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MURRAY BOOKCHIN ECOLOGY AND REVOLUTIONARY THOUGHT

WITH THE
ECOLOGY ACTION EAST
MANIFESTO

AND
TOWARD AN
ECOLOGICAL
SOLUTION

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ECOLOGY AND REVOLUTIONARY THOUGHT

Murray Bookchin

In almost every period since the renaissance, the development of revolutionary thought has been heavily influenced by a branch of science, often in conjunction with a school of philosophy.

Astronomy in the time of Copernicus and Galileo helped to guide a sweeping movement of ideas from the medieval world, riddled by superstition, into one pervaded by a critical rationalism, openly naturalistic and humanistic in outlook. During the Enlightenment—the era that culminated in the Great French Revolution—this liberatory movement of ideas was reinforced by advances in mechanics and mathematics. The Victorian Era was shaken to its very foundations by evolutionary theories in biology and anthropology, by Marx's re-working of Ricardian economics, and towards its end, by Freudian psychology.

In our own time, we have seen the assimilation of these once liberatory sciences by the established social order. Indeed, we have begun to regard science itself as an instrument of control over the thought processes and physical being of man. This distrust of science and of the scientific method is not without justification. "Many sensitive people, especially artists", observes Abraham Maslow, "are afraid that science besmirches and depresses, that it tears things apart rather than integrating them, thereby killing

rather than creating". What is perhaps equally important, modern science has lost its critical edge. Largely functional or instrumental in intent, the branches of science that once tore at the chains of man are now used to perpetuate and gild them. Even philosophy has yielded to instrumentalism and tends to be little more than a body of logical contrivances, the handmaiden of the computer rather than the revolutionary.

There is one science, however, that may yet restore and even transcend the liberatory estate of the traditional sciences and philosophies. It passes rather loosely under the name of "ecology"—a term coined by Haeckel a century ago to denote "the investigation of the total relations of the animal both to its inorganic and to its organic environment". At first glance, Haeckel's definition sounds innocuous enough; and ecology, narrowly conceived as one of the biological sciences, is often reduced to a variety of biometrics in which field workers focus on food chains and statistical studies of animal populations. There is an ecology of health that would hardly offend the sensibilities of the American Medical Association and a concept of social ecology that would conform to the most well-engineered notions of the New York City Planning Commission.

Broadly conceived, however, ecology deals with the balance of nature. Inasmuch as nature includes man, the science basically deals with the harmonization of nature and man. This focus has explosive implications. The explosive implications of an ecological approach arise not only from the fact that ecology is intrinsically a critical science—in fact, critical on a scale that the most radical systems of political economy failed to attain—but it is also an integrative and reconstructive science. This integrative, reconstructive aspect of ecology, carried through to all its implications, leads directly into anarchic areas of social thought. For in the final analysis, it is impossible to achieve a harmonization of man and nature without creating a human community that lives

in a lasting balance with its natural environment.

THE CRITICAL NATURE OF ECOLOGY

Let us examine the critical edge of ecology—a unique feature of the science in a period of general scientific docility.

Basically, this critical edge derives from the subject-matter of ecology—from its very domain. The issues with which ecology deals are imperishable in the sense that they cannot be ignored without bringing into question the viability of the planet, indeed the survival of man himself. The critical edge of ecology is due not so much to the power of human reason—a power which science hallowed during its most revolutionary periods—but to a still higher power, the sovereignty of nature over man and all his activities. It may be that man is manipulable, as the owners of the mass media argue, or that elements of nature are manipulable, as the engineers demonstrate by their dazzling achievements, but ecology clearly shows that the *totality* of the natural world—nature taken in *all* its aspects, cycles, and interrelationships—cancels out all human pretensions to mastery over the planet. The great wastelands of North Africa and the eroded hills of Greece, once areas of a thriving agriculture or a rich natural flora, are historic evidence of nature's revenge against human parasitism, be it in the form of soil exploitation or deforestation.

Yet none of these historical examples compare in weight and scope with the effects of man's despoilation—and nature's revenge—since the days of the Industrial Revolution, and especially since the end of the Second World War. Ancient examples of human parasitism were essentially local in scope; they were precisely *examples* of man's potential for destruction and nothing more. Often, they were compensated by remarkable improvements in the natural ecology of a region, as witness the European peasantry's superb reworking of the soil during centuries of

cultivation and the even more superb achievements of Inca agriculturists in terracing the Andes Mountains during pre-Columbian times.

Modern man's despoilation of the environment is global in scope, like his imperialisms. It is even extra-terrestrial, as witness the disturbances of the Van Allen Belt a few years ago. Human parasitism, today, disrupts not only the atmosphere, climate, water resources, soil, flora, and fauna of a region; it upsets virtually all the basic cycles of nature and threatens to undermine the stability of the environment on a world-wide scale.

To gauge the scope of modern man's disruptive role: it has been estimated that the burning of fossil fuels (coal and oil) annually adds 600 million tons of carbon dioxide to the air, an average of about .03 percent of the total atmospheric mass--this, I may add, aside from an incalculable quantity of toxicants. Since the Industrial Revolution, the overall atmospheric mass of carbon dioxide has increased by 13 percent over earlier, more stable, levels. It could be argued on very sound theoretical grounds that this mounting blanket of carbon dioxide, by intercepting heat radiated from the earth into outer space, leads to rising atmospheric temperatures, to a more violent circulation of air, to more destructive storm patterns, and eventually, it will lead to a melting of the polar ice caps (possibly in two or three centuries), rising sea levels, and the inundation of vast land areas. Far removed as such a deluge may be, the changing proportion of carbon dioxide to other atmospheric gases is symbolic of the impact man is having on the balance of nature.

A more immediate ecological issue is man's extensive pollution of the earth's waterways. What counts, here, is not the fact that man befouls a given stream, river, or lake—a thing he has done for ages—but rather the magnitude water pollution has reached in the past two generations.

Nearly all the surface waters of the United States are polluted.

Many American waterways are open cesspools that properly qualify as extensions of urban sewage systems. It would be a euphemism to describe them any longer as rivers or lakes. More significantly, large portions of groundwater are sufficiently polluted to be undrinkable, even medically hazardous, and a number of local hepatitis epidemics have been traced to polluted wells in suburban areas. In contrast to surface-water pollution, groundwater or sub-surface-water pollution is immensely difficult to eliminate and tends to linger on for decades after the sources of pollution have been removed.

An article in a mass-circulation magazine appropriately describes the polluted waterways of the United States as "Our Dying Waters". This despairing, apocalyptic description of the water-pollution problem in the United States really applies to the world at large. The waters of the earth, conceived as factors in a large ecological system, are literally dying. Massive pollution is destroying the once pristine rivers and lakes of Africa, Asia, and Latin America as media of life, as well as the long-abused waterways of highly industrialized continents. Even the open sea has not been spared from extensive pollution. And I speak, here, not only of radioactive pollutants from nuclear bomb tests and power reactors, which apparently reach all the flora and fauna of the sea. It suffices to point out that the discharge of diesel-oil wastes from ships in the Atlantic has become a massive pollution problem, claiming marine life in enormous numbers every year.

Accounts of this kind can be repeated for virtually every part of the biosphere. Pages can be written on the immense losses of productive soil that occur annually in almost every continent of the earth; on the extensive loss of the tree cover in areas vulnerable to erosion; on lethal air-pollution episodes in major urban areas; on the world-wide distribution of toxic agents, such as radioactive isotopes and lead; on the chemicalization of man's immediate environment—one might say his very dinner table—with pesticide

residues, and food additives. Pieced together like bits of a jig-saw puzzle, these affronts to the environment form a pattern of destruction that has no precedent in man's long history on the earth.

