
**THE
ECOLOGICAL
CRISIS:
IS
CHRISTIANITY
RESPONSIBLE?**

by
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Introduction

“**T**echnological progress,” wrote Abraham J. Heschel, “creates more problems than it solves” (Heschel 1975, 165). We can always debate Heschel’s claim that the problems created are more than the solutions provided. However, there is a growing awareness that human interaction with the environment has led to an ecological crisis, which threatens to destroy our ecosystem. John Bellamy Foster succinctly sums up the problem: “Everywhere we look—in the atmosphere, oceans, watersheds, forests, soil, etc.—it is now clear that rapid ecological decline is setting in” (Foster 1995, 1). Bill McKibben goes even further to argue that human activities have already made extinct the very concept of nature as “the wild province, the world apart from man to which he adapted, under whose rule he was born and died” (McKibben 1989, 48). In other words, the most elemental forces of nature (weather patterns, temperature, animal habitats, etc.) have been substantially modified by human technological advances and the attendant pollution. Hence we can no longer think of nature simply as the wild, elemental forces, because those factors have been changed by the impact of human activities. Some who have studied these ecological problems, notably Heilbroner and the Club of Rome, feel that they have reached such crisis proportions that only a radical change in the attitude that has guided human activities, especially technological development, can save us from catastrophe (See Heilbroner, 1974).

An essential issue, therefore, is to determine what attitudes, values or philosophical/theological outlooks have predisposed humans to push the limits of nature to the brink of possible disaster. In other words, where does the responsibility lie for this “wanton and

ignorant destruction or defacement" of the environment (Heschel 1975, 185). Lynn White, a historian, contends that the historical roots of our ecological problems can be attributed to Christianity and its effects on the attitude of the West toward nature. It is the attribution of the responsibility for the ecological crisis to Christianity which is the focus of this essay. But before I take up White's thesis, I will outline the dimensions of the effects of human activities on the environment.

Dimensions of the Ecological Crisis

Three interrelated processes are responsible for the current environmental problems: exponential population growth, rabid exploitation of natural resources, and industrial and domestic pollution. Considering that the ecosystem is finite, explosive growth in human population, rapid depletion of the earth's resources, and mounting pollution of the environment will inevitably lead to ecological disaster.

In 1650, the earth's human population was approximately a half a billion and growing at 0.3 percent per year (Meadows 1974, 34). It doubled over the next 200 years, reaching the billion mark in 1850. By 1970 the human population had almost quadrupled, reaching 3.6 billion and growing at an average of 2.1 per cent per year. At this rate, human population will exceed 6 billion in the year 2000, and between 8 and 15 billion by the end of the 21st century (Meadows 1974, 34; Myers 1984, 180). As I am writing, November 2, 1996 at 3:00 pm, the world population is estimated at 5,855,056,016 (World POPClock from Us Bureau of Census [on the Internet]), well on its way to breaking the 6 billion mark by year 2000.

The momentum in population growth over the last 150 years is due mainly to dramatic decreases in the mortality rate, compared with only a slight decrease in the fertility rate. The decrease in the mortality rate is a direct result of scientific and technological development. Advances in medical technology, the development of better hygienic methods, advances in food production and distribution and the availability of public services have all combined to decrease infant mortality rate and increase life expectancy, with the result of a burgeoning population. In the seventeenth century human life expectancy was about 30 years. In the 1970s it rose to an average of 53 years. Today the average is 60 years, with some countries having a rate of over 70 years (Meadows 1974, 37). It is estimated that over the last 150 years modern medicine has cut in half the power of diseases and epidemics around the world. While technology has made a significant dent in the death rate, the birth rate has only shown a slight decrease, partly due to the fact that in many societies traditional attitudes to childbearing still persist. The result is

what Paul Harrison calls, "death control with birth control" (Harrison 1981, 217).

Some debate whether overpopulation and the associated problems of poverty, drought, famine and strifes are the real problems. They will point out that there are enough resources for everyone, but inequities and overconsumption by the rich of the world have condemned others to poverty and its attendant ills. Whichever side of the debate we advocate, we must concede that infinite population increase within a finite world, is impossible.

