

Credo

NATURE, TECHNOLOGY, AND THEOLOGY

by *William H. Klink*

Abstract. Modern technology presents new challenges and possibilities to the environment and life on earth. It is argued that ecology as the science of the earth as a whole cannot provide the means for making technical decisions pertaining to the environment. An alternative means is suggested in which modern technology provides the medium for communicating with nature, so that a dialogue, an intruding in and listening to nature, becomes the basis both for seeing modern technology in a new light and for living with modern technology in a new way. Some theological ramifications are also explored.

Keywords: dialogue; ecology; modern technology; theology.

We live in an age which in many ways is qualitatively different from previous ages, even though we are obviously connected in a continuous way with the past. The notion of war is now qualitatively different because weapons are available which can annihilate both sides in a conflict, so that there are no longer winners or losers. Before the advent of nuclear weapons, war was waged with the intention of winning a conflict, or at least minimizing military, economic, or political losses. A nuclear conflict between the Soviet Union and the United States would result in the destruction of the Northern Hemisphere and possibly a major part of the biosphere. The development of nuclear weapons depended on the technology arising from quantum physics, on the control and transformation of nuclear forces, forces of nature that were discovered only in this century.

Parallel to the development of nuclear weapons has been the development of substances and devices that attempt to transform the environment on a large scale. Here again, as with the waging

William H. Klink is a professor in the Department of Physics and Astronomy at the University of Iowa, Iowa City, IA 52242-1479.

[*Zygon*, vol. 27, no. 2 (June 1992).]

© 1992 by the Joint Publication Board of *Zygon*. ISSN 0591-2385

of war, we see a development that is not new in history, for human beings have been clearing forests and building cities and canals for thousands of years. What is new is the scale on which the interaction with the environment is being carried out. Instead of cutting several acres of trees over a long period of time, huge machines make it possible for thousands of acres to be cleared in a relatively short time. Instead of fertilizing small plots of land with natural fertilizers, thousands of acres are fertilized with artificial fertilizers, with substances that do not occur naturally in the environment. Instead of building canals over short distances, whole river basin systems are drained or transformed with machines of enormous power and capacity.

Nuclear destruction and environmental crisis are both consequences of modern technology. Modern technology has given us the means to interact with the environment in novel ways. But the character of the environmental crisis is not necessarily that we are polluting the earth in an irreversible fashion (we may or may not be doing that); rather, it is that we have the means to do so. As a consequence, we have a responsibility towards the environment which is without historical precedent. Technology has always been used to interact with the environment. For example, cutting down trees in Egypt apparently started the Sahara. But the Egyptians of 2000 B.C. were surely not aware that they were causing arable land to become desert. Because of modern technology, we have the means to interact with the environment in significant and subtle ways, usually without knowing the long-term consequences to ourselves or the environment, yet aware that our actions will have consequences of some sort.

We have all read about the destruction of ecosystems in various parts of the earth. Vast jungle tracts are being cut and species are dying out at ever-accelerating rates. In industrialized countries chemical spills threaten communities and poison water supplies. The difficulty is that there seems to be no way of making informed judgments about such occurrences. Does it matter that species are dying out at ever-faster rates? Aren't there funds available to deal with chemical dumping (if only there were the political will to use the money)? As Hans Jonas (1984) has pointed out, we not only have scant means by which to make judgments about environmental issues, we also have few historical precedents on which to draw.

But if there were a developed science of ecology, perhaps we could predict the outcome of our technical actions and in that way make rational judgments about what could or should be done to the environment. In discussing the relationship between nature and theology, I want first to close off this possibility, the possibility of

using ecology as a tool for guiding our actions toward the environment. My claim is that there can be no science of ecology (I am using the term *science* in a narrow, but precise way) and therefore the possibility of using the science of ecology as a guide for our actions toward the environment cannot succeed. If this claim is correct, then other means for guiding our actions toward the environment must be found. One possibility will be discussed in the latter part of this essay.

All of the various branches of science investigate phenomena that are deterministic. Probably the best-known example is to be found in physics, where the motion of the planets around the sun and the occurrence of eclipses can be predicted with astounding accuracy for many years into the future. But whereas for the nineteenth century the uncovering of deterministic structures was seen as one of the most important characteristics of science, a striking feature of twentieth-century science, extending from physics through biology to psychology, is its probabilistic character. The behavior of atoms is probabilistic, not deterministic. This means that scientific statements are tested by doing experiments on ensembles of identically prepared systems; predictions about future outcomes of systems can only be given as probabilities. Since probabilities that tend toward one become certainties, deterministic systems can be viewed as subclasses of probabilistic systems.

For the purposes of this essay I want to define ecology as the science of the earth as a whole, including how various subsystems (ecosystems) of the whole are related to one another. Some of these subsystems may seem to have a deterministic character, but because of the strong coupling of the various parts of the subsystems with one another, to test for the alleged deterministic character of a subsystem requires using probabilistic methods. But there is only one earth; we do not have at our disposal an ensemble of earths, by which to test the validity of deterministic ecological models. Because there is only one earth, probabilistic ecological models are even harder to test. So what is often done is to construct computer models for studying the behavior of specific ecosystems, or even the earth as a whole (for example, to study weather or wind patterns). But even sophisticated computer models have to be tested, and again the only possibility is against an ensemble of earths.

