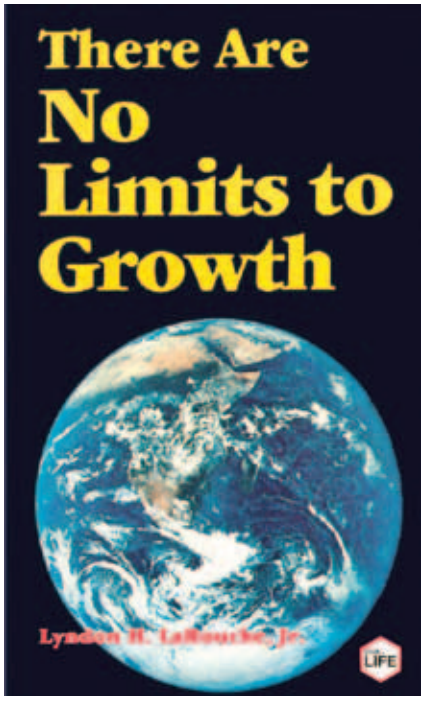
June 1983

There Are No Limits to Growth

Mother Nature Kills German Forests

by Lyndon H. LaRouche, Jr.

The world is now facing the global imposition of a new form of fascism, called alternatively the Green New Deal, Green Finance, The Great Reset, and other euphemisms for the top-down British Imperial destruction of scientific and technological progress under the guise of the "carbon causes global warming" hoax. Thirty-seven years ago, Lyndon H. LaRouche laid to rest, for any thinking person, any form of Malthusian mental aberrations in his seminal book, There Are No Limits to Growth. *Had his ideas been adopted at that time, we would not now be facing the threat of the Four Horsemen of the Apocalypse. There is still time to reverse the descent into famine, pestilence and war, if the cause of these phenomena are properly understood, as Lyndon LaRouche understood even then. The following is taken from Chapter 1, "Mother Nature Kills German Forests," of that 1983 book.*



Over the past fifteen years, the greatest single cause for destruction of the world's "ecology" has been the toleration of the policies demanded by the so-called "ecologists," the so-called "neo-Malthusians" of the Club of Rome, of the International Institute for Applied Systems Analysis (IIASA), of the World Wildlife Fund, the Aspen Institute, the Ford Foundation, the Rockefeller Foundation, the U.S. Sierra Club, and so forth and so on. We are not putting enough industrially-produced energy, in the form of water management, chemicals, and so forth, into the farming of the Earth's biosphere. At the same time, we are using biomass for fuel and other "traditional" uses, in cases we should be using nuclear-generated energy supplies, and using modern, industrially-produced materials in place of timber for housing and so forth.

Meanwhile, at the opposite extreme, since approximately the 1920s in Germany, some of us have been planning mankind's exploration and colonization of space. During the 1950s and 1960s, well-designed plans for human colonization of the Moon and Mars began to be developed. With development and use of controlled thermonuclear fusion, frequent travel between Mars and a large, orbiting space-station parked near the Earth would become practicable. With thermonuclear fusion energy and use of directed-beam technologies, including high-powered lasers, we will have the basic repertoire of technologies needed to create and maintain "artificial Earth-like" environments on the Moon or Mars, probably beginning with the use of Earth's natural orbiting-satellite space station, the Moon, as a logistical base in nearby space, from which to launch the long leg of exploration of nearby and deep space.

Can mankind construct a forest on Mars? If we resume the rates of technological progress we may remember from the pre-1967 period of research and development efforts of the U.S.A.'s National Aeronautics and Space Administration (NASA), we will be able to do just that during the twenty-first century. With thermonuclear fusion technologies we shall possess cheaply-produced, abundant energy supplies in the needed quantities at the best cost required to develop the necessary artificial, Earth-like environments under

"plastic bubbles." With directed-beam technologies, such as high-powered lasers and coherent particle-beams, and with related classes of technology of relativistic physics, the productive power of an average human individual will zoom to between ten and a hundred times that on Earth today. With aid of progress in biotechnology, we shall be able to engineer properties into trees and other plants to produce types suited to the conditions of artificial, Earth-like environments.