Concomitant with the exponential population growth, is the rapid depletion of the earth's resources. Every year erosion accounts for the loss of one billion tons of topsoil in Europe, 25 billion tons in Asia, and over one billion tons in the United States. Even more topsoil is being lost in the tropics, where tropical downpours wreak havoc on cleared hillsides, and where wind storms carry away topsoil from land made semi-arid by over-farming and over-grazing. If the present rate of erosion continues, the added 200 million hectares of arable land, which are slated to be cultivated by year 2000, will only offset the production lost through erosion, thus adding nothing to present productivity (Myers 1984, 40). The loss of topsoil has serious implications for agriculture, and hence the food production which supports human life. Furthermore, it means the loss of food and habitat for other life forms which help to maintain the balance in the ecosystem.

Along with erosion, deforestation plays a major role in the depletion of the earth's resources and in the exacerbation of the ecological crisis. Human activities are eliminating 12 million hectares of forest from the planet each year, while significantly degrading another 10 million hectares. At such a rate, tropical forests, with the exception of some areas in the Amazonia and the Zaire Basin, may disappear by 2050. Logging removes 4.5 million hectares of timber from the world's forest each year. Slash and burn farming, practised by over 250 million peasant farmers, seriously damages 10 million hectares of forest each year. Two million hectares of tropical forest suffer the scourge of foraging of fuel wood. Twice as much woodland and scrub forest suffer the same fate (Myers 1984, 43-43). In Central America and the Amazon alone, 2.5 million hectares are cleared for ranching each year. For example, in the state of Para, Brazil, 180,000 square kilometers of forest was cleared between 1975 and 1986, compared to 18,000 in the previous 100 years (McKibben 1989).

Deforestation has several crucial environmental consequences. The loss of the "sponge effect" of the forest will result in erratic rainfall and the loss of the irrigation capacity of some rivers. Obviously, this is also a threat to water supply and the silting of dams. Scientists believe that

climatic conditions will be adversely affected if we lose the rain forest in the Amazon, which contains more than half of the moisture circulating through the ecosystem in the region. Tropical rain forests absorb much of the solar radiation entering our atmosphere. Their loss means an increase in the amount of radiation escaping into the atmosphere, resulting in changes in the pattern of wind current and tropical rainfall. The clearing and burning of forest lands contribute significantly to the release and build up of carbon dioxide in the atmosphere, resulting in global warming (Myers 1984).

Erosion and deforestation inevitably lead to "desertification," the process by which additional lands are added to the desert because of the encroachment of humans and other animals. About 12 million hectares per year are becoming agriculturally useless, forty percent as a result of soil erosion and the rest as a result of overgrazing (Myers 1984).

Along with population growth and the depletion of natural resources, pollution poses a serious threat to the viability of the world's ecosystem. The atmosphere, the biosphere, and the hydrosphere have all been severely affected. One source of atmospheric pollution is the emission of sulphur oxides and nitrogen oxides from industrial machines. Released into the atmosphere, these substances are dissolved in rain and returned to earth as sulphuric and nitric acids, which are very corrosive. Acid rain affects the environment in at least two ways. By deoxygenating the inland waters, sulphuric and nitric acids prove to be very destructive to the life forms in lakes, rivers and ponds. For example, some of Sweden's fresh water sources are so acidic that they can no longer provide life support for aquatic animals and plants (McKibben 1989, 37). Acid rain also leaches plant nutrients from soil, contributing to the destruction of wood areas. The gradual dying of the red spruce in Vermont, USA, and loss of a third of the Black Forest in Germany have been attributed to acid rain and other pollutants (Myers 1984, 118-19; McKibben 1989, 35-37).

Hydrocarbons, emitted from combustion engines are another source of atmospheric pollutions. Along with nitrogen oxides, hydrocarbons combine with sunlight to produce photo-chemical smog, which endangers both plant and human life. While Los Angeles may have the greatest notoriety for smog, it is becoming increasingly noticeable in other large cities, including cities in the Developing World (Myers 1984, 119). Recently, I was reading about a football match between Jamaica and Mexico played in Mexico City. The reporter, citing an Associated Press report in *The Weekly Star* (Mexico City) on 26 October, 1996, (p. 19, Col. 1), observed that the match "was played in an unhealthy level of thick smog, which has cloaked the city."