This means that any prediction about the outcome of some action on the environment must always have an intrinsic uncertainty about it. The greenhouse effect (seen experimentally and predicted on the basis of computer modeling) asserts that the earth is warming up because fumes from industry and automobiles trap more solar radiation than in the past. A warmer earth will melt more ice and raise the

levels of the oceans. This all sounds very deterministic and may even be true. But if there is a warming trend, is it because of fumes, or because of some other cycle in the life of the earth? Only tests on ensembles of earths could distinguish between such possibilities. Because of this intrinsic uncertainty about future outcomes, politicians and other decision makers are able to quote those scientists who happen to agree with their point of view and slide around the harder issue of what should be done.

I am not arguing that ecology should not be pursued as a subject of inquiry. Clearly, a great deal has been learned about the behavior of ecosystems through the study of ecology. I am, however, arguing that in principle ecology can never make deterministic predictions in the way that physics or biology or even occasionally psychology can, because these sciences are able to test their models on ensembles of identically prepared systems, whereas ecology cannot. If this conclusion is correct, then the outcome of our actions on the environment cannot be predicted on the basis of ecological models—we cannot predict with any confidence what the outcomes of our actions might be. Yet we continue to interact with the environment. On what basis should judgments be made as to whether one course of action as opposed to another ought to be followed? When a new chemical is used for controlling insects, how should judgments be made that it will be safer or more benign than previous chemicals?

One possibility is to have strict rules for preventing certain kinds of technical actions that seem likely to be harmful. But even if a society could agree on such rules, even if the policing and sanctioning of society according to these rules were carried out, this would again presuppose that the outcomes of actions were readily determinable. Further, as has been pointed out by a number of persons who have reflected on the character of modern technology (such as Ellul 1964; Winner 1977; or Mumford 1970) modern technology seems to have an autonomy about it that often seems independent of human constraints. Dyson (1983) has shown how technology has driven the arms race. Technology, not government officials or laws, has determined the course of the arms race. The significant events in the past twenty years are not so much symbolized by a few treaties, but by terms like MIRV, ABM, cruise missiles, and most recently, Star Wars. Scientists like to talk about weapons systems that are technically sweet—they must be built, independent of external political constraints.

On the other hand, we can keep fumbling along, hoping that the tropical forests that have been cut and the chemicals that have been dumped will not upset the equilibrium of the earth so much as to

preclude the possibility of sustaining life on the planet. For the most part we take this course of action out of necessity. For most persons Love Canal is far away, but the pesticides in their drinking water are not. And unfortunately, farmers have to compete with other polluters. Besides, we have been told that if knowledgeable scientists put the right chemicals into our water, they can neutralize the harmful effects, even if the water doesn't taste too good.

I want to suggest another alternative for relating to the environment, one which takes seriously our responsibility for nurturing and caring for the environment, while also accepting the inevitability of intrusion into the environment by modern technology: namely, we should think of our interaction with the environment as a way of listening to and talking with Nature, via the medium of technology. The autonomy and drive of technology may well not be controllable, but technology can be used as a means of communication between human beings and the environment. Human beings will keep intruding into the environment because we are part of the environment and have the technical means to do so. But we can also think of Nature as a living organism which responds to our intrusions. When the Corps of Engineers channelizes parts of the Missouri River, and the result is flooded homes and fish unable to survive the swift currents, the Missouri River is telling us something. When we use DDT to kill insects, and the DDT turns up in the eggshells of birds thousands of miles away, we are getting a response of a most unexpected sort. Because we are human beings with technical tools, we will interact with the environment. But if we view this interaction as a dialogue, as an interaction and response, then we no longer "dehumanize" Nature; rather, we both give to and learn from Nature. Such a dialogue is only possible with sufficient technical means. For thousands of years, human beings were unaware that they might be able to influence or overpower Nature. Only in the last fifty years or so have we become aware of such a possibility, and then only because of new and more powerful technology.

Thus, in my view, technology should not be seen in primarily negative terms, as is done by Ellul (1967), or in positive terms, as is the case with Fuller (1969); both of these positions are too simple and one-sided. Technical innovations in farming have made it possible to feed many more people, at the expense of polluted streams and water supplies. Technical advances in transportation have made it much easier to travel long distances, but exhaust fumes from automobiles and other vehicles could disrupt the heat balance of the earth. If one takes the evidence from these and many other examples, two attitudes are possible. One is to assert, as Fuller does, that it is possible

to master technology and by technical means eventually control all aspects of life on earth, including the technical means to correct technical "mistakes." Or, like Ellul, one may reject the dehumanization that results from increasing technical control over all aspects of life; that is to say, to reject as much as possible all forms of modern technology. But neither of these positions sees technology in its autonomy, necessity, and ambiguity, as a means toward control which in its very success undermines itself. Heidegger's analysis of technology sees this ambiguity much more clearly: "The essence of technology is in a lofty sense ambiguous. Such ambiguity points to the mystery of all revealing, i.e. of truth" (Heidegger 1977, 33). If technology is used as a means of communication, as a new possibility for carrying on a dialogue with nature, the very notion of technology changes, from a means of more control and power, to a means for listening, responding, being open to new possibilities in the life of the earth. Such a dialogue, of course, carries a risk. From Buber (1970) we know that all genuine I-Thou encounters risk being reduced to I-It relationships, in which one side (and then necessarily the other) becomes an object, to be tampered or played with, or destroyed. For the most part, our present relationship with the environment has had such an I-It character. But I-It relationships can become I-Thou relationships in which both sides listen to and respond to the other side.