Obviously, man would be dismissed as a highly destructive parasite, who threatens to destroy his host—the natural world—and eventually himself. In ecology, however, the word "parasite", used in this over-simplified sense, is not an answer to a question, but comprises the question itself. Ecologists know that a destructive parasitism of this kind usually reflects a disruption of an ecological situation; indeed, many species, seemingly highly destructive under one set of conditions, are eminently useful under another set of conditions. What imparts a profoundly critical function to ecology is the fact that man's destructive activities raises the question: What are the conditions that have turned man into a destructive parasite? What produces a form of human parasitism that results not only in vast natural imbalances, but also threatens the very existence of humanity itself?

The truth is that man has produced imbalances not only in nature, but more fundamentally, in his relations with his fellow man—in the very structure of his society. To state this thought more precisely: The imbalances man has produced in the natural world are caused by the imbalances he has produced in the social world. A century ago it would have been possible to regard air pollution and water contamination as the result of greed, profit-seeking, and competition—in short, as the result of the activities of industrial barons and self-seeking bureaucrats. Today, this explanation would be a gross oversimplification. It is doubtless true that most bourgeois enterprises are still guided by a public-be-damned attitude, as witness the reactions of power utilities, automobile concerns, and steel corporations to pollution problems. But a more deep-rooted problem than the attitude of the owners is the size of the firms themselves—their enormous physical

proportions, their location in a region, their density with respect to a community or a waterway, their requirements for raw materials and water, and their role in the national division of labor.

What we are seeing, today, is a crisis not only in natural ecology but, above all, in social ecology. Modern society, especially as we know it in the United States and Europe, is being organized around immense urban belts at one extreme, a highly industrialized agriculture at the other extreme, and capping both, a swollen, bureaucratized, anonymous state apparatus. If we leave all values aside, for the moment, and examine the physical structure of this society, what must necessarily impress us is the incredible logistical problems it must try to solve—problems of transportation, of density, of supply (raw materials, manufactured commodities, and foodstuffs), of economic and political organization, of industrial location, and so forth. The burden this type of urbanized and centralized society places on any continental area is enormous. If the process of urbanizing man and industrializing agriculture were to continue unabated, it would make much of the earth inhospitable for viable, healthy human beings and render vast areas utterly uninhabitable.

Ecologists are often asked, rather tauntingly, to locate with scientific exactness the ecological breaking point of nature—presumably, the point at which the natural world will cave in on man. This is equivalent to asking a psychiatrist for the precise moment when a neurotic will become a non-functional psychotic. No such answer is ever likely to be available. But the ecologist can supply a strategic insight into the directions man seems to be following as a result of his split with the natural world.

From the standpoint of ecology, man is dangerously simplifying his environment. The modern city represents a regressive encroachment of the synthetic on the natural, of the inorganic (concrete, metals, and glass) on the organic, of crude, elemental stimuli on variegated, wide-ranging ones. The vast urban belts now

developing in industrialized areas of the world are not only grossly offensive to eye and ear, but they are becoming chronically smog-ridden, noisy, and virtually immobilized by congestion. This process of simplifying man's environment and rendering it increasingly elemental and crude has a cultural as well as a physical dimension. The need to manipulate immense urban populations—to transport, feed, employ, educate, and somehow entertain millions of densely concentrated people daily—leads to a crucial decline in civic and social standards. A mass concept of human relations—totalitarian, centralistic, and regimented in orientation—tends to dominate the more individuated concepts of the past. Bureaucratic techniques of social management tend to replace humanistic approaches. All that is spontaneous, creative, and individuated is circumscribed by the standardized, the regulated, and the massified. The space of the individual is steadily narrowed by restrictions imposed upon him by a faceless, impersonal social apparatus. Any recognition of unique personal qualities is increasingly surrendered to the needs—more precisely, the manipulation—of the group, indeed, of the lowest common denominator of the mass. A quantitative, statistical approach, a beehive manner of dealing with man, tends to triumph over that precious, individualized-qualities approach which places its strongest emphasis on personal uniqueness, free expression, and cultural complexity.

The same regressive simplification of the environment occurs in modern agriculture.¹ The manipulated people in modern cities must be fed, and to feed them involves an extension of industrial farming. Food plants must be cultivated in a manner that allows for a high degree of mechanization—not to reduce human toil but to increase productivity, efficiency, maximize investments, exploit the biosphere. Accordingly the terrain must be reduced to a flat plain—to a factory floor, if you will—and natural variations in topography must be diminished as much as possible. Plant growth

must be closely regulated to meet the tight schedules of food-processing plants. Ploughing, soil fertilization, sowing, and harvesting must be handled on a mass scale, often in total disregard of the natural ecology of an area. Large areas of the land must be used to cultivate a single crop, a form of plantation agriculture that not only lends itself to mechanization but also to pest infestation—a single crop being the ideal environment for the proliferation of individual pest species. Finally, chemical agents must be used lavishly to deal with the problems created by insects, weeds, plant diseases; to regulate crop production and maximize soil exploitation. The real symbol of agriculture is not the sickle or, for that matter, the tractor, but the airplane. The modern food cultivator is represented not by the peasant, yeoman, or even the agronomist—men who could be expected to have an intimate relationship with the unique qualities of the land on which they grow crops—but the pilot and chemist, for whom soil is a mere resource, an inorganic raw material.

The simplification process is carried still further by an exaggerated regional, indeed a national division of labor. Immense areas of the planet are increasingly reserved for specific industrial tasks or reduced to depots of raw materials. Others are turned into centers of urban population, largely occupied with commerce and trade. Cities and regions, in fact countries and continents, are specifically identified with special products—Pittsburgh, Cleveland, and Youngstown with steel, New York with finance, Bolivia with tin, Arabia with oil, Europe and America with industrial goods, and the rest of the world with raw materials of one kind or another. The complex ecosystems which make up the regions of a continent are submerged, in effect, by an organization of entire nations into economically rationalized entities, each a way-station in a vast industrial belt system, global in its dimensions. By the same token, it is only a matter of time before the most attractive areas of the countryside will succumb to the concrete mixer, just as most of the

Eastern seashore areas of the United States have already succumbed to subdividers and bungalows. What will remain in the way of natural beauty will be debased by trailer lots, canvas slums, "scenic" highways, motels, food stalls, and the oil slicks of motor boats.

The point is that man is literally undoing the work of organic evolution. By creating vast urban agglomerations of concrete, metal, and glass; by overriding and undermining the complex, often subtly organized ecosystems that constitute local differences in the natural world—in short, by replacing a highly complex, organic environment by a simplified, inorganic one—man is disassembling the biotic pyramid that supported humanity for countless millennia. In the course of replacing the complex ecological relationships on which all advanced living things depend for more elementary relationships, man is steadily restoring the biosphere to a stage which will be able to support only simpler forms of life. If this great reversal of the evolutionary process continues, it is by no means fanciful to suppose that the preconditions for higher forms of life will be irreparably destroyed and the earth will be incapable of supporting man himself.

Ecology derives its critical edge not only from the fact that it alone, among all the sciences, presents this awesome message to humanity, but because it also presents this message in a new social dimension. From an ecological viewpoint, the reversal of organic evolution is the result of appalling contradictions between town and country, state and community, industry and husbandry, mass manufacture and craftsmanship, centralism and regionalism, the bureaucratic scale and the human scale.

THE RECONSTRUCTIVE NATURE OF ECOLOGY

Until recently, attempts to resolve the contradictions created by urbanization, centralization, bureaucratic growth, and statification

were viewed as a vain counterdrift to "progress"—a counterdrift that, at best, could be dismissed as chimerical and, at worst, reactionary. The anarchist was regarded as a forlorn visionary, a social outcast, filled with nostalgia for the peasant village or the medieval commune. His yearnings for a decentralized society, for a humanistic community at one with nature and the needs of the individual—spontaneous and unfettered by authority—were viewed as the reactions of a romantic, of a declassed craftsman or an intellectual "misfit". His protest against centralization and statification seemed all the less persuasive because it was supported primarily by ethical considerations, by utopian, ostensibly "unrealistic" notions of what man could be, not what he was. To this protest, opponents of anarchist thought—liberals, rightists, and authoritarian "leftists"—argued that they were the voices of historic reality, that their statist, centralist, and political notions were rooted in the objective, practical world.