Probably the most discussed pollutants are the greenhouse gases. Carbon dioxide is a bi-product of burning fossil fuels such as wood, coal and gasoline. Methane, a natural gas, is emitted into the air by billions of head of cattle and billions of termites. Methane also escapes from innumerable rice paddies and landfills. Chloroflourocarbons (CFCs) are used as coolants in refrigeration and air conditioning systems and as propellants in aerosol sprays. They are also basic ingredients in a variety of plastic and cleaning products (McKibben 199, 11-18, 38-40; Meadows 1974, 71-72). The increasing high concentration of these gases in the air traps infra-red radiation from the sun in the earth's atmosphere, preventing it from going back into space. At the same time, these gases eat away at the ozone layer, which protects the earth from the direct assault of the sun by filtering out some of its ultra-violet radiation. The thinning of the ozone layer means more radiation is reaching the earth's atmosphere. The combination of more radiation entering and less leaving produces global warming. Some experts fear that global warming will eventually cause an environmental chain reaction: rising temperature, leading to melting of the ice caps, leading to rise in sea levels, leading to the loss of coastlines, marsh lands, beaches and resorts (McKibben 1989, 19-23).

The pollution of the hydrosphere has come from many sources: the disposal of sewage sludge containing highly toxic chemicals, agricultural run-offs containing pesticides, herbicides and nitrates (from fertilizers), industrial effluents including metallic pollutants and the deadly polychlorinated biphenyls (PCBs), radio-active waste from nuclear plants, oil spills on the water ways, and domestic and commercial waste (Meadows 1974, 74-80). Some of these chemicals, notably pesticides and PCBs, find their way into animal tissues, and as they move up the food chain (from smaller to larger organisms), they become more concentrated and more deadly. Finding their way into human bodies, through the food chain and through polluted drinking waters, these pollutants have been implicated in a number of maladies, ranging from food poisoning, to cancer, to heart disease, to damage to the nervous system (Myers 1984, 122-123).

The dimensions of the ecological crisis that I have cited here are by no means exhaustive. I have mentioned these areas merely to illustrate the breadth and gravity of the environmental problems we face, and to provide a background against which to discuss where the responsibility should fall for such widespread defacement of the earth.

Is Christianity the Culprit?

As noted previously, Lynn White answers this question in the affirmative. He begins by pointing out that technology and science, as they exist today, are eminently Western, and that their present contour is related to an "arranged marriage" between them in the nineteenth century. Prior to the mid-nineteenth century, science was conceived as an elite academic endeavor, while technology was considered the prerogative of artisans. But in the mid-nineteenth century, the acceptance of "the Baconian creed that scientific knowledge means technological power over nature" led to a merger between science and technology, and thus to a widespread exploitation of nature (White 1970, 14). This merger might have been influenced by the rise of democracy and the resultant blurring of class distinctions in Europe.

The roots of European technological development, White argues, can be traced back to the Middle Ages, when the West gradually became superior in science and technology. Admittedly, Europe inherited the scientific legacy from the Arabs and the Greeks, but European scientists not only imbibed the science of the Arabs and Greeks, but also criticized it and made further observations and postulations of their own. White cites the widening application of water power, the utilization of wind power, the manufacture of mechanical clock, and the development of cross-ploughing machines as evidence of European technological superiority (White, pp. 16, 18). It is this superiority, says White, which enabled the Europeans to colonize and dominate the world from the fifteenth century onwards (White 1970, 20).

From these technological innovations, which White finds in the Middle Ages, he concludes that there prevailed an exploitative attitude toward nature. This attitude he attributes to the dominance of the Judeo-Christian world view in Western Europe. In his own words, "the victory of Christianity over paganism was the greatest psychic revolution in the history of our culture" (White 1970, 19). Lynn White is supported in this thesis by several thinkers, including Harvey Cox, Johannes Metz, Max Nicholson, Arnold Toynbee, and Arend van Leeuwen, though all of them do not make the same ecological connection (Shinn 1985, 185-86; McQuarrie 1974, 32-34). This victory operated on three fronts to give impetus to technological progress through the exploitation of nature.

