

Deep Ecology from the Perspective of Ecological Science

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Deep ecology is examined from the perspective of scientific ecology. Two norms, self-realization and biocentric equality, are considered central to deep ecology, and are explored in brief. Concepts of scientific ecology that seem to form a bridge to these norms are ecological hierarchical organization, the exchange of energy, material and information, and the development of species within ecosystems and the biosphere. While semantic problems exist, conceptually it appears that deep ecology norms can be interpreted through scientific ecology.

INTRODUCTION

There is no need to describe the environmental problems we face at the end of the twentieth century. The literally thousands of environmental books, articles, and films produced in the past thirty years eloquently testify that the biosphere has been drastically disturbed by human activities. Although successes in environmental conservation and management can be observed, globally the situation is serious.¹ Clearly the conventional methods of managing human uses of the biosphere have not been adequate. A much deeper, different, even radical approach seems to be required. In developing such an approach humans will have to reconsider their relationship with other living beings and with the nonliving environment. That is, we must examine the philosophical foundations of our relations with nature and reform our value systems. Callicott claims that the most important task in this essentially theoretical process is the development of a nonanthropocentric value theory.² Such a theory must provide for the

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¹ Lester Brown et al., *The State of the World* (New York: W. W. Norton, 1986), is an excellent, overall summary of global conditions. Chapter 2, "Assessing Ecological Decline," is especially relevant.

² J. Baird Callicott, "Non-Anthropocentric Value Theory and Environmental Ethics," *American Philosophical Quarterly* 21 (1984): 299-309. Richard A. Watson delivers a criticism of this type of theory in his paper "A Critique of Anti-Anthropocentric Biocentrism" *Environmental Ethics* 5 (1983): 245-56. Watson quotes Webster's *New World Dictionary* as defining *anthropocentric* as the position "that considers man as the central fact, or final aim, of the universe and generally conceives of everything in the universe in terms of human values."

intrinsic value of both individual organisms and a hierarchy of higher order organismic entities, such as ecosystems and regional biomes, and be conceptually concordant with modern evolutionary and ecological biology.

One movement in environmental ethics that has proposed a nonanthropocentric value theory is called "deep ecology." The term *deep ecology* was coined by the Norwegian philosopher, mountaineer, and environmental activist Arne Naess in 1973.³ Naess contrasted his deep approach with a shallow environmental approach that accepts the extant social value system and works within it to solve environmental problems.⁴ Since 1973 deep ecology has developed into a substantial movement. For example, two books titled "deep ecology" were published in 1985,⁵ and deep ecology theory has contributed to such diverse organizations as the Green Party of the Federal Republic of Germany⁶ and Earth First in the United States.

My intention in this essay is to examine deep ecology from the perspective of scientific ecology.⁷ My justification for this exercise is two-fold. First, a philosophy or movement with the name "deep ecology" must naturally attract the attention of an ecologist. What exactly is meant by the word *deep* when applied as an adjective to ecology? And second, as Callicott suggested above, an environmental ethical system must be concordant with ecological knowledge.

In considering this second justification it is important to point out that I do not mean that deep ecology should be derived from ecological principles. Indeed, Naess explicitly denies this derivation for deep ecology.⁸ He states that while deep ecology was suggested, inspired, and fortified by ecological knowledge, and the life style of the ecological field worker, the norms of deep ecology are not derived from ecology by logic or deduction. Rather, my purpose here is to examine the premises of deep ecology in the context of my understanding of ecological principles to determine if a concordance exists or not. I argue that if

³ Arne Naess, "The Shallow and the Deep. Long Range Ecology Movement: A Summary" *Inquiry* 16 (1973): 95-100.

⁴ Joseph Meeker, *Minding the Earth Quarterly* 6, no. 4 (December 1985), deploras the polarization implied in the shallow-deep duality. Meeker states (letter, 28 March 1986) that "Deep ecology needlessly introduces a power structure into its premises and an aristocracy into its structure by its mutually-exclusive contrast between deep and shallow." Meeker, *Minding the Earth Quarterly* 7, no. 1 (March 1986), would prefer a focus on harmony or on "tempering." A well-tempered ecology would be like "a five-part fugue, developing the themes of proportionality, tempered hardness, lively tempo, contemplation, and temporality."