If this is possible during a period less than a century ahead, why can we not solve the much less challenging problems of improving the ecology on Earth today? With the combinations of very high energy-flux density thermonuclear fusion, directed-beam and related technologies, and biotechnology, we can manufacture air, water, and so forth where they do not exist today in space, and can provide plant life the properties needed to cope with special problems; perhaps we might even develop a new, improved version of chlorophyll, to double or treble the energy-gathering powers of the plant life. Today, we either have such technologies, or are at the edge of mastering them. Why, then, do we continue to tolerate conditions on Earth which even existing technologies are proven capable of solving?

Miserable Conditions on Earth

The reason for these miserable conditions is a simple reason. Some people, people with a great deal of power over the periodicals, universities, financial institutions, and political parties of much of the world, simply do not wish society to solve these problems.

Take the case of a fellow known as Rudolf Bahro. This fellow once enjoyed an international reputation as a great fighter for freedom and human welfare generally, at the point he was in the process of leaving East Germany (the German Democratic Republic) for sanctuary in the West. Now, many of us suspect that the East German government was delighted to see its competitor, West Germany, enjoy the benefits of Herr Bahro's advice. In mid-March 1983, Herr Bahro presented an audience some seeds held in his hand—presumably seeds of grain—and declared that these seeds represented the beginning of the evils which afflict man today.

Some very basic facts about the economic history and prehistory of human life on Earth show exactly what Herr Bahro was implicitly proposing.

The lowest form of human life known is what is called a "hunting and gathering society," the kind of

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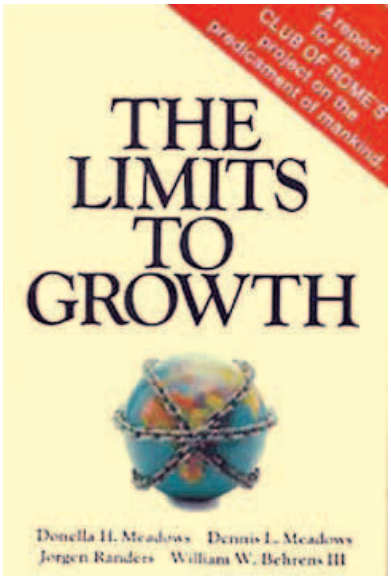
Neo-Malthusian Rudolf Bahro, who proclaimed that the practice of agriculture is evil.

society to which mankind would presumably return if Herr Bahro's demands were accepted. In such a form of society, an area of between ten and fifteen square kilometers of the habitable surface of the Earth is required to sustain an average individual. This means a total human population of the Earth of never more than approximately ten millions individuals. This fact prompts us to ask Herr Bahro to list, by name, the approximately four and a half billions individuals presently living on Earth, whom he proposes to kill, in order to reduce the population levels down to those possible without the "agricultural revolution" which occurred most probably ten to twelve thousand years ago?

Not only is such a pre-agricultural-revolution form of society a very thinly-populated society. The prevailing life expectancy is significantly less than twenty years of age, and the life of each local tribe as a whole is extremely precarious. Although Herr Bahro has not stated that he proposes to boycott the food and fiber produced by the agricultural revolution, he seems otherwise sincere in asserting that he considers it a mistake ever to have left the spiritually invigorating cultural climate of the extinct South African strandlooper, pelting to death washed up, dying fish and whatnot which the surf has cast upon the beach.

Admittedly, Herr Bahro's views are presently those of an extremely eccentric, although organized and growing, tiny minority. Nonetheless, his views are only the most extreme version of the broader spectrum of neo-Malthusian dogmatists generally. So-called "environmentalists" or "ecologists" infest increasingly large portions of most major political parties, as well as the



Dennis Meadows, co-author of The Limits to Growth*, published by the Club of Rome in 1972, which became the bible of the anti-scientific ecologist movement. It was based on a fraudulent computer study.*

variously neo-Nazi-led and "leftist." varieties of "anti-technology" sects. Moreover, most of the major news media, the major entertainment media, the courts, legislatures, and powerful, very wealthy foundations, are more or less saturated with neo-Malthusian policies and pro-Club of Rome propaganda.