In the first place, the Judeo-Christian assertion that nature is created by the one personal, eternal and transcendent God, in one bold stroke, de-divinized, desacrilized and disenchanting nature. The belief that nature was inhabited by divine spirits or pervaded by the divine energy was thrown out of court, thus releasing human beings from the fear of exploiting nature (White 1970, 25). Second, the Judeo-Christian world-

view makes humankind master over nature. Christian theology, based on *Genesis 1:28*, and *9:1-3*, makes a dichotomy between human beings and nature and teaches that God has given them the right to dominate and exploit nature in accordance with their own needs and for their own ends (White 1970, 19, 20). Third, in the West, Christian teleology replaced the ancient idea of history as cyclical with the notion of gradual progress—a notion which became the driving force behind the technological development of the nineteenth and twentieth century, and which still has currency in the post-Christian era (White 1970, 19).

The conclusion is obvious and clearly stated:

Our science and technology have grown out of Christian attitudes toward man's relation to nature which are almost universally held not only by Christians and neo-Christians but also by those who fondly regard themselves as post-Christians (White 1970, 23).

So simply stated, the blame for the "destruction and defacement of creation" is to be laid at the door of Christianity. Christianity is the culprit.

A Critique of White's Thesis

The popularization of the above thesis by Lynn White and others, notably Daisetz Suzuki, a Zen Buddhist, has sparked considerable debate in academic circles and elsewhere. A debate at a 1987 conference on "Christianity and Ecology" illustrates the level of controversy. Earl B. Arnold reports that they debated "long and fiercely" whether or not "the Bible is a help or a hindrance of defending the earth" (Arnold 1987, 3). Without exploring the various directions the controversy has taken, I wish to argue that Lynn White's thesis is based more on logical deduction than on empirical and historical data, and thus it is grossly inadequate. The following considerations point in the direction of my conclusion.

The notion that animistic and pantheistic beliefs lead in the direction of non-exploitation of nature, and that monotheism leads in the opposite, cannot be substantiated. As White himself admits, and as Rene Dubos argues strongly, human assault on nature predated monotheistic faiths, and certainly Western Christianity. As evidence for his position Dubos cites the irreversible damage done to the landscape by early civilizations from Egypt to the Indus Valley, because of their agricultural practices (Dubos 1972, 154-55). Such depletion of the agricultural capacity of the soil was probably a dominant factor in the disappearance of most of those civilizations (Dubos 1972, 161). Dubos also cites the depletion of

the cedars and cypresses of Lebanon, and the extinction of many animal species associated with the advent of agriculture. He concludes, "all over the globe and at all times in the past, men have pillaged nature and disturbed the ecological equilibrium" (Dubos 1972, 161).

Contrary to White's thesis, a view of nature as possessed by sacred spirits and forces can lead to a philosophy or theology which justifies human enterprise which acts upon nature. Shintoism in Japan provides a good example. According to Shintoism, "human and nature are blood relatives" because they both owe their existence to the all-pervasive kami—the Japanese word for god (Ludwig 1984, 10). From this basic assumption, Shintoism proceeds to regard "human participation in and advancement of this life" as a kind of participation with kami" in bringing benefits to human existence" (Ludwig 1984, 10). The Japanese versions of Buddhism and Confucianism are very consistent with the Shinto legitimation of human activities in nature (Ludwig 1984, 15). Robert N. Bellah, a sociologist of Japanese and American religions, is very much in agreement with the point I am arguing. He contends that the "traditional ethico-religious beliefs" of the Japanese society have survived into the technological age and is a dynamic force in the technological pursuit of Japan (Bellah 1987, 65).

The ecological problems created by the Japanese are no secret. A Japanese, observing the variety of insects in Jamaica, some of which were causing him a great deal of discomfort, remarked to me that the pollution level is so high in Tokyo that many of its life forms have disappeared. Moreover, we all know of the notoriety the Japanese, along with the Russians, have acquired for whaling which threatens to make extinct some species of whales.

The Japanese are not alone. Yi-Fu Tuan shows that though the animistic and Taoist traditions of China are oriented toward respect for nature, beliefs such as the "male" principle of dominance" have moved the Chinese toward transforming their world in pursuit of order and prosperity (Tuan 1974, 101-102). Yi-Fu Tuan also shows that in the Graeco-Roman world, which White gives as an example of the attitude which is not prone to exploit nature, untold damage was done to the landscape by agricultural activities. He cites Plato's lament over the erosion of Attica and contends that the Romans' assault on nature was rather extensive. His conclusion is that "against this background of vast transformation of nature in the pagan world, the inroads made in the early century of the Christian era were relatively modest" (Tuan 1974, 98).

