

Ecology and revolutionary thought

(EDITOR'S NOTE: Murray Bookchin was a featured speaker at the ENACT Teach-in on the Environment.)

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 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 methods 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.

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 sound 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, 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.

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.

Modern man's despoliation 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.

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 an 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.

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. Piled together like bits of a jigsaw 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 raise 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.

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.

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 previous, 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. 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, maximum 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.

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.

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.

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.

UNTIL RECENTLY, attempts to resolve the contradictions created by urbanization, centralization, bureaucratic growth, and stratification 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 declassé craftsman or an intellectual "misfit." His protest against centralization and satisfaction 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, historically 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 con-



ceived of merely as reactions to the prevailing state of affairs — a vigorous "may" to the "yea" of what exists today — a compelling objective case can now be made for the practicality of an anarchist 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 controlling 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.

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 agriculture 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 diversi-

fied 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, practiced 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 microclimate, 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.

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 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 electrical needs of northern France.

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 develop 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.

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 provides 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.

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 gasoline-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 these 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 gasoline-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, tranquilizers 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. 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 higher level of development, we must conserve and promote variety.

Both ecologists and anarchists 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 Read, 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.

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 expression, 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 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 to 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.

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.

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 trammels 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.