The Club of Rome

During recent years, it has been overlooked, how recent the mass-based "ecologist" movements are. The first movements were organized, top-down at the end of 1969, pulling together remnants of the 1950s Ban the Bomb movements, the 1965-1969 anti-Vietnam War movements, and the New Left generally, on both sides of the Atlantic. "Sun Day," during spring 1970, was the first of the demonstrations organized top-down by governmental agencies and private foundations for the "ecologist causes." The banning of the pesticide DDT, (on fraudulent pretexts), and the campaign against nuclear energy came only slightly later. The spread of this ideology is little more than ten years old.

The present-day neo-Malthusian organizing did not really get under way outside the ranks of the "re-programmed leftists" until 1972, with the publication of a book called *The Limits to Growth*. This book's production was sponsored by the Club of Rome, and its publication was used to launch the public relations campaign which made the Club of Rome almost an instant major policy-influencing institution.

The Limits to Growth was based on a computer-assisted study conducted under the direction of two professors from the Massachusetts Institute of Technology (U.S.A.), Dennis Meadows and Jay Forrester. The study itself was most conspicuously fraudulent on two leading counts.

First, in attempting to prove that industrial society was using up its remaining natural resources very rapidly, Meadows and Forrester greatly understated the known quantities of such resources.

Second, more important, Meadows and Forrester projected the rate of consumption of natural resources by using systems of simultaneous linear equations. The very use of such linear equations for a computer "model" of that sort, builds into the computer projections the assumption that absolutely no technological progress is occurring in society. In fact, technological progress, including fundamental redefinitions of what "natural resources" means, has been the outstanding feature of European civilization for five hundred years. *The Limits to Growth* depended upon the assumption that such technological progress had come to a sudden, absolute stop.

How could anyone have believed such nonsense? Every qualified scientist knew that the kinds of arguments used by the Club of Rome were a fraud. Most engineers knew it. Industrial corporations knew it. If the news media checked with scientists, they, too, would have known it. If governments and political parties had behaved responsibly, they would have denounced the Club of Rome and its *Limits of Growth* as a monstrous hoax.

If we are running out of coal, and we do have about 200 years known supply at present rates of consumption, why not use more abundant nuclear energy, and why not concentrate on speeding up development of almost unlimited resources of thermonuclear fusion? We are not running out of petroleum either; we are discovering vast new petroleum fields faster than we use up the old fields. However, if we are worried about carbon dioxide build-ups and other pollution caused by fossil fuel combustion, why not shift at an accelerating rate into nuclear and thermonuclear generation of process-heat?

Nuclear Power

"Radioactivity"? Nonsense! A nuclear energy plant radiates less radioactive waste into the environment than a coal-fired plant generating the same number of kilowatt-hours. A nuclear plant radiates less radioactivity into the environment than a brick wall. A person leaning against a nuclear plant receives less radioactivity than while traveling in a transatlantic jet, or a weekend's ski trip in the U.S. Rocky Mountains or Swiss Alps. If one is concerned about such levels of radioactivity, one ought to insist that never more than two (naturally slightly radioactive) human bodies ought to be allowed in the same bed.