⁵ These two books are Bill Devall and George Sessions, *Deep Ecology* (Salt Lake City: Peregrine Smith Books, 1985), and Michael Tobias, ed., *Deep Ecology* (San Diego: Avant Books, 1985).

⁶ Fritjof Capra and Charlene Spretnak, *Green Politics* (New York: E. P. Dutton, 1985), p. 30.

⁷ The only analysis of deep ecology concepts from the perspective of scientific ecology that I am aware of is the paper by the philosopher A. A. Brennan, University of Stirling, Scotland, "Ecological Theory and Value in Nature," given at a conference on ecological thinking at the University of Bristol, November 1984.

⁸ Naess, "The Shallow and the Deep," p. 98.

the premises of deep ecology contradict the principles of ecology, then we have a problem with this value theory.

DEEP ECOLOGY

Deep ecology refers to a "relational, total-field image of life and non-life in which diversity, complexity, autonomy, decentralization, symbiosis, egalitarianism, and classlessness are operative and which is clearly and forcefully normative." It involves both a philosophy, called an *ecosophy* by Naess,⁹ and a movement or program of action.¹⁰ These two activities are mixed in statements about deep ecology. For example, Naess in his original presentation of his ideas characterized deep ecology as (1) rejection of the man-in-environment image in favor of the relational, total-field image; (2) biospherical egalitarianism—in principle; (3) incorporation of the principles of diversity and symbiosis; (4) an anti-class posture; (5) a fight against pollution and resource depletion; (6) complexity, not complication; and (7) local autonomy and decentralization.¹¹ In his most recent defense of the program Naess described the tenets of the movement as: (1) the well-being of nonhuman life on Earth has value in itself; (2) richness and diversity in life forms contribute to this value and have value in itself; (3) humans have no right to interfere destructively with nonhuman life except to satisfy vital needs; (4) present interference is excessive and detrimental; (5) present policies must therefore change; (6) the necessary policy changes affect basic economic and ideological structures and will be more drastic the longer it takes before significant change begins; (7) the ideological change is mainly that of appreciating life quality rather than enjoying a high standard of life; and (8) those who subscribe to the foregoing points have an obligation directly and indirectly to try to implement the necessary changes.¹²

Clearly the latter set of eight tenets differs from the first set of seven points. This inconsistency characterizes statements about deep ecology generally. However, my objective in this essay is not to consider the claims of the deep ecology movement in a formal way, but rather to focus on the *ecosophy* that furnishes the premises which are the foundation of the programs of action. Naess presents two ultimate norms or intuitions that are the basis of *ecosophy*.¹³ These are self-realization and biocentric equality. These two norms are the target of my analysis.

⁹ *Ibid.*, p. 99.

¹⁰ Bill Devall, "The Deep Ecology Movement," *Natural Resources Journal* 20 (1980): 299-322.

¹¹ Naess, "The Shallow and the Deep," pp. 95-98.

¹² Arne Naess, "A Defense of the Deep Ecology Movement," *Environmental Ethics* 6 (1984): 265-70.

¹³ Bill Devall and George Sessions, *Deep Ecology*, p. 66.

SELF-REALIZATION

Under the theme of self-realization Naess is referring to a comprehensive, broad concept of self, not the narrow ego implied in the usual common usage of the term *self*. The comprehensive Self (Naess employs the capital "S" to identify this meaning) involves "me," defined by the boundary of my skin, or "mine," defined by the relations between me and others, and a larger set of beings and influences that might be called a total field of interaction. Self-realization occurs by a "process of ever-widening identification and ever-narrowing alienation."¹⁴ Thus, the Self is as comprehensive as the "totality of our identifications." Through identification higher level unities are experienced, from identifying with "ones nearest, through circles of friends, local communities, tribes, compatriots, races, humanity, life, and ultimately, as articulated by religious and philosophic leaders, unity with the supreme whole, the 'world' in a broader and deeper sense than usual."¹⁵ Thus, "Self realization in its absolute maximum is the mature experience of oneness in diversity."¹⁶ "The minimum is the self realization by more or less consistent egotism—by the narrowest experience of what constitutes one's self and a maximum of alienation. As empirical beings we dwell somewhere in between, but increased maturity involves increase of the wideness of the self."¹⁷