Time is not very kind to the conflict of ideas. Whatever may have been the validity of libertarian and non-libertarian views a few generations ago, historical development has rendered virtually all objections to anarchist thought meaningless today. The modern city and state, the massive coal-steel technology of the Industrial Revolution, the later, more rationalized systems of mass production and assembly-line systems of labor organization, the centralized nation, the state and its bureaucratic apparatus—all, have reached their limits. Whatever progressive or liberatory role they may have possessed has clearly become entirely regressive and oppressive. They are regressive not only because they erode the human spirit and drain the community of all its cohesive, solidarity, and ethico-cultural standards; they are regressive from an objective standpoint, from an ecological standpoint. For they undermine not only the human spirit and the human community but also the viability of the planet and all living things on it.

What I am trying to say—and it cannot be emphasized too

strongly—is that the anarchist concept of a balanced community, a face-to-face democracy, a humanistic technology, and a decentralized society—these rich libertarian concepts are not only desirable but they are also necessary. They belong not only to the great visions of man's future but they now constitute the preconditions for human survival. The process of social development has carried them from an ethical, subjective dimension into a practical, objective dimension. What was once regarded as impractical and visionary has now become eminently practical. And what was once regarded as practical and objective has become eminently impractical and irrelevant in terms of man's development towards a fuller, unfettered existence. If community, face-to-face democracy, a humanistic, liberatory technology, and decentralization are conceived of merely as reactions to the prevailing state of affairs—a vigorous “nay” to the “yea” of what exists today—a compelling, objective case can now be made for the practicality of an anarchist society.

This reflex-like reaction, this rejection of the prevailing state of affairs accounts, I think, for the explosive growth of intuitive anarchism among young people today. Their love of nature is a reaction against the highly synthetic qualities of our urban environment and its shabby products. Their informality of dress and manners is a reaction against the formalized, standardized nature of modern institutionalized living. Their predisposition for direct action is a reaction against the bureaucratization and centralization of society. Their tendency to drop out, to avoid toil and the rat-race reflects a growing anger towards the mindless industrial routine bred by modern mass manufacture, be it in the factory, office, or university. Their intense individualism is, in its own elemental way, a *de facto* decentralization of social life—a personal abdication from the demands of a mass society.

What is most significant about ecology is its ability to convert this rejection of the *status quo*, often nihilistic in character, into an

emphatic affirmation of life—indeed, into a reconstructive credo for a humanistic society. The essence of ecology's reconstructive message can be summed up in the word “diversity”. From an ecological viewpoint, balance and harmony in nature, in society, and by inference, in behavior, is achieved not by mechanical standardization, but precisely by its opposite, organic differentiation. This message can be understood clearly only by examining its practical meaning on several levels of experience.

Let us consider the ecological principle of diversity—what Charles Elton calls the “conservation of variety”—as it applies to biology, specifically to agriculture. A number of studies—Lotka's and Volterra's mathematical models, Gause's experiments with protozoa and mites in controlled environments, and extensive field research—clearly demonstrate that fluctuations in populations, ranging from mild to pest-like proportions, depend heavily upon the number of species in an ecosystem and the degree of variety in the environment. The greater the variety of prey and predators, the more stable the population; the more diversified the environment in terms of flora and fauna, the less likely is there to be ecological instability. Complexity, variety, and diversity—choose whatever term you will—are a function of stability. If the environment is simplified and the variety of animal and plant species is reduced, fluctuations in population become marked and tend to get out of control. They tend to reach pest proportions.

In the case of pest control, many ecologists now conclude that we can avoid the repetitive use of toxic chemicals such as insecticides and herbicides by allowing for a greater interplay between living things. We must accord more room for natural spontaneity, for the diverse biological forces that make up an ecological situation. “European entomologists now speak of managing the entire plant-insect community”, observes Robert L. Rudd. “It is called manipulation of the biocenose.² The biocenetic environment is varied, complex and dynamic. Although numbers of

individuals will constantly change, no one species will normally reach pest proportions. The special conditions which allow high populations of a single species in a complex ecosystem are rare events. Management of the biocenose or ecosystem should become our goal, challenging as it is."

To "manipulate" the biocenose in a meaningful way, however, presupposes, a far-reaching decentralization of agriculture. Wherever feasible, industrial agriculture must give way to soil and agricultural husbandry; the factory floor must yield to gardening and horticulture. I do not wish to imply that we must surrender the gains acquired by large-scale agriculture and mechanization. What I *do* contend, however, is that the land must be cultivated as though it were a garden—its flora diversified and carefully tended, balanced by a fauna and tree shelter appropriate to the region. Decentralization is important, moreover, not only for the development of the agricultural situation, but also for the development of the agriculturist. Food cultivation, practised in a truly ecological sense, presupposes that the agriculturist is familiar with all the features and subtleties of the terrain on which the crops are grown. By this I mean that he must have a thorough knowledge of the physiography of the land, its variegated soils—crop land, forest land, pasture land; mineral and organic content—its micro-climate, and he must be engaged in a continuing study of the effects produced by new flora and fauna. He must acquire a sensitivity to its possibilities and needs to a point where he becomes an organic part of the agricultural situation. We can hardly hope to achieve this high degree of sensitivity and integration in the food cultivator without reducing agriculture to a human scale, without bringing agriculture within the scope of the individual. To meet the demands of an ecological approach to food cultivation, agriculture must be rescaled from huge industrial farms to moderate-sized units.

The same reasoning applies to a rational development of energy

resources. The Industrial Revolution increased the *quantity* of energy available to industry, but it diminished the *variety* of energy resources used by man. Although it is certainly true that pre-industrial societies relied primarily on animal power and human muscles, complex energy patterns developed in many regions of Europe, involving a subtle integration of resources such as wind and water power, and a variety of fuels (wood, peat, coal, vegetable starches, and animal fats).

The Industrial Revolution overwhelmed and largely destroyed these regional energy patterns, initially replacing them by a single energy system (coal) and later by a dual system (coal and petroleum). Regions disappeared as models of integrated energy patterns—indeed, the very concept of *integration through diversity* was obliterated. As I indicated earlier, many regions became predominantly mining areas, devoted to the extraction of a single resource, while others were turned into immense industrial areas, often devoted to the production of a few commodities. We need not review the role this breakdown in true regionalism has played in producing air and water pollution, the damage it has inflicted on large areas of the countryside, and the prospect we face in the depletion of our precious hydrocarbon fuels.

We can, of course, turn to nuclear fuels. Conceived as a single-energy-resource, it is chilling to think of the lethal radioactive wastes that would require disposal as power reactors replace conventional fuel systems. Eventually, an energy system based on radioactive materials would lead to the widespread contamination of the environment—at first, in a subtle form, but later on a massive and palpably destructive scale.