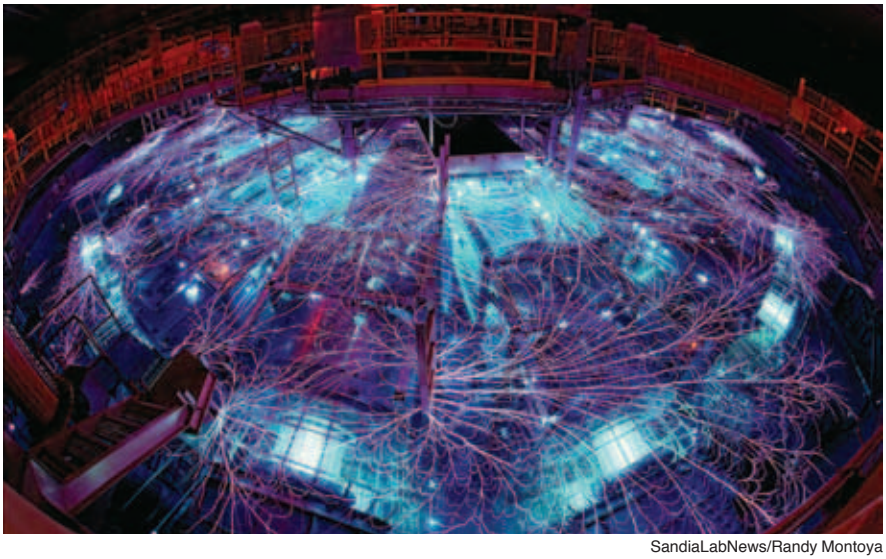
"Nuclear plant accidents"? The "lesson of Three Mile Island" in Pennsylvania is, first, that the combination of circumstances involved could occur only through sabotage, and, second, that the "accident" proved totally the perfection of the safety precautions built into nuclear plants today. The tales of the "China Syndrome" and other Grimm stories issued by the news media were all a deliberate hoax, a lie, as every investigation of the matter proved during and after the "accident."

To cause a nuclear accident, either one would have to drop a nuclear bomb directly onto the plant, or carry in and place the most sophisticated combination of shaped charges imaginable. In any case, the mass of steel and concrete built into such plants make them the most bomb-proof structures presently in existence in the world. If we employ nuclear fuels of the thorium-cycle, for example, even the infinitesimal possibilities for some degree of nuclear accident become approximately absolute zero.

Nuclear reactors producing baseline power provide a much greater energy-flux density and at lower cost than solar, wind, or fossil fuels. Shown is the nuclear-fueled Susquehanna Steam Electric Station on the Susquehanna River in Luzerne County, Pennsylvania.

All this is well-known, even by the scientifically-trained liars trotted out as "authorities" by the anti-nuclear propagandists.

In the case of thermonuclear fusion, the possibility of nuclear accidents is automatically absolutely zero. The components of a thermonuclear reaction, such as those used in hydrogen bombs, are either a combination of lithium and an isotope of hydrogen, deuterium, or deuterium and tritium, the latter another isotope of hydrogen, or deuterium and deuterium. The latter two combinations produce so-called "clean explosions," without primary radioactive fall-out. To cause a thermonuclear ignition requires temperature equivalents in the order of between 5×10^7 and 5×10^8 degrees Kelvin, and even then, the ignition will not occur without the proper physical principles of precise hydrodynamic self-focussing of the material, to effect what is called *isentropic compression.* Any disruption, such as an accident or being hit directly by a 10 megaton bomb, means that the plant's thermonuclear reaction stops abruptly.



SandiaLabNews/Randy Montoya

"Thermonuclear fusion is far superior to nuclear fission." The Z machine at the Sandia National Laboratory in Albuquerque, New Mexico, is used to study materials subjected to high temperatures and pressures, a vital field for fusion research.

Thermonuclear fusion is far superior to nuclear fission, but we re-

quire large-scale use of nuclear fission to supply the energy needed to develop a thermonuclear fusion-based economy. Some figures are helpful in making the point.

In the statistical theory of heat, today, we measure the level of heat processes in units we call *energy-flux density.* This measures the number of kilowatt-hours passing through an area of cross section of the heat-generating process. The following two tables, compiled in 1979, show the comparative energy-flux densities of various sources of energy, and also the comparative costs of electrical energy produced using such sources.

TABLE 1
Energy-Flux Density

Energy Source	Density In Kilowatts/Square Meter
Sloar—Biomass	0.0001
Solar—Earth surface	0.2
Solar—near-Sun orbit (5 millions miles)	1.4
Fossil Fuels	10,000.00
Solar—at Sun's surface	20,000;00
Fission	70,000.00
Fusion (first commercial types)	70,000.00
Fusion (next century)	10^{15} +

TABLE 2
Comparison of Delivered Electrical Power
(in U.S.A. dollars)

	Total Energy Costs (mils/kw-hr)	Total Energy Prices (mils/kw-hr)	Capital Invested ($ billions)
Oil	25.1	45.7	$0.94
Coal	24.2	31.7	0.97
Coal Gas	41.7	55.7	1.67
Light Water Nuclear	27.8	28.5	1.16
Fast Breeder	33.7	33.9	1.43
Fusion (early types)	45.2	45.2	1.92
Solar Collector	490.0	490.0	20.90
Solar Cells	680.0	680.0	28.90

(Source: Fusion Energy Foundation, U.S.A.)