The concept of widening identification and narrowing alienation is coupled with the idea that "we can make no firm ontological divide in the field of existence."¹⁸ Warwick Fox terms this concept "the central intuition" of deep ecology.¹⁹ He states that "At the level of everyday life, the deep ecologist, as we have seen, intuitively the same underlying structure of reality as does the 'new physicist' at the quantum level and the mystic at the transcendental level. In Bill Devall's words "Deep ecology begins with unity rather than dualism which has been the dominant theme of Western philosophy." Like the mystic and the "new physicist," the deep ecologist is drawn to a cosmology of (in David Bohm's words) "unbroken wholeness which denies the classical idea of the analysability of the world into separately and independently existing parts." Thus, Self-realization grows across a network of organisms or a field of process and action involving human, nonhuman life and nonlife until it includes the universe.

¹⁴ Arne Naess, "Identification as a Source of Deep Ecological Attitudes," in Tobias, *Deep Ecology*, p. 261.

¹⁵ *Ibid.*, p. 263.

¹⁶ *Ibid.*, p. 261.

¹⁷ *Ibid.*

¹⁸ Warwick Fox, "The Intuition of Deep Ecology," unpublished manuscript, delivered at a conference on "Environment, Ethics, and Ecology" at Australian National University, 26–28 August 1983.

¹⁹ *Ibid.*

As Fox points out, this concept of Self is not unique to deep ecology.²⁰ Throughout human history we have identified those who have progressed on the path of Self-realization toward identification with a wider field as mature and as wise. However, the idea that Self-realization unfolds in a total-field, in which individuals are knots in a biospheric network, is different, being derived from ecological research, and will be a focus of our attention below.

BIOCENTRIC EQUALITY

The deep ecologist asserts that every living and nonliving thing has value. Every being has the right to live and flourish. And in some contexts the right to exist is extended to rivers, mountains, and other landscapes. These rights and values have no connection with instrumental use; they are intrinsic within the biospheric net itself. Humans have rights to satisfy their "vital" needs, but not the right to dominate and exploit other species, and, we must add today, cause them to go extinct. Yet conflicts of interest must occur. For example, "our vital interests, if we are not plants, imply killing at least some other living beings. A culture of hunters, where identification with hunted animals reaches a remarkably high level, does not prohibit killing for food. But a great variety of ceremonies and rituals have the function to express the gravity of the alienating incident and restore the identification."²¹

Two rules seem to operate when we observe a value conflict. The more vital interest has priority over the less vital interest, in the sense of *vital* used above. And the near in time, space, culture, and species has priority over the more remote. The concept of vitality will be discussed more fully below.

THE PERSPECTIVE OF ECOLOGICAL SCIENCE

Do these premises accord with the observations of the natural world by the field ecologist? The concept of Self-realization is readily identified by the ecologist as calling for the self (the ego) to recognize its environment (all that is outside or beyond the self) through identification. Ecology was originally defined by Ernst Haeckel, a German biologist, in 1869 as the total relations of the animal to both its organic and its inorganic environment. One modern definition makes this definition even more general by stating that ecology is the study of the structure and function of nature.²² In the modern sense, organism and environment are understood to comprise a system, called an ecosystem.²³

²⁰ *Ibid.*

²¹ Naess, "The Shallow and the Deep," p. 262.

²² Eugene P. Odum, *Fundamentals of Ecology*, 3rd ed. (Philadelphia: W. B. Saunders Co., 1971), p. 3.

²³ The term ecosystem was coined by Sir Arthur Tansley in 1935 in his book *Introduction to Plant Ecology* (London: George Allen and Unwin, 1935). The concept developed from Tansley's interest in the plant ecological community but with the community as an analog of a physical system.

There are two ecological concepts that follow from these definitions of ecology that are relevant to the deep ecology norm of Self-realization. First, the environment of an organism can be viewed hierarchically. The organism interacts directly with and acts directly on physical factors (such as the temperature of the air or water), chemical materials (nutrients), and biological organisms (competitors or food).²⁴ This immediate environment is in constant interaction with the individual. However, environment in this immediate sense is embedded in a hierarchy of larger environments. For example, periodic catastrophic events, such as hurricanes, impact organisms on an infrequent basis. Organisms evolve to cope with these irregular events but the nature of the interaction is different from that of the immediate environment. And then, finally there are even more remote environmental phenomena in time and space which indirectly influence the organism. These environmental events might include phenomena such as glaciation which were present in the history of the organism. This hierarchy of environment parallels the idea of the widening identification of Self-realization.

