constitute the irreducible minimum biota to keep our biosphere functioning and healthy. To think we could breed resistance to any list of pollutants in any significant number of these species—even if we knew which ones to select—is patently absurd.

How is it possible for otherwise knowledgeable scientists to be unaware of any hazard stemming from a pollution-stressed and pollution-reduced earth biota? Why are they so confident that no damage can be incurred to essential organisms such as N-fixing microbes? Largely, I suppose, it's the appearance of having gotten away with it up to now. They need to be cautioned, however of the rapidly shifting balance between man-generated systems of less than 30 years old, and ecological systems that have survived a valid test of time. There is a great deal of difference in the potential danger to the overall system of farms separated by fence rows and woodlots as opposed to blocks of hundreds of square miles containing a single variety of wheat and sustained by an ever-lengthening list of pesticides, the latter of which may escape to damage organisms at some distance from their point of application. Also, a lonely camper urinating behind a tree is a far cry from the chain of urban complexes utilizing the same river for sewage disposal, generator cooling, drinking water and allowing their urban pest control chemicals to move down the storm drains into the same river. We now approach a scale of operation that does indeed endanger other species. If we know they aren't now essential, and if we are certain we will *never* profit from the genetic information they contain, we might justifiably swap our freedom to pollute against their loss. To permit extinctions unmonitored and in complete ignorance of the creature's genetic assets borders on lunacy.

How have we learned so much only to become so ignorant? Scientists and engineers are often more coldly willing to take the risks in such trades than an uneducated person. Something is drastically wrong with our priorities in education.

Many of us have noted with dismay that while our public schools *require* courses in how our governments function, in how our economy functions, and even in how the student's own body functions—none (to my knowledge) require courses focused on how the ecosystems that sustain society function. Couple this with the ever-increasing number of lifelong urbanites in our society and we get a hint of the educational displacement.

In my own opinion we ought to require elementary training in systems ecology for all of our high school graduates. We surely need it for our engineers, for all high school teachers, home economists, and the scientists in agriculture, industry and medicine.