Or we could apply ecological principles to the solution of our energy problems. We could try to re-establish earlier regional energy patterns—a combined system of energy provided by wind, water, and solar power. But today we would be aided by more sophisticated devices than any known in the past. We have now

designed wind turbines that could supply electricity in a number of mountainous areas to meet the electric-power needs of a community of 50,000 people. We have perfected solar-energy devices that yield temperatures high enough in our warmer latitudes to deal with most metallurgical problems. Used in conjunction with heat pumps, many solar devices could provide as much as three-quarters—if not all—of the heat required to comfortably maintain a small family house. And at this writing the French are completing a tidal dam at the mouth of the Rance River in Brittany that is expected to produce more than 500 million kilowatt-hours of electricity a year. In time, the Rance River project will meet most of the electric needs of northern France.³

Solar devices, wind turbines, and hydro-electric resources—each, taken singly, does not provide a solution for our energy problems and the ecological disruption created by conventional fuels. Pieced together as a mosaic, more precisely, as an organic energy pattern developed from the potentialities of a region, they could amply meet the needs of a decentralized society. In warm, sunny latitudes, we could rely more heavily on solar energy than on combustible fuels. In areas marked by atmospheric turbulence, we could rely more heavily on wind devices, and in suitable coastal areas or inland regions with a good network of rivers, the greater part of our energy would come from hydro-electric installations. In all cases, we would use a *mosaic* of non-combustible energy resources, filling whatever gaps develop by combustible and nuclear fuels. The point I wish to make is that by diversifying our use of energy resources, by organizing them into an ecologically balanced pattern, we could combine wind, solar, and water power in a given region to meet all the industrial and domestic needs of a community with only a minimal use of hazardous fuels. And eventually, we would sophisticate all our non-combustion energy devices to a point where all harmful sources of energy could be eliminated from the pattern.

As in the case of agriculture, however, the application of ecological principles to energy resources presupposes a far-reaching decentralization of society and a truly regional concept of social organization. To maintain a large city requires immense packages of fuel—“mountains of coal and veritable oceans of petroleum. By contrast, solar, wind, and tidal energy can reach us mainly in small packets; except for spectacular tidal dams, the new devices seldom provide more than a few thousand kilowatt-hours of electricity. It is difficult to believe that we will ever be able to design solar collectors that can furnish us with immense blocks of electric power produced by a giant steam plant; it is equally difficult to conceive of a battery of wind turbines that will provide us with enough electricity to illuminate Manhattan Island. If homes and factories are heavily concentrated, devices for using clean sources of energy will probably remain mere playthings, but if urban communities are reduced in size and widely dispersed over the land, there is no reason why these devices cannot be combined to provide us with all the amenities of an industrialized civilization. To use solar, wind and tidal power effectively, the megalopolis must be decentralized. A new type of community, carefully tailored to the characteristics and resources of a region, must replace the sprawling urban belts that are emerging today.”⁴

An objective case for decentralization, to be sure, does not end with a discussion of agriculture and the problems created by combustible energy resources. The validity of the decentralist case can be demonstrated for nearly all the “logistical” problems of our time. At the risk of being cursory, let me cite an example from a problematical area such as transportation. A great deal has been written quite recently about the harmful effects of petrol-driven motor vehicles—their wastefulness, their role in urban air pollution, the noise they contribute to the city environment, the enormous death toll they claim annually in the large cities of the world and on highways. In a highly urbanized civilization, it would be

meaningless to replace those noxious vehicles by clean, efficient, virtually noiseless, and certainly safer battery-powered vehicles. The best of our electric cars must be recharged about every hundred miles—a feature which limits their usefulness for transportation in large cities. In a small, decentralized community, however, it becomes eminently feasible to use these electric vehicles for intra-urban or regional transportation and establish monorail networks for long-distance transportation.

It is fairly well known, today, that petrol-powered vehicles contribute enormously to urban air pollution, and there is a strong sentiment to “engineer” the more noxious features of the automobile into oblivion. Our age characteristically tries to solve all its irrationalities with a gimmick—blow-by devices and after-burners for toxic petrol fumes, antibiotics for ill-health, tranquillizers for psychic disturbances. The problem of urban air pollution is more intractable than we care to believe. Basically, air pollution is caused by high population densities, by an excessive concentration of people in a small area. The fact is that millions of people, densely concentrated in a large city, necessarily produce serious *local* air pollution merely by their day-to-day activities. They must burn fuels for domestic and industrial reasons; they must construct or tear down buildings (the aerial debris produced by these activities is a major source of urban air pollution); they must dispose of immense quantities of rubbish; they must travel on roads with rubber tires (again, the particles produced by the erosion of tires and roadway materials adds significantly to air pollution). Quite aside from the pollution-control devices we add to automobiles and power plants, it should be fairly clear that whatever improvements these devices will produce in the quality of urban air will be more than cancelled out by future megalopolitan growth.

The social possibilities opened by decentralization could be discussed indefinitely and, in any case, there is more to anarchism

than decentralized communities. If I have examined these possibilities in some detail, it has been to demonstrate that an anarchist society, far from being a remote ideal, has become a pre-condition for the practice of ecological principles. To sum up the critical message of ecology: If we diminish variety in the natural world, we debase its unity and wholeness. We destroy the forces making for natural harmony and stability, for a lasting equilibrium, and what is even more significant, we introduce an absolute retrogression in the development of the natural world, eventually rendering the environment unfit for advanced forms of life. To sum up the reconstructive message of ecology: If we wish to advance the unity and stability of the natural world, if we wish to harmonize it on ever high levels of development, we must conserve and promote variety. To be sure, mere variety for its own sake is a vacuous goal. In nature, variety emerges spontaneously. The capacities of a new species are tested by the rigors of climate, by its ability to deal with predators, by its capacity to establish and enlarge its niche. *Yet the species that succeeds in enlarging its niche in the environment also enlarges the ecological situation as a whole.* To borrow E. A. Gutkind's phrase, it “expands the environment”, both for itself and for the species with which it enters into a balanced relationship.⁵

How do these concepts apply to social theory? To many, I suppose, it should suffice to say that, inasmuch as man is part of nature, an expanding natural environment enlarges the basis for social development. But the answer to the question, I think, goes much deeper than many ecologists and libertarians suspect. Again, allow me to return to the ecological principle of wholeness and balance as a product of diversity. Keeping this principle in mind, the first step towards an answer is provided by a passage in Herbert Read's *The Philosophy of Anarchism*. In presenting his “measure of progress”, Read observes: “Progress is measured by the degree of differentiation within a society. If the individual is a unit in a

corporate mass, his life will be limited, dull, and mechanical. If the individual is a unit on his own, with space and potentiality for separate action, then he may be more subject to accident or chance, but at least he can expand and express himself. He can develop—develop in the only real meaning of the word—develop in consciousness of strength, vitality, and joy.”

Read's thought, unfortunately is not fully developed, but it provides an interesting point of departure for our discussion. Leaving the quotation aside, for the moment, what first strikes us is that both the ecologist and the anarchist place a strong emphasis on spontaneity. The ecologist, in so far as he is more than a technician, tends to reject the notion of “power” over nature. He speaks instead of “steering” his way through an ecological situation, of *managing* rather than *recreating* an ecosystem. The anarchist, in turn, speaks in terms of social spontaneity, of releasing the potentialities of society and humanity, of giving free and unfettered reign to the creativity of people. Both, in their own ways, regard authority as inhibitory, as a weight limiting the creative potential of a natural and social situation. Their object is not to *rule* a domain, but to *release* it. They regard insight, reason, and knowledge as means for fulfilling the potentialities of a situation, as facilitating the working out of the logic of a situation, not of replacing these potentialities with preconceived notions or distorting their development with dogmas.