Second, ecology has developed a quasi-field theory similar to that of physics.²⁵ The concept of ecosystem implies flows of energy, matter, and information, with periodic storage (where the rate of flow abruptly changes) in organisms and physical structures. For example, as suggested by Morowitz, individual organisms may be conceived as momentary formations of energy in an energy field.²⁶ As long as there is a flow of energy, individuals exist as energy structures. However, as the energy flow ceases or the rate of flow changes, the organism is reformed, grows or dies, and new individuals form which fit the new flow rate. Similarly, individuals experience a dynamic exchange of chemical elements from the cells of one body to the cells of another or to the physical environment. Such exchanges occur from minute to minute, day to day, and over the lifetime of the organism. The consequence is that there is a chemical coupling between organisms and environment that is reflected in the basic chemical structure of the organism. The mental, perceptual, conceptual character of the organism is also affected at each moment by its sensory inputs. We are what we experience and we constantly change our perspective as we experience new environments. Thus, all ecosystems are open to energy, materials, and information, and no individual is an isolated entity in any sense. All individuals are

²⁴ Bernard C. Patten, "Environ: Relativistic Elementary Particles for Ecology," *American Naturalist* 119 (1982): 179-219.

²⁵ J. Baird Callicott, "The Metaphysical Implications of Ecology," *Environmental Ethics* 8 (1986): 301-16. This paper is a presentation of the history of ecological concepts and the linkage of modern ecology with modern theoretical physics.

²⁶ Harold J. Morowitz, "Biology as a Cosmological Science," *Main Currents in Modern Thought* 28 (1972): 156.

exchanging energy, matter, and information constantly and are thereby linked to the other parts of the world.²⁷

The recognition of the temporality and interpenetration of the boundaries of organisms, lakes, and of landscapes by the deep ecologist has strong resonance with the experience of the field ecologist and the ecosystem theorist. Self-realization reflects these insights and concepts, but expresses them in a more personal way. The deep ecologist premise begins from the self and expands through the environment. The ecologists environment concept is objective and is applied to organisms and phenomena out there in the natural world. There is a close parallel between the two sets of concepts and one supports the other.

So far so good, the Self-realization intuition seems to fit closely the environment and ecosystem concepts of ecological science. What about biocentric equality? Biocentric equality appears to have two meanings in deep ecology. The statement "all living organisms have an equal right to live and flourish" may mean equality in a human political sense or equality of opportunity in an ecological sense.²⁸ The first meaning makes no sense ecologically because the central phenomenon of existence is biological difference. Each individual, species, habitat, and ecosystem differs from each other. Nature seems seldom, if ever, exactly the same. Mutation, gene insertions, deletions and rearrangements, and sexual recombination all create change in genotype. Natural selection acts upon these differences at the individual level producing adaptation and evolution. The field ecologist observes selection of such differences in subordinance-dominance relationships, in competition, predation, feeding, cooperation, and other interactions. Clearly organisms have no equality in the human political sense.

However, in another sense biocentric equality does find support from the ecological sciences. Biocentric equality can mean that all species and individuals have the right to play those roles that they have evolved. Ecosystems have a recognizable character because the individuals and species that compose them have, over time, evolved networks of interaction and exchange that are persistent and predictable. Survival of the ecosystem, with its complement of species, depends on these species being allowed free opportunity to organize and operate within the environmental constraints. Species in such systems respond to natural disturbance in recognizable patterns of response. While one cannot say that species or ecosystems are stable, individuals, species, and ecosystems do exhibit

²⁷ This concept of a field of energy, matter, and information does not imply that a unitary superorganism exists. Brennan, above, discusses the problems with the ecological idea of communities, ecosystems, and the ecosphere as superorganismic entities. The emphasis of ecological field theory is on the dynamic flows, not on the objects, which are recognized as temporary configurations.

