3. QUANTIFICATION AND CONCEPTUAL CHANGE

The July 1984 issue of *New Age Journal* featured a story by R. H. Ring called "The Computerized Forest," which lamented the conceptual changes among U.S. Forest Service workers who are now asked to do their jobs mainly via computers. The entire forest system, says Ring, has been divided into "management units" containing "habitat capacity" models and "maximum sustainable yield" computations, all of which reduce the needs of species, and the workers' understanding of them, to quantified formulas.

Computers were introduced into forest management, like everywhere else, for the sake of "efficiency," the implication being that this would help preserve nature. In fact, the objective was to more efficiently account for forest *resources*—trees, animals, water, minerals—and to better develop them as part of commodity society. A former head of the Forest Service, John Crowell (who also formerly worked for Louisiana Pacific) said candidly that he favored "thinking of the natural world in terms of 'commodities' rather than 'amenities.'" So now the Flathead Forest in Montana has a planned "output" of 200 grizzly bears. And old-growth forest is called "accumulated capital."

As Ring wrote, "The ecosystem is not so easily reduced to computerized bytes. The needs of most wildlife species, their interrelationships and dependencies on their forest habitats, are not completely understood."

It ought to go without saying that certain elements of forests resist objectification: the unnameable feelings and moods, the subtle relationships. At one time, according to Ring, forest managers learned these more subtle dimensions of forest life by direct experience—by physically being out in the woods—and they integrated what they learned into their planning. But as management goals changed from preservation to development, the tools changed as well, and with those tools changed the concepts and the job. Ring reports that now Forest Service workers themselves are changing; the new breed does not come to the task with a basic loyalty to and personal involvement with the land. They are more concerned with production goals and budgets.

Of course, computers cannot be blamed for this change in direction for forest management. But they have made possible a new information system and an accelerated pace of development, which accommodates the desires of the prime movers in our society. Meanwhile, with nuances, moods,

and personal observations subtracted from the information model—the very elements by which humans and nature have traditionally communicated with one another—the end result is passionlessness: a net loss in intimacy with, caring for, and love of nature. Workers who are not comfortable with this new mode of reckoning leave the Service, and are replaced with workers who don't mind the change.

The government of Canada has been as aggressive as the United States in introducing quantified, computerized resource management. At a recent conference of Circumpolar Peoples (Inuit and Indians) of the far north, the Canadian government announced a new initiative for bringing computers and computer training to native resource managers. The intention was ostensibly to be helpful, but the net result will be to destroy traditional resource management systems, and, perhaps along with that, native resistance to large-scale exploitation. The assumption is that objective data of the sort that computers emphasize will improve upon methods natives have employed for millennia.

Computers are actually antithetical to information sources that traditional societies have used: personal observation, sensory interaction, historical and geographic contexts, and teachings about the human-wildlife relationship that have been passed down from previous generations. These sources offer a broader spectrum than mere numerical data, and recent studies have shown them to be just as effective. The viability of native economic practices will be discussed at length in Chapter 14, but I want to suggest here what will be lost if computers take over the management of native peoples' resources.

• • •

Canadian anthropologist H. A. Feit, of McMaster University, Ontario, speaking at the 1986 Symposium of the Alberta Society of Professional Biologists, described the resource management methods of the Waswanipi Cree of northern Ontario. Their methods, used for thousands of years as they are today, are based on a philosophical premise of reciprocity among humans and animals. But they also lead to highly efficient management and accounting:

> 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 people. Causality in the Waswanipi world is not mechanical or biological, it is personal. . . .

> Waswanipi hunters say that they only catch an animal when the animal is given to them. They say that in winter it is the spirits, especially the north wind, and the animals' spirits themselves which *give* animals to the hunters and their families so that they will have what they need to live and survive. . . . The body of the animal a 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. . . . In return for the gifts, the hunter has obligations to the animals and the spirits to act responsibly, to use what is given completely, and to act respectfully towards the bodies and souls of the animals. . . . It is expected that men will kill animals swiftly, and avoid causing them undue suffering . . . not to kill more than he is given, not to kill animals for fun or self-aggrandizement.

Apparently, for thousands of years, the Waswanipi have divided their territory into hunting regions, ranging in size from 250 to 1,500 square kilometers. For each territory, an elder is appointed as steward, based on his personal "ties to spirits and the land, within a system of communal rights," says Feit. "The stewards, by repeatedly returning to the same tracts of land, have the opportunity to observe and assess the condition of the game populations . . . Stewards generally have the right and obligation to decide whether a hunting territory should be used for harvesting of big game and fur-bearers during any year, and they allocate [land] to hunters who do not have their own. They can thus decide how many hunters will use a territory, and they can indicate to those who do, how many of various kinds of game animals they may harvest. . . . their supervision is usually respected."

