

Toward an Ecocentric Postmodern Theory: Fusing Deep Ecology and Quantum Mechanics

Serpil Oppermann

Serpil Oppermann is a professor of English Literature at Hacettepe University, Ankara (Turkey). She has numerous articles, and book chapters on postmodernism, postmodern American and British novelists, and literary theory published in Turkey, the United States and Germany. She is also the author of *Postmodern Theory of History: Historiography, The New Historicism and the Novel*. Ankara: Evin Yayincilik, 1999 (published in Turkish). Her current research is on ecophilosophy, quantum theory, and ecocriticism. She will be working on her book project of ecocentric postmodern theory as a visiting professor at Dresden University, Germany for a year, 2002–2003. This article is the introductory part of this project.

*The world we have made as a result of the
level of thinking we have done thus far
creates problems we cannot solve at the same
level at which we created them.*

Albert Einstein

One of today's leading issues is the global environmental crisis at the root of which lies the causal-realist worldview, which is based on analytical reasoning whereby the physical world is seen as "existing and exerting its causal powers."¹ This view has successfully led to the development of modern technological civilization and is also responsible for subjecting all human societies to a common global destiny: total destruction of the ecosystem. The general order of the causal-realist worldview had profound effects on society as a whole, both ethically and ideologically, a point argued forcefully by many theorists of radical ecology.² George Sessions, for example, evaluates "the whole question of the environmental crisis" as "a crisis of the West's anthropocentric philosophical and religious orientations and values."³ This critical stream of thought was developed in the 1960s in the writings of Gary Snyder, Rachel Carson, and Alan Watts, among others.⁴ Rachel Carson's *Silent Spring* in 1962 was particularly effective in initiating conservation activism and in influencing the Norwegian environmental philosopher Arne Naess to develop a radical philosophy of deep ecology in response to the detrimental environmental effects of Western industrialization. In 1973, Naess

introduced the phrase “deep ecology” to environmental literature.⁵ Since then deep ecology has been an influential movement that emphasizes the essential value and interdependence of all forms of life. The eight platform principles that Naess and Sessions outlined are a critique of the dominant social paradigm, which is based on the realist-causal conception of reality which, in turn, grew out of the mechanistic worldview.⁶

The emergence and development of this view goes back to the mechanistic Newtonian model of the universe (as a world of stable objects in uniform motion), which gave humans the impression that they had ultimate control and dominion over machine-like nature. The fundamental concepts of natural science initiated by this model also contributed to the development of Western philosophy culminating in the Cartesian division of human thought.⁷ The separation of mind and matter, and of nature and culture, continued to shape Western understanding of reality into what Lyotard has called a “metadiscourse making an explicit appeal to some grand narrative, such as the dialectics of Spirit, the hermeneutics of meaning, the emancipation of the rational or working subject, or the creation of wealth.”⁸ As Heisenberg underlines, “Cartesian partition” had deeply “penetrated into the human mind during the past centuries.”⁹

Newton’s idea of the mechanical order of nature was also adapted into the political and social discourses by Hobbes, who introduced a mechanistic model of society and related its implications to individuals, social structures and political order.¹⁰ It was particularly in physics, however, that “the mechanistic world-view obtained its most complete development, especially during the nineteenth century when its triumph seemed almost complete. From physics, mechanism has spread into other sciences and almost all fields of human endeavor”¹¹

The validity of institutionalized power structures in the West is based on this legitimation of scientific knowledge. Newtonian mechanics had produced a dominant paradigm of material progress that allowed for an unquestioned anthropocentrism. As John Meyer argues in “Searching for Roots,” this dominant paradigm “alternatively identified as mechanistic anthropocentric, dualistic or hierarchical ... is presumed to exist and to hold a great influence over human practices ...”¹²

The Cartesian and Newtonian conceptions of reality, acknowledged as the only valid models of an already unquestioned scientific and social paradigm, had drastic results in creating an ongoing division, fragmentation and disorientation in human consciousness. The resulting polarity between what Heisenberg calls the *res cogitas* and the *res extensa* has propelled natural science to concentrate its interest on the