²⁸ Naess, "Defense," p. 266.

consistent behavior. Biocentric equality asserts that these systems should be permitted to display these behaviors.

This interpretation of the premise of biocentric equality may also be understood as a proscription of human meddling and manipulation in order that a human design may be imposed upon nature. Management of the natural world is best accomplished by working with nature. Ecological knowledge is insufficient to design and manage ecosystems as if they were engines or machines. For example, there may be a thousand species and a million individuals in a single, small patch of forest. With this complexity it is an unending task to understand all the flows and interactions within the ecosystem as we would in a machine. The abstract, machine design approach is not practical in this context. Biocentric equality admonishes us to keep our hands off and let the individuals and species function according to their evolutionarily selected patterns. Biocentric equality requires that man be part of the system and not a separated, god-like environmental force that acts upon nature.

THE ETHICAL PERSPECTIVE

In this brief analysis we have discovered that the two ultimate norms or intuitions of deep ecology coincide with ecological understanding. The language in which these premises are presented is misleading. "Self" and "equality" are employed in unconventional ways but with interpretation the meanings of these words can be understood in an ecological context. Thus, I conclude that these premises of deep ecology do not conflict with the observations and conclusions of the field ecologist.

However, the analysis raises a series of questions. The first question concerns the form of the biosphere in which we live. Naess recognizes the biosphere as a relational, total-field in which there is no ontological divide between object and environment. This insight is supported by ecological science which finds numerous physical connections between objects and objects and between objects and the physical environment. The objects we recognize in the world such as individual trees and lakes, for example, are linked to other objects through flows of energy, materials, and information. Trees have connections between their root systems (root grafts) which couple different trees together allowing exchange of nutrients between apparent individuals. Lakes are a part of watersheds which furnish water, sediment, and nutrients to the lake. Thus, while objects are convenient for human purposes, in another sense they are momentary entities in energy, matter, and information fields. Ecological science treats natural phenomena in both ways, as objects and as nodes in interaction fields.

The second question involves the value of ecological objects. Value is an attribute of an object, but it assumes a valuer, which may be the object itself or another object. Ordinarily we would expect an object to have value for another

object when it is used by that other object. A seed, for instance, has value to the Savannah Sparrow which may eat the seed as food. Rolston has discussed seven levels of meaning of value for wildlands.²⁹ These meanings include individual preference value, market price, individual good value, social preference value, social good value, organismic value, and ecosystemic value. In addition, Rolston recognizes twelve types of value: economic, life support, recreational, scientific, genetic diversity, aesthetic, cultural symbolism, historical, character building, therapeutic, religious, and intrinsic. The first eleven types are ultimately anthropocentric, since they involve value to humans. The last form, intrinsic, may be interpreted to recognize or reflect the biospheric network, the lack of a division between organisms and environment, and the relational, total-field theory of the ecosystem. In this context, all entities we recognize in the biosphere have some form of value; these values are instrumental when they derive from the specific vital needs or desires of objects, and they are intrinsic when they contribute to the performance and maintenance of the ecosystem through the biospheric field of interaction.³⁰

We are left with one final question. What do we mean, in an operational and theoretical sense, by the phrase "to satisfy vital needs" in the context of the sentence "all species and individuals have the right to act out their natural, evolved roles in ecosystems free of human disturbance, except where humans must satisfy their vital needs?" I propose that there are two kinds of criteria for determining vital needs. First, there are criteria concerned with performance of individual organisms. For example, vital needs might involve the capacity to reproduce, grow, maintain one's self, and survive. This is a familiar form and is the basis of adaptation and evolution of the individual. Second, there are those criteria that concern the ecosystem. These criteria include maintenance of the well-being of keystone species, primary producing species, those species whose role in the flows and influences are poorly understood, and those who have an additive or synergistic impact on system function. For example, cutting old-growth forest destroys the trees which dominate the entire forest. Old-growth forests are very rare and unusual; they serve as a comparative basis for human understanding of forests; they support species that cannot live in young forests; they are a source of inspiration. Wood can be obtained so easily elsewhere that there can be no excuse for this type of destruction. The trees and the deadwood of

²⁹ Holmes Rolston, III, "What Sorts of Value does Nature Have?" in *Ecological Consciousness*, Robert C. Schultz and J. Donald Hughes, eds., (Washington, D.C.: University Press of America, 1981), discusses a variety of sources of value of nature, most of which are anthropocentric. The meanings of value are from Rolston, "Valuing Wildlands," *Environmental Ethics* 7 (1985): 23-48.