Energy-Flux Density

The simplest of the physical principles involved in choosing among energy sources is that the higher the level of energy-flux density, the more efficient the energy source is. Not only is less heat wasted, but the higher the energy-flux density, the greater the potential of the process-heat to accomplish work.

To appreciate the importance of this, including the important question of maintaining forests, we must consider another important kind of figure. This figure has a name which may appear frightening to the layman at first glance; we shall show that it is easily understood. This datum is named *potential relative population-density.* We explain the meaning of this figure, and then show its relationship to the business of maintaining forests.

Given a population inhabiting a certain territory, and let that territory be measured in square kilometers of habitable area. By developing and using the natural resources available in that area, how many people can be maintained through the work of the population's labor force? On the average, the answer is given as the average number of persons per average square-kilometer. Persons per square-kilometer is *population-density.*

That figure is not an adequate measurement. Land varies in quality, so that one square-kilometer is not of the same quality for human habitation as another square-kilometer. Those desirable qualities of land, which express such differences, are variable qualities. Man may improve the land, or deplete it. The quality of land is the net result of combined depletions and improvements of its qualities. Therefore, we say that the value of all square-kilometers are not the same; they are different, and they are variable. Therefore, we must measure population-density in terms of relative qualities of the land inhabited: *relative population-density.*

The present level of population is not necessarily a measurement of what the population level could be. We must determine what that population could become, as a maximum, given the kinds of production technologies presently in use. What is the potential level of population, given those technologies? That is the general meaning of *potential relative population-density.*

We have already indicated that the potential relative population-density of primitive society is about 0.06 to 0.10/square-kilometer: about 10 millions maximum population. There exist today approximately 4.5 billions individuals, more than 100 times the levels of primitive man. Since a factor of "10" is called *one order of magnitude,* this means that mankind has raised its potential relative population-density by two orders of magnitude. With full use of existing levels of technology, combined with the thermonuclear, directed-beam, and bio-technology coming into existence now, our planet could sustain a population of tens of billions of persons, and at an average standard of living higher than that for the United States during the early 1970s: a rise above primitive society by *three orders of magnitude*!

Potential Relative Population-Density

No beast, or any other lower form of life could *willfully* increase in potential relative population-density by even one order of magnitude. Man is fundamentally different from the beasts. Man is not merely a creature of instinctive potentialities, a mere creature of animal-like perceptions of pleasure and pain. Man is somehow very different. Man has the potential of Reason, the power to make creative discoveries which advance his scientific knowledge, and to convert such scientific advances into advances in technology. We are able to uncover, with increasing perfection, the lawful, universal principles which order universal creation, and to master nature with increasing power, through guiding ourselves to change our ways of behavior in accordance with universal laws.

The successive technological advances accumulated by human culture since the level of Herr Bahro's utopia, have increased man's potential relative population-density by between two and three orders of magnitude.

This technological progress, this increase in human potential, has been accomplished by an increasing command over energy. Beginning with the agricultural revolution, and ocean fishing in boats earlier, mankind has increased the amount of useful energy available to the average individual, and has increased the number of kilowatt-hours' value of the amount of usable energy obtained by society per square-kilometer. Today, we can roughly measure the fertility of agricultural land by the amount of "artificial energy" used per hectare by the farmer: chemical energy of fertilizers, trace-element additions, pesticides, and electrical and other industrially-produced energy forms used for irrigation, powered machinery, and so forth. Similarly, in industry and transportation, the productive powers of the average member of the labor force are measured in first approximation by the amount of industrially-produced energy used per capita.