*res extensa*¹³ where the animals and plants were placed on the side of the *res extensa*. Since this view privileged a concentration on the *res extensa*, which operated according to strict mathematical laws, “the animals and the plants were not essentially different from machines, their behavior was completely determined by material causes.”¹⁴ The Newtonian worldview asserted the supremacy of the laws of science to be unquestionably applicable to the living organisms, seeing them as separate parts of an objective reality in which humans were assigned the place of observers and controllers. This anthropocentric orientation based on “discontinuity between humans and nature,” in Val Plumwood’s words,¹⁵ became the only acceptable condition of natural science and made the causal-realist epistemology an essential part of Western thought. Nature was separated from the observer, and human culture and social activity from the rest of the environment.¹⁶ Fritjof Capra’s description of how mechanistic model of nature shaped modern Western society provides a clear picture of the entire scene:

This paradigm consists of a number of entrenched ideas and values, among them the view of the universe as a mechanical system composed of elementary building-blocks, the human body as a machine, the view of life in society as a competitive struggle for existence, the belief in unlimited material progress to be achieved through economic and technological growth, and—last, not least—the belief that a society in which the female is everywhere subsumed under the male is one that follows a basic law of nature.¹⁷

Accordingly, the laws and concepts of natural science were strictly defined. The fact that they were purely conceptual, incomplete and downright erratic was discovered in the beginning of the twentieth century with the rise of new physics, when Einstein’s General Theory of Relativity showed an interaction between matter and energy that questioned long-held assumptions about reality. In 1913, Einstein wrote: “Since Maxwell’s time, Physical Reality has been thought of as represented by *continuous fields* ... not capable of any mechanical interpretation. This change in the conception of Reality is *the most profound and the most fruitful* that physics has experienced since the time of Newton.”¹⁸ Einstein had shown that space and time are not separate things, but part of a larger whole he called the space-time continuum. But it was in the 1920s that a major breakthrough in physics came with the discoveries of physicists such as Niels Bohr, Louis de Broglie, Erwin Schrödinger, Wolfgang Pauli, Paul Dirac and Werner Heisenberg. They realized that atomic physics could not be described in the traditional terms of classical physics. Faced with the paradoxical results of their experiments (because an atomic event could never be predicted with certainty¹⁹) they began to express the strange laws of the new physics in terms of probabilities. At this time, Heisenberg’s

Uncertainty Principle, which concerned the unpredictable behaviour of smallest particles, posed deeper questions about the so-called laws of nature. The following words of Heisenberg attest to this true Logos of Nature in quantum physics: “The world thus appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole.”²⁰

Quantum theory had thus confounded the deterministic laws of nature and traditional concepts of reality, and had introduced a new direction to human thought. As Fritjof Capra explains in *The Tao of Physics*, “at the subatomic level, the solid material objects of classical physics dissolve into wave-like patterns of probabilities, and these patterns, ultimately, do not represent probabilities of things, but rather probabilities of interconnections.”²¹ As a result, Capra states, subatomic particles can only be understood as interconnections, which clearly show the basic oneness of the universe. “As we penetrate into matter, nature does not show us any isolated ‘basic building blocks,’ but rather appears as a complicated web of relations between various parts of the whole.”²² Such a radical discovery would inevitably lead to a total revision of the old, restrictive paradigm.

The Holistic View of Quantum Theory

There are many interpretations of quantum physics because quantum mechanical experiments have always generated conceptual and interpretive problems.²³ The debates over these have scarcely been resolved today, but the principal factor remains intact, that quantum mechanics opened the way for fundamental revisions of our classical conceptions of the physical world and of their underlying socio-political and cultural assumptions. In fact, the necessary evidence for a nondualistic worldview is provided by the ontological interpretations of the quantum theory at large. What follows is that, at a deeper level of reality, all things in the universe are infinitely interconnected, as shown by the action of indivisible quanta. It was first brought to the attention of the scientific community by physicist Alain Aspect and his research team at the University of Paris who performed an amazing experiment in 1982. Aspect and his team discovered that, under certain circumstances, electrons instantaneously communicate with each other regardless of the distance separating them. The revolutionary aspect of this experiment was the fact that the communication occurred faster than the speed of light, breaking all space-time barriers. In their experiment, they saw that each electron seemed to know what the other was doing. Such particles, then, are not separate entities but parts of a deeper unity that is ultimately indivisible. As a consequence, it was