³⁰ Holmes Rolston, III in "Duties to Ecosystems," forthcoming in J. Baird Callicott, ed., *Companion to A Sand County Almanac* (Madison: University of Wisconsin Press, 1987), suggests that when we are dealing with ecosystems there is a source of value beyond the instrumental or intrinsic dichotomy. He calls this *systemic value*.

old-growth forest are so vitally important, such a key element in the forest, that it is of highest priority to maintain them.³¹ It does not matter that trees will regrow; destruction of old trees destroys a fundamental aspect of the forest that cannot be recreated within our lifetime. These definitions are not rigid, but rather are comparative, requiring understanding of the context in which value is defined. This is a very important point because it moves from a law-like, abstract system to a real-life, relative system of value.

Contrary to the assertion of some critics of deep ecology, a capacity to be practical exists in this approach. The deep ecologist requires that action be based on knowledge, especially on knowledge of the context or the indirect effects of the action. As Gandhi showed us, with knowledge we can weigh the impacts of an action and determine if vital needs are in jeopardy.³² When there is inadequate information the deep ecologist argues for no action. Organisms and the environment have the right to be free of ill-informed meddling by mankind.

More information about the relational total-field biospheric network is obviously needed for ethical as well as scientific reasons. There needs to be a free interplay between field investigation and philosophy. As Callicott has observed, science and ethics seem to be moving in the same direction and this common focus gives us a reason for confidence in a time when the environment and the human race seem to be in serious trouble, indeed.³³

Summarizing, in one sense it appears that Naess presents us with a self-centric, equalizing value theory to replace an anthropocentric, abstract theory. The self in this theory is defined as an entity in a biospheric network of energy, matter, and information relationships. Naess' theory is eminently practical, since it begins with the ego and then extends outward through identification to encompass a larger and larger part of the environment of self. As the self begins this journey of identification, it encounters what it defines as objects. The norm of biocentric equality, as I've interpreted it,³⁴ tells us not to order these objects by some abstract system of value, but to order them according to vital needs, considering both the vital needs of the individual and the ecosystem. Thus, Naess presents a theory that recapitulates our field experience of the life processes of birds or mammals. For example, the fox leaves the den and is alert to each event in its environment. No smell, sound, or item seems to be uninteresting. Then an object signifying food is encountered. This object is attacked and eaten. The next

³¹ See M. E. Harmon, J. F. Franklyn, F. J. Swanson, et al., "Ecology of Coarse Woody Debris in Temperate Ecosystems," in A. MacFadyen and E. D. Ford, eds., *Advances in Ecological Research* (London and New York: Academic Press, 1975), vol. 15.

³² Arne Naess, *Gandhi and the Nuclear Age* (Totowa, N.J.: Bedminster Press, 1965).

³³ Callicott, "The Metaphysical Implications of Ecology."

³⁴ George Sessions (letter, March 1986), commenting on this point, emphasizes that biocentric equality tells us not to order objects at all.

food item may be ignored since hunger has been satisfied and the vital need of feeding fulfilled.

This theory is set in a larger context—the total-field of biospheric relationships. Objects are recognized as momentary configurations, as artifacts of human perception. What is fundamental is the unity of life and nonlife in a widening circle of relationship, leading ultimately to the planet and the universe. Self-realization leads us to identify with this unity. This fundamental intuition answers the question one must raise about the desire of humans to satisfy vital needs by building dams and nuclear bombs. All life and nonlife is linked into patterns of energy, matter, and information flow. It is a vital need for any organism to fit into this system and to maintain it, to the degree an individual can, in a predictable state so that in the next instant of time the individual can satisfy its other vital needs. A radically oscillating system or a chaotic system is less predictable and an individual can easily lose its way and die. Thus, to maintain life it is essential to maintain the system in which one has evolved, developed, and was born. All individuals have this conservative tendency. Biocentric equality is a theory that strengthens this tendency.

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