Ecologists play an important role in this dialogue; they are less scientists as such than the primary "listeners," those who work closely with the environment and are sensitive to the way in which Nature is responding to our technological incursions. Such a role is the modern analogue to the "listeners" of old—farmers, peasants, administrators of the land, whose primary responsibility was to listen to Nature in order to see when to plant, harvest, or use land for new purposes. Now, however, not only listening is involved; there is also large-scale technical intervention, which changes the relationship from one of just listening to one of dialogue, of listening and responding and listening again. Even as human beings move farther and farther away from any direct connection with the environment (by living in cities or simply not seeing their own surroundings), it is ever more necessary for them to be conscious of their listening responsibility. Hence the importance of environmental groups and coalitions which serve to bring the dialogue to the consciousness of communities. Hence the importance of recycling efforts, not only because we are running out of landfills, but because this constitutes the beginning of the transition from an I-It relationship (just dump the garbage, and let Nature take care of it) to an I-Thou relationship

(what shall we dump and where, and how will Nature respond to what we do dump; then after we see how Nature responds, what further alternatives are there?). So we should all be listeners; but the ecologists are the primary listeners, because they have been trained to listen sensitively to the responses that Nature makes, and because they can make more reasoned judgments about the consequences of future technical incursions into the environment.

What does all of this have to do with theology? For those who hold that there is nothing "behind" Nature, or even behind the laws of Nature, the possibility of a dialogue is then simply a dialogue between human beings and Nature. But for many religious communities, and in particular those communities that understand themselves in light of the Judeo-Christian tradition, there exists another possibility. The Judeo-Christian tradition has long seen God acting in history through Nature. God "spoke" through the flood, through the parting of the Red Sea, through famine and drought. What is new in our present age is that we can "speak back"; that is to say, God has put at our disposal technical powers that are nearly as great as some of the powers that were used by God in previous ages. From this theological point of view, our technical incursions into the environment are a "speaking back" to God in which we expect, and listen for, responses from the environment and recognize them as God's responses. What is needed to guide our "speaking back" are theological models that incorporate human freedom (and therefore responsibility for our actions) along with the sense of God's acting on our earth. To the extent that we participate in God's larger plan for the universe, we do so not only in our actions with and for other human beings, but also in our actions with and for the environment. I have just argued that future actions cannot be based on science, but need to be informed by a larger vision. The role of theology is to provide that larger vision. The role of theological models is to make concrete how a new kind of dialogue between human beings and God is possible, one in which human beings act on the environment through technology, and listen for the response of God through Nature. A most important function of such theological models is to make religious communities aware of the sense that technical incursions constitute the beginnings of a dialogue with Nature, rather than simply the subjugation of Nature. Thus, a dialogue with Nature through technology can be carried out by anyone—or any community—through technical means. From the point of view of religious communities, and in particular those in the Judeo-Christian tradition—a tradition which bears considerable responsibility for many of our environmental problems—the dialogue is understood as a dialogue

between human beings and God, with Nature as the intermediary, as the location where the conversation is actually carried out.

The greenhouse effect and the depletion of the ozone layer are the result of technological incursions that have received a great deal of notice in recent years. We should listen carefully to the advice of environmental experts, even when they disagree with each other, not because they have the correct environmental models, but because they are trying to listen carefully to how Nature is responding to human actions. The hope is that this might be the beginning of a genuine dialogue between human beings and Nature, and from the Judeo-Christian perspective, a new dialogue between human beings and God.

REFERENCES

- Buber, Martin. 1970. *I and Thou*. Trans. by W. Kaufman. New York: Charles Scribner's Sons.
- Dyson, F. 1983. *Values at War*. Salt Lake City: Univ. of Utah Press.
- Ellul, J. 1964. *The Technological Society*. New York: Vintage Books.
- Fuller, R. B. 1969. *Operating Manual for Spaceship Earth*. Carbondale: Southern Illinois Univ. Press.
- Heidegger, M. 1977. *The Question Concerning Technology and Other Essays*. Trans. by W. Lovitt. New York: Harper and Row.
- Jonas, H. 1974. *Philosophical Essays: From Ancient Creed to Technological Man*. Englewood Cliffs, N.J.: Prentice Hall.
- . 1984. *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*. Chicago: Univ. of Chicago Press.
- Mumford, L. 1970. *The Myth of the Machine*. New York: Harcourt, Brace and World.
- Winner, L. 1977. *Autonomous Technology: Technics out of Control as a Theme in Political Thought*. Cambridge: MIT Press.