Turning, now, to Read's words, the next thing that strikes us is that both the ecologist and anarchist view differentiation as a measure of progress. The ecologist uses the term “biotic pyramid” in speaking of biological advances; the anarchist, the word “individuation” to denote social advances. If we go beyond Reade, we will observe that to both the ecologist and anarchist, an ever-enlarging unity is achieved by growing differentiation. *An expanding whole is created by the diversification and enrichment of the parts.*

Just as the ecologist seeks to elaborate the range of an ecosystem and promote a freer interplay between species, so the anarchist seeks to elaborate the range of social experience and remove all fetters to its development. To state my point more concretely: Anarchism is not only a stateless society but also a harmonized society which exposes man to the stimuli provided by both agrarian and urban life, physical activity and mental activity, unrepressed sensuality and self-directed spirituality, communal solidarity and individual development, regional uniqueness and world-wide brotherhood, spontaneity and self-discipline, the elimination of toil and the promotion of craftsmanship. In our schizoid society, these goals are regarded as mutually exclusive dualities, sharply opposed to each other. To a large extent, they appear as dualities because of the very logistics of present-day society—the separation of town and country, the specialization of labor, the atomization of man—and it would be preposterous, I think, to believe that these dualities could be resolved without a general idea of the *physical* structure of an anarchist society. We can gain some idea of what such a society would be like by reading William Morris's *News From Nowhere* and the writings of Peter Kropotkin. But these are mere glimpses. They do not take into account the post-war developments of technology and the contributions made by the development of ecology. This is not the place to embark on “utopian writing”, but certain guide lines can be presented even in a general discussion. And in presenting these guide lines, I am eager to emphasize not only the more obvious ecological premises that support them, but also the humanistic ones.

An anarchist society should be a decentralized society not only to establish a lasting basis for the harmonization of man and nature, *but also to add new dimensions to the harmonization of man and man.* The Greeks, we are often reminded, would have been horrified by a city whose size and population precluded a

personal, often familiar, relationship between citizens. However true this precept may have been in practice two thousand years ago it is singularly applicable today. There is plainly a need to reduce the dimensions of the human community—partly to solve our pollution and transportation problems, partly also to create *real* communities. In a sense, we must *humanize* humanity. There should be a minimum of electronic devices—telephones, telegraphs, radios, television receivers and computers—to mediate the relations between people. In making collective decisions—and the ancient Athenian *ecclesia* was, in some ways, a model for making social decisions during the classical period—all members of the community should have an opportunity to acquire in full the measure of anyone who addresses the assembly. They should be in a position to absorb his attitudes, study his expressions, weigh his motives as well as his ideas in a direct personal encounter and through full debate, face-to-face discussion and inquiry.

Our small communities should be economically balanced and well rounded, partly so that they can make full use of local raw materials and energy resources, partly also to enlarge the agricultural and industrial stimuli to which individuals are exposed. The member of a community who has a predilection for engineering, for instance, should be encouraged to steep his hands in humus; the man of ideas should be encouraged to employ his musculature; the “inborn” farmer should gain a familiarity with the workings of a rolling mill. To separate the engineer from the soil, the thinker from the spade, and the farmer from the industrial plant may well promote a degree of vocational over-specialization that would lead to a dangerous measure of social control by specialists. What is equally important, professional and vocational specialization would prevent society from achieving a vital goal: the humanization of nature by the technician and the naturalization of society by the biologist.

I submit that an anarchist community, in effect, would

approximate a clearly definable ecosystem—diversified, balanced, and harmonious. It is arguable whether such an ecosystem would acquire the configuration of an urban entity with a distinct center, such as we find in the Greek *polis* or the medieval commune, or whether, as Gutkind proposes, society would consist of widely dispersed communities without a distinct center. In either case, the ecological scale for any of these communities would be the smallest biome capable of supporting a moderate-sized population.

A relatively self-sufficient community, visibly dependent on its environment for the means of life, would gain a new respect for the organic inter-relationships that sustain it. In the long run, the attempt to approximate self-sufficiency would, I think, prove more efficient than the prevailing system of a national division of labor. Although there would doubtless be many duplications of small industrial facilities from community to community, the familiarity of each group with its local environment and its rootedness in the area would make for a more intelligent and more loving use of its environment. I submit that far from producing provincialism, relative self-sufficiency would create a new matrix for individual and communal development—a oneness with the surroundings that would vitalize the community.

The rotation of civic, vocational, and professional responsibilities would awaken all the senses in the being of the individual, stimulating and rounding out new dimensions in self-development. In a complete society we could hope again to create complete men; in a rounded community, rounded men. In the Western world, the Athenians, for all their shortcomings and limitations, were the first to give us a notion of this completeness. “The *polis* was made for the amateur”, Kitto tells us. “Its ideal was that every citizen (more or less, according as the *polis* was democratic or oligarchic) should play his part in all of its many activities—an ideal that is recognizably descended from the generous Homeric conception of *arete* as an all-round excellence and an

all-round activity. It implies a respect for the wholeness or the oneness of life, and a consequent dislike of specialization. It implies a contempt for efficiency—or rather a much higher ideal of efficiency; an efficiency which exists not in one department of life, but in life itself.”⁶ An anarchist society, although it would surely aspire for more, could hardly hope to achieve less than this state of mind.

If the foregoing attempts to mesh ecological with anarchist principles is ever achieved in practice, social life would yield a sensitive development of human and natural diversity, falling together into a well-balanced, harmonious unity. Ranging from community, through region, to entire continents, we would see a colorful differentiation of human groups and ecosystems, each developing its unique potentialities and exposing members of the community to a wide spectrum of economic, cultural, and behavioral stimuli. Falling within our purview would be an exciting, often dramatic, variety of communal forms—here, marked by architectural and industrial adaptations to semi-arid biomes, there to grasslands, elsewhere to forest lands. We would witness a dynamic interplay between individual and group, community and environment, man and nature. Freed from an oppressive routine, from paralysing repressions and insecurities, from the burdens of toil and false needs, from the trammel of authority and irrational compulsion, the individual would finally be in a position, for the first time in history, to fully realize his potentialities as a member of the human community and the natural world.

OBSERVATIONS ON “CLASSICAL” ANARCHISM AND MODERN ECOLOGY

The future of the anarchist movement will depend upon its ability to apply basic libertarian principles to new historical situations. These principles are not difficult to define—a stateless,

decentralized society, based on the communal ownership of the means of production. There is also an anarchist ethic, if not methodology, which Bakunin beautifully summarized when he said: “We cannot admit, even as a revolutionary transition, a so-called revolutionary dictatorship, because when the revolution becomes concentrated in the hands of some individuals it becomes inevitably and immediately reaction.” (There is also need, I fear, for a vigorous, uncompromising article on “Taking Anarchism Seriously”. There are far too many so-called “anarchists”, comfortably situated in the millenarian world of bourgeois reform—and its many official and material rewards—whose notions can be regarded as mere extensions of Adam Smith. But that is a separate matter. . . .) What disquiets me, for the present, is the word “classical” as applied to anarchism, a word, fortunately, that is usually decorated by quotation marks. The word has strange connotations for a movement whose very life-blood is a fervent iconoclasm, not only with respect to authority in society at large, but in itself.

To my thinking, anarchism consists of a body of imperishable ideals which men have tried to approximate for thousands of years in all areas of the world. The context of these ideals has changed with time, although basic libertarian principles have altered very little through the course of history. It is vitally important that anarchists grasp the changing historical context in which these ideals have been applied, lest they needlessly stagnate because of the persistence of old formulas in new situations.

In the modern world, anarchism first appeared as a movement of the peasantry and yeomanry against declining feudal institutions. In Germany its foremost spokesman during the Peasant Wars was Thomas Muenzer; in England, Gerrard Winstanley, a leading participant in the Digger movement. The concepts held by Muenzer and Winstanley were superbly attuned to the needs of their time—a historical period when the majority of

the population lived in the countryside and when the most militant revolutionary forces came from an agrarian world. It would be painfully academic to argue whether Muenzer or Winstanley could have achieved their ideals. What is of real importance is that they spoke to their time; their anarchist concepts followed naturally from the rural society which furnished the bands of the peasant armies in Germany and the New Model in England.