proven that everything in the physical reality is fundamentally interconnected. Scientific evidence shows that this is a “participatory universe,”²⁴ a worldview that takes humanity to be internally related to the rest of the ecosystem. In this sense, quantum theory provides a sound basis for a conceptual transformation in our socio-cultural and philosophical discourses. Therefore, its evidence needs to be integrated into the general ecological discourse, as well as our cultural narratives. In this respect, the reformist responses can be adapted from the ontological interpretation of quantum mechanical analyses of reality.

The ontological approach to quantum processes is provided by the famous physicist David Bohm following Alain Aspect’s ground-breaking experiment. By elaborating on Aspect’s discovery, Bohm laid much of the theoretical groundwork with regards to the “nonlocal” connections being absolutely instantaneous. As he writes in *Unfolding Meaning*, “The universe is one whole, as it were, and is in some sense unbroken.”²⁵ Bohm’s theory is one of the most influential interpretations of the quantum phenomena, first called “hidden-variables theory”²⁶ and later revised into what he named the “Undivided Wholeness and the Implicate Order.” According to Bohm, the faster-than-light connection between subatomic particles posits a deeper level of reality which is undivided and intimately interconnected. The subatomic particles in the human body, for example, are deeply connected to the subatomic particles that comprise every other living organism, plants and animals, as well as non-living things, and even the stars. Everything is interrelated to everything else. In this respect, the apparent separateness between the observer and the observed, subject and object, is also illusory and no longer relevant. In other words the observer of the complex subatomic interrelations is an essential link in the process of measurement and the properties of the atomic object, interacting with the object of his observation. In their book, *The Undivided Universe*, Bohm and B. J. Hiley made this point quite clear:

The key feature here is that of the *undivided wholeness* of the measuring instrument and the observed object, which is a special case of the wholeness to which we have alluded in connection with quantum processes in general. Because of this, it is no longer appropriate, in measurements to a quantum level of accuracy, to say that we are simply “measuring” an intrinsic property of the observed system. Rather what actually happens is that the process of interaction reveals a property involving the whole context in an inseparable way. Indeed it may be said that the measuring apparatus and that which is observed *participate irreducibly* in each other, so that the ordinary classical and common sense idea of measurement is no longer relevant.²⁷

Though much debated, David Bohm's ontological theory of wholeness has significant philosophical implications.²⁸ Underlying his holistic approach is the fundamental idea that the universe acts like one indivisible unity, behind all of which lies a deeper, implicate order of undivided wholeness. Everything in the universe is part of a continuum. Although the world may appear apparently fragmented at the explicate level, everything is an extension of everything else, and thus the explicate order, too, is part of the deeper implicate order. Bohm explains implicate order as such: "The word 'implicate' means to enfold—in Latin—to fold inward. In the implicate order everything is folded into everything."²⁹ Bohm's theory of the Implicate Order proposes that implicit potentials can be seen to unfold out of a universal unbroken field into explicit phenomena before being re-enfolded.