This technological progress is not merely an available option. The authors of *The Limits to Growth* are right on one point, although perhaps this was an unintentional feature of their book. If, at any point, we halt technological progress, the society foolish enough to do such a thing condemns itself to die.

Any level of productive technology requires a certain array of *raw materials* produced by agriculture, fishing, forestry, mining, and so forth. This is what we work up from the Earth around us into primary materials of production and other consumption. For any level of technology and human consumption, the amount of each such kind of raw material approximates an average requirement per capita.

The production of such primary materials therefore requires some definite percentile of the entire labor force of the society. Only the remainder of the labor force, after deducting this percentile, is available for other forms of labor. As a society uses up some of the richest and most accessible natural sources of raw materials-production, the amount of labor a society must expend to produce a constant per capita amount of raw materials rises. This rise in cost lowers the productivity of labor on the average. Fewer individuals can be sustained, on the average, by the output produced by an average member of the labor force. In other words, the potential relative population-density falls. If the technology of production remains constant, the rise in costs caused by depletion of critical kinds of natural resources is a rise which continues without limit. Therefore, for this reason, the potential relative population-density would fall without limit under those conditions.

The Necessity for Technological Progress

At the point the society's potential relative population-density falls below the population-density of the existing population, the Four Horsemen of the Apocalypse enter. Famine promotes desperate strife. War and bloody civil commotions worsen the conditions of famine. The famine-stricken population becomes a breeder of diseases, spiraling into epidemics and pandemics, as was the case during the early fourteenth century Europe. The breakdown of agriculture and hygienic institutions promotes the eruptions of pestilences. The society is conquered, collapses, or changes its ways abruptly.

Technological progress prevents such catastrophes in two related ways. First, simply by increasing the productive powers of labor, technological progress overcomes the rising costs of production of essential raw materials. Second, technological revolutions redefine the range of usable natural resources, and introduce new kinds of raw materials to the bill of requirements, just as the industrial revolution's use of coal overcame the threatened collapse of Europe caused by exhaustion of forests.

Technological progress is indispensable even to maintain a constant level of potential relative population-density. Therefore, constantly rising levels of energy supplies, both per square-kilometer and per capita are indispensable to the survival of society. These growing energy supplies must become relatively cheaper: The cost of producing the average amount of increased energy per capita must tend to be significantly less than the old cost of producing less energy per capita. The energy-flux density of energy supplies must

Development of the Earth's Population

(to 1920, from United Nations' Statistical Yearbook, figures in millions)

	1650	1750	1800	1850	1900	1920	1940	1950	1960	1980	2000
Europe and U.S.S.R.	103	144	193	274	423	487	575	573	639	791	973
Asia (not including U.S.S.R).	257	437	595	656	857	966	1244	1381	1651	2557	4401
North America	1	1	6	26	81	117	144	166	199	272	388
Central and South America	7	10	23	33	63	91	130	163	212	387	756
Africa	100	100	100	100	141	141	191	222	273	458	860
Oceania and Australia	2	2	2	2	6	9	11	13	16	22	32
Earth	470	694	919	1091	1571	1811	2295	2517	2990	4487	7410

At the first stage of human development, that of hunting and gathering, at most one human being per square kilometer could be supported under ideal conditions, so that no more than approximately 10 million human beings could survive on earth. The transition to animal husbandry and nomadic pastoral economy increased population density to around 8 human beings per square kilometer; agriculture in its primitive form brought the level to approximately 20 human beings per square kilometer.

Industrial society brought tremendous progress. Modern energy-intensive agriculture increased population density to around 100 human beings per square kilometer. The relative potential population density of the earth thus increased to some 10 billion human beings.

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A hunter-gatherer in the Central African Republic.

CC/Nathan Freitas

Plowing in Tibet using yaks.

Canadian Wheat Board

Modern wheat harvesting in Canada.

also increase, at least in a general way. There must also be periodic revolutions in the definition of the term "natural resources," even under conditions of a constant potential relative population-density.

Agriculture and Forestry

In connection with matters of agriculture and forestry, there exists today the widespread, but false opinion that the fertility of the soil for agriculture lies essentially with an assumedly natural fertility of land. This was, more or less exactly, the argument submitted by the radically feudalist faction of eighteenth-century France, the so-called Physiocrats.