With Jacques Roux, Jean Varlet, and the Enragés of the Great French Revolution we find a re-application of substantially the same concepts held by Muenzer and Winstanley to a new historical context: Paris in 1793—a city of nearly 700,000 people, composed (as Rudé tells us) of “small shopkeepers, petty traders, craftsmen, journeymen, laborers, vagrants, and the city poor. . . .” Roux and Varlet address themselves to a basically classless people who might properly be compared with the sullen Negro masses in the Watts district of Los Angeles. Their anarchism is urbanized, so to speak; it is focused on the need to still the pangs of hunger, on the misery of the poor in the restless Graviilliers district. Their agitation tends to center more around the cost of living than the redistribution of land, around popular control over the administration of Paris than the formation of communal brotherhoods in the countryside.

Proudhon, in his own way, probes the very vitals of this context. He speaks directly to the needs of the craftsman, whose world and values is being threatened by the Industrial Revolution. In the background of nearly all his works is the village economy of the Franche-Comte, the memories of Burgille-en-Marnay and the *tour de France* he made as a journeyman in the printing trade. A benign paterfamilias, an artisan at heart who loathed Paris (“I suffer from my exile”, he wrote from Paris, “I detest Parisian civilization, . . . I shall never be able to write except on the banks of the Doubs, the Ognon and the Loue”), the fact yet remains that the very Parisians who were to “storm the heavens” in 1830, in

1848, and again in the Commune of 1871 were mainly artisans, not factory workers, and it was these men who were to adhere to Proudhon's doctrines. Again, my point is that the Proudhonian anarchists were men of their times and dealt with the problems from which stemmed most of the social unrest in France—the painful, agonizing destruction of the handicraft workers.

In the latter half of the 19th century, anarchist thought finds itself in a new historical context—a period marked by the rise of the industrial proletariat. Its most effective expression for the time is to be found less in the works of Bakunin and Kropotkin as in the less permanent articles and speeches of Christian Cornelissen, Pierre Monatte, “Big Bill” Haywood, Armondo Borghi, and Fernand Pelloutier—in short, in the anarcho-syndicalists. That many anarcho-syndicalist leaders should have drifted from anarchist notions to a reformist trade-union outlook should not surprise us; in this respect they often followed the changing mentality of the industrial working class and its growing stake in bourgeois society.

If we look back, then, we find that anarchist principles, in so far as they have been more than the personal ideas of a few isolated intellectuals, have always been clothed in a historical context. Before the Great French Revolution, anarchist doctrines rose on the full swell of peasant discontent. Between the French Revolution and the Paris Commune, the historical wave which carried these doctrines forward was artisan discontent. And between the Paris Commune of 1871 and the Spanish Revolution of 1936, anarchism—this time, together with Marxian socialism—flowed and ebbed as movements with the fortunes of the industrial proletariat.

There is still widespread peasant discontent in the world, today; indeed, the source of the most violent discontent will be found in the villages of Asia, Latin America, and Africa. There are still craftsmen whose social position is being undermined by modern technology; and there are still millions of industrial workers for

whom the class struggle is a brute, immediate fact of life. Many aspects of the older anarchist programs, sophisticated by historical experience and matured by later thinkers, doubtless still apply to many parts of the world.

But the fact remains that in the United States and in many countries of Europe, a new historical context is emerging for anarchist principles. The distinguishing features of this new context is the development of gigantic urban belts, the increasing centralization of social life into state capitalism, the extension of automated machinery to all areas of production, the breakdown of the traditional bourgeois class structure (I refer, here, to the decline of the working class, not merely to the disappearance of the old robber barons), the use of "welfare" techniques to stifle material discontent, the ability of the bourgeoisie—more precisely, the state—to deal with economic dislocations and crises, the development of a ware economy, and the re-alignment of imperialist nations around the United States—what is crudely called the Pax Americana. This new era of state capitalism which has supplanted the older era of industrial *laissez-faire* capitalism, must be dealt with earnestly and without regard to earlier precepts by the anarchist movement. To fail to meet this theoretical challenge will doom all existing movements to a lingering, burdensome stagnation.

New problems have arisen to which an ecological approach offers a more meaningful arena of discussion than the older syndicalist approach. Life itself compels the anarchist to concern himself increasingly with the quality of urban life, with the reorganization of society along humanistic lines, with the subcultures created by new, often indefinable strata—students, unemployables, an immense bohemia of intellectuals, and above all, a youth which began to gain social awareness with the peace movement and civil rights' struggles of the early 1960's. What keeps all strata and classes in a state of astonishing social mobility

and insecurity is the advent of a computerized and automated technology—for it is virtually impossible to predict the vocational or professional future of most people in the Western world.

By the same token, this very technology is ripe with the promise of a truly liberated society. The anarchist movement, more so than any other, must explore this promise in depth. It must thoroughly assimilate this technology—master its development, possibilities, application, and reveal its promise in *humanistic* terms. The world is already beset with mechanical "utopias" which more closely resemble Huxley's "brave new world" and Orwell's "1984" than the organic utopias of Thomas More and William Morris—the humanistic trend in utopian thinking. Only anarchism can infuse the promise of modern technology with an organic perspective, with a man-oriented direction. Ecology provides a superb approach to the fulfilment of this historical responsibility. It is more than likely that if the anarchist movement does not take this responsibility seriously and apply itself fully to the job of translating the promise of technology into an envisionable body of guide lines, a technocratic, mechanistic approach will tend to dominate modern thinking on the future. Men will be asked to resign themselves to "improved" and gimmick-ridden versions of existing urban monstrosities, of a mass society, of a centralized, bureaucratic state. I do not believe that these monstrosities have permanence or stability; quite to the contrary, they will seethe with unrest, regress towards a new barbarism, and eventually fall before the revenge of the natural world. But social conflict will be reduced to its most elemental, brutish terms, and it is questionable indeed if mankind will be able to regain its vision of a libertarian society.

There is a fascinating dialectic in the historic process. Our age closely resembles the Renaissance, some four centuries ago. From the time of Thomas More to that of Valentin Andraea, the breakdown of feudal society produced a strange, intermediate

social zone, an indefinable epoch, when old institutions were clearly in decline and new ones had not yet arisen. The human mind, freed from the burden of tradition, acquired uncanny powers of generalization and imagination. Roaming freely and spontaneously over the entire realm of experience, it produced astonishing visions, often far transcending the material limitations of the time. Entire sciences and schools of philosophy were founded in the sweep of an essay or a pamphlet. It was a time when new potentialities had replaced the old actualities, when the general, latent with new possibilities, had replaced the burdensome particulars of feudal society, when man, stripped of traditional fetters, had turned from a transfixed creature into a vital, searching being. The established feudal classes were breaking down, and with them, nearly all the values of the medieval world. A new social mobility, a restless, almost gipsy-like yearning for change, pervaded the Western world. In time, bourgeois society crystallized out of this flux, bringing with it an entirely new body of institutions, classes, values—and chains—to replace feudal civilization. But for a time, the world was loosening its shackles, and it still sought a destiny that was far less defined than we suppose today, with our retrospective “historical” attitudes. This world haunts us like an unforgettable dawn, richly tinted, ineffably beautiful, laden with the promise of birth.

Today, in the last half of the 20th century, we too are living in a period of social disintegration. The old classes are breaking down, the old values are in disintegration, the established institutions—so carefully developed by two centuries of capitalist development—are decaying before our eyes. Like our Renaissance forebears, we live in an epoch of potentialities, of generalities, and we, too, are searching, seeking a direction from the first lights on the horizon. It will no longer do, I think, to ask of anarchism that it merely free itself from 19th-century fetters and update its theories to the 20th century. In a time of such instability, every decade telescopes a

generation of change under stable conditions. We must look even further, to the century that lies ahead; we cannot be extravagant enough in releasing the imagination of man.