Also militating against White's thesis is the fact that a Christian world view does not necessarily lead to a disregard for nature. By his own

confession, this did not happen in the East where Christianity was as firmly entrenched as in Europe. Furthermore, his patron saint of ecological consciousness is Francis of Assisi, a western Christian. Roger L. Shinn points out two other examples of Christian believers that showed considerable respect, if not reverence, for nature: Dostoevsky's Alyosha Karamazu in the East and Martin Luther, the reformer, in the West (Shinn 1985, 189).

Turning to White's claims that the West's superiority in technology dates back to the Middle Ages with the victory of Christianity over paganism, I find that his historical insight or hindsight is somewhat out of focus. As Jacques Ellul points out, during the period when the West was officially Christian, the fourth to the fourteenth century, there was a marked decline in "Roman techniques in every area—on the level of organization as well as in construction of cities, in industry and in transport" (Ellul 1964, 33). Interestingly, Christianity was accused as the culprit which caused this decline, probably because of its otherworldly emphasis and its injunctions against avarice and selfishness. This decline has led some historians to label this millenium the Dark Ages.

Dubos, drawing on the work of Joseph Needham, a British scientist and historian, argues that China's technological superiority over Europe extended into the seventeenth century (Dubos 1972, 160). It was only the shock of the Renaissance that awoke Western Europe from its technological slumber. And as Ellul rightly observes, when the West sensed its need for technological development, it was to the East that it turned (Ellul 1964, 33). In my opinion, the reason why the East fell and lagged behind the West from the seventeenth century, and in some cases as early as the fifteenth century, is not so much that it respected nature, but that it went through a process of recoiling because of the threat it faced from European expansionism, colonialism and imperialism.

White must take more seriously the fact that as Christianity gained ascendancy in the West the technological drive slowed, and as the dominance of the Christian world view progressively declined, technology developed rapidly. It was only as the humanistic ideas, which were introduced by the Renaissance and which flourished in the Enlightenment, came to dominate, and Christianity as the dominant world-view was thrown out and was replaced by a kind of "social Darwinism," that technology really gained momentum in the West. And the less Christian the West has become, the more it has flourished technologically.

Furthermore, even if we accept White's thesis that the disenchantment of nature led to western technological development, we are still left with

unanswered questions. Why, even after hundreds of years as a nation which accepted monotheism, was Israel technologically inferior to its neighbors which did not share its belief in YAHWEH? Why did not the Islamic nations become the leaders in modern technology? They share the monotheistic faith with Christianity and Judaism, and were once more advanced in science than Europe. And most importantly, why did Christianity not produce the same impetus in the East as it did in the West?

White tries to answer the last question by pointing to the fact that the Eastern church tended to be more intellectually inclined while the Western church tended to be voluntarist (White 1970, 20-21). But it is exactly this difference that indicates that different forces, cultural and/or historical, were at work, and that we should therefore look for another variable (or other variables), since Christianity is a common variable shared by both East and West. The crucial variable, I suggest, is Europe's inheritance of the pragmatic and technical drive, as well as the expansionist fervor, from the Romans. Of course, the pragmatic and technical drive and the expansionist fervor went through a period of hibernation in the Middle Ages, but when they resurfaced, both combined to shape Europe and the United States well into the twentieth century.

Conclusion

My critique has shown that human action on nature and the resultant environmental problems are universal. Where then do we begin to look for the real roots for our ecological crisis? I do not profess to have the definitive answer, but I wish to suggest that any answer must take into consideration the role that human necessity, creativity and ambition play in the drive toward technological advancement.

That human necessity provided the first impetus toward technology hardly needs to be argued. It was the need for food and clothing that drove human beings to the creation of the most primitive technology, whether in agriculture or tool-making for hunting. Put another way, the first feeble steps toward technology was occasioned by the human need to survive amidst an inhospitable environment. But human necessity must still figure in today's discussion of ecological problems. Peasant farming and the foraging for fire woods, which are two major threats to the forests of the world, are not the result of malicious disregard for nature, but a function of the necessity to survive.

Creativity, which is an innate quality of the human species, is also a factor in the creation and multiplication of technologies. That human is *homo faber* is one of the most self-evident facts of life. Sociologist Peter

Berger explains that creative activity is a function of humankind's biological make up. Human beings have organismic drives which are expressed or externalized in human creative activities (Berger and Luckmann 1966, 52). So even where the necessities for survival are provided, the creative spirit still gives rise to human interaction with nature.