The history of agriculture in the United States, since it began during the seventeenth century, is perhaps the best case with aid of which to demonstrate the absurdity of the Physiocratic opinion. Notable, of course, is the case of California's Imperial Valley, today the most

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An aerial view of California's Salton Sea and Imperial Valley, "the most valuable agricultural land on Earth, which was, but a few decades ago, a desert."

valuable agricultural land on Earth, which was, but a few decades ago, a desert. This case is exceptional in degree, but not in matters of principle. Virtually the entirety of the richness of agriculture in the United States and the earlier settlements was created out of an infertile, stubborn wilderness by means of processes of man-imposed improvements in land, improvements analogous to the investment and improvement of industrial capital.

In Europe, where a longer occupation of the land by agriculture is the case, the same demonstration is immediately clear to all who know agriculture, but is less dramatically demonstrated than in the relatively brief history of agriculture in the United States.

Otherwise, one of the clearest demonstrations of the same principle is the case of the forests of Germany, which are, with the rarest exceptions, man-made creations, not natural occurrences. They are not forests, but better described as tree-farms, a point immediately clear to any visitor to those pleasant parks (called forests) who has firsthand recollections of struggling through a primitive jungle or temperate zone forest.

Yet, these "artificial" German forests are not to be despised because they are not "natural," any more than one would despise the produce of agriculture on our tables, on grounds that the tropical melons are not poisonous, like the ancestors of our melons in their "natural" occurrence. These "artificial forests" are better than those naturally occurring, on many important points; if they are not, it is because the tree-farmer is not meeting his responsibilities as a farmer. To the point, a good forest must be weeded, like a farmer's field, to the effect of producing a healthier forest than would occur "naturally."

Biological Systems are Negentropic

A forest, like agriculture generally, is a biological system. All biological systems, except dying ones, are characterized by a property called *negentropy*. Over successful cycles of their growth, they embody greater energy than earlier, and such systems are ranked by the equivalent of energy-flux density per unit of mass-weight. Their potentialities of growth, of quality of growth, and powers of resistance to various injuries,

vary with the nourishment provided by their environment. Above all, they require relatively abundant energy, energy organized in those forms they can assimilate it.

A striking illustration of the point was accomplished in Wales, Britain, by experimenters working with flax plants. It was demonstrated repeatedly, that by affording young flax plants the proper environment of temperature and nourishment, a change occurred in these plants. This change proved to be fully hereditable, although no genetic change had occurred. This heredity persisted in daughter, granddaughter, and great-granddaughter, and so forth, plants, even though those later generations had been reproduced under normal conditions, without the special conditions of temperature and nourishment employed to produce the original change.

Otherwise, in cases in which no environment-directed hereditable change occurs in plants, superior strains of plants usually require enhanced environments, especially nutrition. This enhancement takes the included forms of water-management and soil- treatment, and sometimes "hothouse" preparation of the seedlings before transplanting. All of this requires industrially-produced "artificial energy," and all of this translates into increased supplies of such "artificial energy" per hectare, whether for forest or farm. In Germany, therefore, one of the best friends of the field and forest is, traditionally, the BASF chemical plant.

It is most helpful to think about developing a forest under an artificial, bubble-covered, Earthlike environment on Mars. It is the proper point of view for thinking about problems of maintaining and improving the environment on Earth. Forcing ourselves to solve the problems associated with growing a forest on Mars, has the added benefit of forcing us to develop techniques which will be of considerable benefit to maintaining the forests on Earth.

On Mars or Earth, we require the benefits of technological progress for such undertakings. We require not only new technology for treating problems of the biosphere. We require the energy supplies such work implies. It is also indispensable that we cheapen the social cost of doing such work, through increasing the productive powers of society.

In general principles, this is not new. The principles have been known to Europe, in particular, for centuries. We must ask how and why people and institutions of considerable prestige, wealth, and influence, would have produced a doctrine as dangerously absurd as the neo-Malthusianism of the Club of Rome?