1. For an insight into this problem, I wish to urge the reader to consult *The Ecology of Invasions* by Charles S. Elton (John Wiley & Sons, New York; 1958), *Soil and Civilization* by Edward Hyams (Thames & Hudson, London; 1952), *Our Synthetic Environment* by Lewis Herber (Knopf, New York; 1962), and a re-reading of *Silent Spring* by Rachel Carson—the last to be read not so much as a diatribe against pesticides but as a plea for ecological diversification.
2. Rudd's use of the word “manipulation” is likely to create the erroneous impression that an ecological situation can be reduced to simple mechanical terms. Lest this impression arise, I would like to emphasize that our knowledge of an ecological situation and the practical use of this knowledge is a matter of insight and understanding rather than power. Elton, I think, states the case for the management of an ecological situation when he writes: “The world's future has to be managed, but this management would not be just like a game of chess—(but) more like steering a boat.”
3. These examples are merely glimpses of the liberatory potential of little-known areas of modern technology. In a later article on the subject of modern technology and decentralization, I plan to explore the problem in much greater detail, and I propose to show that it is possible to *humanize* technology in such a way that machines will no longer appear to be the masters of men, but quite to the contrary, will enter fully into the service of man's fulfillment, both spiritually and materially.
4. Lewis Herber, *Crisis in Our Cities* (Prentice-Hall Inc., New Jersey; 1965, p. 194).
5. I do not wish to saddle Gutkind with the notions I have advanced above, but I believe the reader would benefit enormously by reading Gutkind's little book, a masterful discussion of communities, *The Expanding Environment* (Freedom Press).
6. H. D. F. Kitto, *The Greeks* (Aldine Publishing Company, Chicago; p. 161).



TOWARD AN ECOLOGICAL SOLUTION

Murray Bookchin

Popular alarm over environmental decay and pollution did not emerge for the first time merely in the late '60's, nor for that matter is it the unique response of the present century. Air pollution, water pollution, food adulteration and other environmental problems were public issues as far back as ancient times, when notions of environmental diseases were far more prevalent than they are today. All of these issues came to the surface again with the Industrial Revolution—a period which was marked by burgeoning cities, the growth of the factory system, and an unprecedented befouling and polluting of air and waterways.

Today the situation is changing drastically and at a tempo that portends a catastrophe for the entire world of life. What is not clearly understood in many popular discussions of the present ecological crisis is that the very nature of the issues has changed, that the decay of the environment is directly tied to the decay of the existing social structure. It is not simply certain malpractices or a given spectrum of poisonous agents that is at stake, but rather the very structure of modern agriculture, industry and the city. Consequently, environmental decay and ecological catastrophe cannot be averted merely by increased programs like "pollution control" which deal with sources rather than systems. To be

commensurable to the problem, the solution must entail far-reaching evolutionary changes in society and in man's relation to man.

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To understand the enormity of the ecological crisis and the sweeping transformation it requires, let us briefly revisit the "pollution problem" as it existed a few decades ago. During the 1930's, pollution was primarily a muckraking issue, a problem of expose journalism typified by Kallet and Schlink's "100 Million Guinea Pigs."

This kind of muckraking literature still exists in abundance and finds an eager market among "consumers," that is to say, a public that seeks personal and legislative solutions to pollution problems. Its supreme pontiff is Ralph Nader, an energetic young man who has shrewdly combined traditional muckraking with a safe form of "New Left" activism. In reality, Nader's emphasis belongs to another historical era, for the magnitude of the pollution problem has expanded beyond the most exaggerated accounts of the '30's. The new pollutants are no longer "poisons" in the popular sense of the term; rather they belong to the problems of ecology, not merely pharmacology, and these do not lend themselves to legislative redress.

What now confronts us is not the predominantly specific, rapidly degradable poisons that alarmed an earlier generation, but long-lived carcinogenic and mutagenic agents, such as radioactive isotopes and chlorinated hydrocarbons. These agents become part of the very anatomy of the individual by entering his bone structure, tissues and fat deposits. Their dispersion is so global that they become part of the anatomy of the environment itself. They will be within us and around us for years to come, in many cases for generations to come. Their toxic effects are usually chronic

rather than acute; the deadly and mutational effects they produce in the individual will not be seen until many years have passed. They are harmful not only in large quantities, but in trace amounts; as such, they are not detectable by human senses or even, in many cases, by conventional methods of analysis. They damage not only specific individuals but the human species as a whole and virtually all other forms of life.

No less alarming is the fact that we must drastically revise our traditional notions of what constitutes an environmental "pollutant." A few decades ago it would have been absurd to describe carbon dioxide and heat as "pollutants" in the customary sense of the term. Yet in both cases they may well rank among the most serious sources of future ecological imbalance and pose major threats to the viability of the planet. As a result of industrial and domestic combustion activities, the quantity of carbon dioxide in the atmosphere has increased by roughly 25 per cent in the past 100 years, a figure that may well double again by the end of the century. The famous "greenhouse effect," which increasing quantities of the gas is expected to produce, has already been widely discussed: eventually, it is supposed, the gas will inhibit the dissipation of the earth's heat into space, causing a rise in overall temperatures which will melt the polar ice caps and result in an inundation of vast coastal areas. Thermal pollution, the result mainly of warm water discharged by nuclear and conventional power plants, has disastrous effects on the ecology of lakes, rivers and estuaries. Increases in water temperature not only damage the physiological and reproductive activities of fish; they also promote the great blooms of algae that have become such formidable problems in waterways.

What is at stake in the ecological crisis we face today is the very capacity of the earth to sustain advanced forms of life. The crisis is being drawn together by massive increases in "typical" forms of air and water pollution; by a mounting accumulation of

nondegradable wastes, lead residues, pesticide residues and toxic additives in food; by the expansion of cities into vast urban belts; by increasing stresses due to congestion, noise and mass living; by the wanton scarring of the earth as a result of mining operations, lumbering, and real estate speculation. The result of all this is that the earth within a few decades has been despoiled on a scale that is unprecedented in the entire history of human habitation on the planet.

Finally, the complexity and diversity of life which marked biological evolution over many millions of years is being replaced by a simpler, more synthetic and increasingly homogenized environment. Aside from any esthetic considerations, the elimination of this complexity and diversity may prove to be the most serious loss of all. Modern society is literally undoing the work of organic evolution. If this process continues unabated, the earth may be reduced to a level of biotic simplicity where humanity—whose welfare depends profoundly upon the complex food chains in the soil, on the land surface and in the oceans—will no longer be able to sustain itself as a viable animal species.

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In recent years a type of biological "cold warrior" has emerged who tends to locate the ecological crisis in technology and population growth, thereby divesting it of its explosive social content. Out of this focus has emerged a new version of "original sin" in which tools and machines, reinforced by sexually irresponsible humans, ravage the earth in concert. Both technology and sexual irresponsibility, so the argument goes, must be curbed—if not voluntarily, then by the divine institution called the state.

The naivete of this approach would be risible were it not for its sinister implications. History has known of many different forms

of tools and machines, some of which are patently harmful to human welfare and the natural world, others of which have clearly improved the condition of man and the ecology of an area. It would be absurd to place plows and mutagenic defoliants, weaving machines and automobiles, computers and moon rockets, under a common rubric. Worse, it would be grossly misleading to deal with these technologies in a social vacuum.

Technologies consist not only of the devices humans employ to mediate their relationship with the natural world, but also the attitudes associated with these devices. The attitudes are distinctly social products, the results of the social relationships humans establish with each other. What is clearly needed is not a mindless depreciation of technology as such, but rather a reordering and redevelopment of technologies according to ecologically sound principles. We need an ecotechnology that will help harmonize society with the natural world.