Though environmentalists and ethicists alike tend to shy away from discussing ambition, I would like to contend that no discussion of the proliferation of technologies and the problems they spawned can be complete without taking into account human ambition. The ambition to succeed is the driving force behind the capitalist ideology of interminable progress; it is embodied in the "male" principle of dominance which propels the Chinese toward prosperity; and it is behind the Japanese justification of the technological enterprise as partnership with kami. Interaction with nature based on necessity and creativity has had severe ecological consequences, often because human beings acted out of ignorance with regards to the effects of their behavior. But when human ambition gets translated into competitiveness, acquisitiveness and selfishness, the assault on nature intensifies and the ecological backlash multiplies. The competitiveness of the European nation-states and the bloody struggles among them for ascendancy seem to have had much to do with the direction technology took in Europe from the fifteenth century onward.

The question still remains: what should be our approach to the ecological crisis? It is not my intention to discuss here the merits of the proposals set forth by the likes of Lynn White, Rene Dubos and Arnold Toynbee. I just wish to point to the direction in which we may look for a responsible ecological ethic, which will engender attitudes and actions that are protective of the environment. To begin, the biblical teaching on God's sovereign ownership of the earth (Psalm 24) and the stewardship responsibility of humankind implicit in Genesis 1:28 and 2:15 and other passages, is pregnant with implications which should inform Christian environmental ethics. Rightly read, the doctrine of the creation of humans in the image of God is not a license for the plundering and despoiling of the earth, but rather a "mandate for responsible representation of divine benevolence and justice" (Nash 1996, 8). In other words, the authority that Genesis bestows upon humans is not a legitimization of senseless and reckless exploitation of nature. It is a duty to protect and enhance God's "good" and purposeful creation. Hence Adam, bearing God's creative nature, was put in the Garden of Eden "to work it and take care of it" (Genesis 2:15, NIV).

Other motifs in the Scriptures highlight the fact that the Judeo-

Christian ethic upholds the integrity of the earth. As Leviticus 25 makes clear the Sabbath Year and the Year of Jubilee were to promote not only social justice, but also 'eco-justice'. They were a means of affirming God's sovereign ownership of the earth and releasing "the earth to regularly replenish its life-giving power, protecting its integrity and providing spaces for its creatures" (Chial 1996, 55). While the Bible does not subscribe to the animistic view that spirits dwell in rocks, trees, rivers, etc., it does affirm the omnipresence of God. In fact, the Scriptures affirm that the created order is kept together and sustained by the same creative power that brought about the world in the first place (Col. 1:16-17). In this respect, the theological affirmation of the World Council of Churches, Canberra 1991 conference is quite apt: "All creation lives and moves and has its being in this divine life. This Spirit is in, with and under 'all things'" (Chial 1996, 56). Therefore, while the world is not God's body, it is nevertheless the object of God's sustaining presence. Also, "it is God's beloved habitat. As such, its integrity demands moral respect and responsibility" (Nash 1996, 9). Furthermore, the Bible views the creation, "subjected to frustration," as the object of liberation and redemption (Rom. 8:19-21; see also I Cor. 15:28, Eph. 1:10). The inclusion of the cosmic order in the plan of redemption illustrates God's concern for the integrity of the earth and the rest of the creation. Therefore, any view that sees the earth as an object to be pillaged in the pursuit of human ambition is not Christian. Human beings, as God's co-creators and God's responsible stewards, must join God in working toward the earth being "liberated from its bondage to decay" (Rom. 8:21, NIV).

In our pluralistic world, not all will share the ethical implications for environmental responsibility that I find in the Judeo-Christian text. However, it would seem to me that the humanistic ideals, which embody the quest for the promotion of human well-being, and which are widely shared by the human community as a whole, may provide a fertile common ground for ecological sensitivity. Coupled with this, should be the recognition that we face a common predicament brought on by irresponsible environmental destruction, and that we will share the common benefits which will accrue from more responsible management of the earth. I think the authors of the Gaia atlas sensed the commonality of human ideals, predicament and benefits, when they issued the following admonition:

It is time for humanity to use this power, and use it well. We must have the courage to face ourselves, to admit our power of life and death, and bring it under permanent watchful control. Now we must take side with life (Meadows 1974, 257).

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