Feit reports that the stewards receive detailed reports from hunters returning from the fields on what has been caught and what has been seen:

> Mature hunters can usually state whether there are more beaver colonies now than there were a year ago, or five years ago, or when the hunter's first child was born, possibly thirty years before. . . . They do not usually remember exact numbers but report relative quantities or trends. Hunters can often comment on whether the number of beavers per colony has been going up or down, on whether females are having more or fewer young per year; on trends in the frequency of different age/size categories, on changes in "shyness" to traps, on changes in the rates of wolves and other predation, and on changes in forest composition, regeneration, and the availability of food for beaver.

All of this is done without computers. The point is this: Given the detailed field-observation practices of native peoples, of whom the Waswanipi Cree are only one example, computer-based systems would probably not produce numbers much different from present estimates. (In fact, Dr. Feit gave examples of comparative research that proved this point.) What computers *would* achieve is a direct assault on an age-old system of human and animal relationships that is at the very heart of native cultures and that underlies the basic philosophical, social, and economic systems of Indian societies. Eventually, the Inuit, Indian, and other native groups who are given computers will begin to conceptualize nature in the objective terms used by Western development interests ("sustainable yield," "animal units"), while the more powerful mythical, sensory, and spiritual outlook that has informed and sustained native cultures for millennia is sacrificed. In the end, this destroys Indian culture and leads to overdevelopment.

• • •

What do you think about the computer takeover in schools? Computer fever is sweeping through the educational establishment. Computer manufacturers are successfully convincing school systems that they cannot get along without them. Many companies are supplying free computers to classrooms, with the eventual goal that each of fifty million high school and college kids will own a personal computer. The long-run potential for the computer industry of having every kid computer trained is obvious.

"Computer literacy" is already required in many colleges and high schools. Computers are replacing teachers and teaching functions. And they are changing the content of the information learned in schools, from the more subtle information that goes with the traditional teacher-student relationship, to the more hard-edged, data-based objective content that goes with the machine-user relationship. It has happened so quickly that there has been little systematic evaluation of what computers do that teachers don't, or vice versa. But it already has enabled school systems to get along with fewer teachers.

Ironically, one of the highly praised aspects of computers in schools has been its "personal" quality. The computer gives the assignment, the student responds; when all goes well, the computer gives "user-friendly" praise and encouragement. The student feels rewarded. Computer advocates say teachers are often too busy to be that "personal." Computers are also infinitely patient, never tiring of working with slow learners. And when completing, say, repetitive drills in math or science, the machine can advance students to new levels and keep the process going, even when there may not be a teacher on the same floor of the building.

The questions are these: What sort of person does this educational process produce? And what sort of knowledge is attained? Marian Kester, writing in the *Toronto Globe,* put it this way: "If children are separated from their parents by hours of TV, from their playmates by video games, and from their teachers by teaching machines, where are they supposed to learn to be human?"

The next question is: Do computers make kids smarter?

Seymour Papert of MIT has said that learning computer programming leads to "conceptually clear thinking," and that children who do so can better deal with complex problems elsewhere. But Joseph Menosky, writing in *Science* magazine, disagrees. He reports that Roy Pea of the Bank Street College of Education tested kids who had learned LOGO, the computer language from MIT, to see if those kids organized their work better or more clearly.

"According to Pea," said Menosky, "the children displayed 'production without comprehension.' In other words . . . children can seem to understand while only going through the motions. This is consistent with studies of college computer science majors with thousands of hours of programming who yet fail to understand the priciples that underlie even the brief programs. These studies raise serious doubts about the sweeping claims made for the cognitive benefits of learning to program."

I worry that the increased use of computers in education will produce three results:

First of all, as with the Inuit and the Forest Service workers, objective, linear knowledge will begin to dominate while other, more subtle forms will recede. Like the wilderness, which has disappeared from the landscape and from our minds, many ways of thinking will also disappear.

Second, as computers replace teachers, the certainty of computer programs will replace the subtlety of student-teacher interaction. I am not saying that all teachers are better than computers for all subjects at all times. It's just that something goes on among humans that is definitely not present in human-machine relationships.

Third, replacing teachers with computers will create an ominous uniformity of knowledge. Corporations already provide a vast amount of "educational materials" to schools; when they also provide the computer programs that kids interact with, especially in the absence of a mitigating human presence, they pave the way to an officially sanctioned, unified field of knowledge. That field will be narrower than at present (though perhaps deeper in a few areas, such as science), and it will be consistent with corporate values.