The same over-simplification is evident in the neo-Malthusian alarm over population growth. The reduction of population growth to a mere ratio between birth rates and death rates obscures the many complex social factors that enter into both statistics. A rising or declining birth rate is not a simple biological datum, any more than is a rising or declining death rate. Both are subject to the influences of the economic status of the individual, the nature of the family structure, the values of society, the status of women, the attitude toward children, the culture of the community, and so forth. A change in any single factor interacts with the remainder to produce the statistical data called "birth rate" and "death rate." Culled from such abstract ratios, population growth rates can easily be used to foster authoritarian controls and finally a totalitarian society, especially if neo-Malthusian propaganda and the failure of voluntary birth control are used as an excuse. In arguing that forcible measures of birth control and a calculated policy of indifference to hunger may eventually be necessary to stabilize

world populations, the neo-Malthusians are already creating a climate of opinion that will make genocidal policies and authoritarian institutions socially acceptable.

It is supremely ironic that coercion, so clearly implicit in the neo-Malthusian outlook, has acquired a respected place in the public debate on ecology—for the roots of the ecological crisis lie precisely in the coercive basis of modern society. The notion that man must dominate nature emerges directly from the domination of man by man. The patriarchal family may have planted the seed of domination in the nuclear relations of humanity; the classic split between spirit and reality—indeed, mind and labor—may have nourished it; the anti-naturalistic bias of Christianity may have tended to its growth; but it was not until organic community relations, be they tribal, feudal or peasant in form, dissolved into market relationships that the planet itself was reduced to a resource for exploitation.

This centuries-long tendency finds its most exacerbating development in modern capitalism: a social order that is orchestrated entirely by the maxim “Production for the sake of production.” Owing to its inherently competitive nature, bourgeois society not only pits humans against each other, but the mass of humanity against the natural world. Just as men are converted into commodities, so every aspect of nature is converted into a commodity, a resource to be manufactured and merchandised



wantonly. Entire continental areas in turn are converted into factories and cities into marketplaces. The liberal euphemisms for these unadorned terms are “growth,” “industrial society” and “urban blight.” By whatever language they are described, the phenomena have their roots in the domination of man by man.

As technology develops, the maxim “Production for the sake of production” finds its complement in “Consumption for the sake of consumption.” The phrase “consumer society” completes the description of the present social order as an “industrial society.” Needs are tailored by the mass media to create a public demand for utterly useless commodities, each carefully engineered to deteriorate after a predetermined period of time. The plundering of the human spirit by the marketplace is paralleled by the plundering of the earth by capital. The tendency of the liberal to identify the marketplace with human needs, and capital with technology, represents a calculated error that neutralizes the social thrust of the ecological crisis.

The strategic ratios in the ecological crisis are not the population rates of India but the production rates of the United States, a country that produces more than 50 percent of the world's goods. Here, too, liberal euphemisms like “affluence” conceal the critical thrust of a blunt word like “waste.” With a vast section of its industrial capacity committed to war production, the U.S. is literally trampling upon the earth and shredding ecological links that are vital to human survival. If current industrial projections prove to be accurate, the remaining 30 years of the century will witness a five-fold increase in electric power production, based mostly on nuclear fuels and coal. The colossal burden in radioactive wastes and other effluents that this increase will place on the natural ecology of the earth hardly needs description.

In shorter perspective, the problem is no less disquieting. Within the next five years, lumber production may increase an overall 20

percent; the output of paper, five percent annually; folding boxes, three percent annually; metal cans, four to five percent annually plastics (which currently form one to two percent of municipal wastes), seven percent annually. Collectively, these industries account for the most serious pollutants in the environment. The utterly senseless nature of modern industrial activity is perhaps best illustrated by the decline in returnable (and reusable) beer bottles from 54 billion bottles in 1960 to 26 billion today. Their place has been taken over by "one-way bottles" (a rise from 8 to 21 billion in the same period) and cans (an increase from 38 to 53 billion). The "one-way bottles" and cans, of course, pose tremendous problems in solid waste disposal, but they do sell better.

It may be that the planet, conceived as a lump of minerals, can support these mindless increases in the output of trash. The earth, conceived as a complex web of life, certainly cannot. The only question is, can the earth survive its looting long enough for man to replace the current destructive social system with a humanistic, ecologically oriented society.

The apocalyptic tone that marks so many ecological works over the past decade should not be taken lightly. We are witnessing the end of a world, although whether this world is a long-established social order or the earth as a living organism still remains in question. The ecological crisis, with its threat of human extinction, has developed appositely to the advance of technology, with its promise of abundance, leisure and material security. Both are converging toward a single focus: At a point where the very survival of man is being threatened, the possibility of removing him from the trammels of domination, material scarcity and toil has never been more promising. The very technology that has been used to plunder the planet can now be deployed, artfully and rationally, to make it flourish.

It is necessary to overcome not only bourgeois society but also

the long legacy of propertied society: the patriarchal family, the city, the state—indeed, the historic splits that separated mind from sensuousness, individual from society, town from country, work from play, man from nature. The spirit of spontaneity and diversity that permeates the ecological outlook toward the natural world must now be directed toward revolutionary change and utopian reconstruction in the social world. Propertied society, domination, hierarchy and the state, in all their forms, are utterly incompatible with the survival of the biosphere. Either ecology action is revolutionary action or it is nothing at all. Any attempt to reform a social order that by its very nature pits humanity against all the forces of life is a gross deception and serves merely as a safety valve for established institutions.

The application of ecological principles to social reconstruction, on the other hand, opens entirely new opportunities for imagination and creativity. The cities must be decentralized to serve the interests of both natural and social ecology. Urban gigantism is devastating not only to the land, the air, the waterways, and the local climate, but to the human spirit. Having reached its limits in the megalopolis—an urban sprawl that can best be described as the "non-city"—the city must be replaced by a multitude of diversified, well-rounded communities, each scaled to human dimensions and to the carrying capacity of its ecosystem. Technology, in turn, must be placed in the service of meaningful human needs, its output gauged to permit a careful recycling of wastes into the environment.

With the community and its technology sculptured to human scale, it should be possible to establish new, diversified energy patterns: the combined use of solar power, wind power and a judicious use of fossil and nuclear fuels. In this decentralized society, a new sense of tribalism, of face-to-face relations, can be expected to replace the bureaucratic institutions of propertied society and the state. The earth would be shared communally, in a

new spirit of harmony between man and man and between man and nature.

In the early years of the 19th century, this image of a new, free and stateless society was at best a distant vision, a humanistic ideal which revolutionaries described as communism or anarchism, and their opponents as utopia. As the one century passed into its successor, the advance of technology increasingly brought this vision into the realm of possibility. The ecological crisis of the late 20th century has now turned the possibility of its early decades into a dire necessity. Not only is humanity more prepared for the realization of this vision than at any time in history—a fact intuited by the tribalism of the youth culture—but upon its realization depends the very existence of humanity in the remaining years ahead.

Perhaps the most important message of Marx a century ago was the concept that humanity must develop the means of survival in order to live. Today, the development of a flexible, open-ended technology has reversed this concept completely. We stand on the brink of a post-scarcity society, a society that can finally remove material want and domination from the human condition. Perhaps the most important message of ecology is the concept that man must master the conditions of life in order to survive.

During the May-June uprising of 1968, the French students sensed the new equation in human affairs when they inscribed the demand: "Be realistic! Do the impossible!" To this demand, the young Americans who face the next century can add the more solemn injunction: "If we don't do the impossible, we shall be faced with the unthinkable."

Murray Bookchin, an anarcho-communist, has written on ecology and revolution since the 1950s and contributes regularly to New York City's *Anarchos* magazine. He has authored, under the pen name of Lewis Herber, *Our Synthetic Environment* (Knopf 1962) and *Crisis in Our Cities* (Prentice-Hall 1965). His most recent book is *Post-Scarcity Anarchism* (Ramparts 1970), and he is currently at work on *The Ecology of Freedom* (Knopf 1971).