This radical scientific theory exposes all of reality as a dynamic process of interrelations. Behind this view of reality is Bohm's emphasis, in his *Wholeness and the Implicate Order*, that "true unity in the individual and between man and nature, as well as between man and man, can arise only in a form of action that does not attempt to fragment the whole of reality."³⁰ Bohm believes that our tendency to fragment the world into separate entities is the cause of many of our social and environmental problems. In the first chapter of his book, Bohm states that "fragmentation is now very widespread, not only throughout society, but also in each individual: and this is leading to a general confusion of the mind, which creates an endless series of problems and interferes with our clarity of perception."³¹ He underlines the fact that "this way of life has brought about pollution, destruction of balance of nature, over-population, world-wide economic and political disorder."³² As Bohm rightly claims, this is not the true state of human nature and consciousness, because "man has always been seeking wholeness—mental, physical, social, individual."³³ He then goes on to state that wholeness is an "absolute necessity to make life worth living."³⁴ Since, however, "our thought is fragmented," which "brings about a thoroughgoing confusion that tends to permeate every phase of life,"³⁵ the result is a division and fragmentation in human societies. Therefore, Bohm calls for a holistic perception of reality where "consciousness and reality would not be fragmented from each other."³⁶

To transcend our fragmentary habit of thought, or in Bohm's words, "to end this illusion," we need to create a new insight "not only into the world as a whole, but also into how the instrument of thought is working. Such insight implies an original and creative act of perception into all aspects of life, mental and physical ..."³⁷ Bohm then explains how this creative perception will be linguistically appropriated. Thus, in *Wholeness and the Implicate Order*, Bohm analyzes how language

itself can be restrictive in imposing subtle pressure to see the world as fragmented, as a collection of separate objects. He posits that “the features of the commonly used language ... tend to sustain and propagate this fragmentation, as well as, perhaps to reflect it.”³⁸ The divisive form of subject-verb-object leads to fragmentation implying a fragmentary perception of things which then gives rise to an illusion of reality independent of thought and language. To counter this structure Bohm introduces an alternative mode of language, which he calls “rhemode,” that can reflect more accurately the true dynamic nature of the physical world. The rhemode, he suggests, does not divide things into static separate entities. He states that if we give the basic role to the verb, rather than the noun, we can change the form of language to end fragmentation, “for the verb describes actions and movements, which flow into each other and merge, without sharp separations or breaks.”³⁹ As he posits, since movements are always in a state of change, they can have no permanent “pattern of fixed form with which separately existent things could be identified.”⁴⁰ Thus, in “rhemode” (literally, to flow), movement will be taken as primary to our thinking and then incorporated into the language structure. Then things will be seen as states of continuing movement. So, according to Bohm, in developing the rhemode, language should be able to call “attention to its own function at the very moment in which this is taking place.”⁴¹ Consequently, the rhemode implies a worldview that is holistic rather than dualistic, and it better expresses reality as a perpetual dynamic flux in which mind and matter are united. Bohm calls this flowing movement “holomovement” in which holo and movement refer to two basic features of reality. The “movement” component refers to reality’s constant state of change and flux, and “holo” signifies that reality is structured like a hologram. In a hologram, the entire image of an object is preserved in the correspondingly small part of the image: “In this form of knowledge information about the whole is enfolded in each part of the image.”⁴² This signifies that every part of the universe contains information about the entire universe itself. It follows that the universe has a holographic structure that is in perpetual dynamism. Bohm refers to holomovement as “the unbroken wholeness of the totality of existence as an undivided flowing movement without borders.”⁴³ Rather than being a static entity, nature is now perceived as a flowing dynamic process. Already, in *The Undivided Universe*, this reconceptualization of nature occurs quite clearly: “... our view is that nature in its total reality is unlimited, not merely quantitatively, but also qualitatively in its depth and subtlety of laws and processes.”⁴⁴

Ecological Perspectives

David Bohm's holistic vision, that we are fundamentally interconnected in a web of life, is by no means new to the environmental philosophy and ecological discourse. It has been continuously underlined by radical ecological theories. The leading ecophilosopher, Arne Naess, for example, has persistently drawn attention to the relations of interdependence in the natural world.

So, understanding the world as a collection of things with constant or changing qualities breaks down when one attempts to render it very precise and apply it in natural scientific or historical research. We must strive for greater familiarity with an understanding closer to that of Heraclitus: everything flows. We must abandon fixed, solid points, retaining the relatively straightforward, persistent relations of interdependence.⁴⁵

Naess's focus on the interrelational order of nature within a dynamic flow is remarkably consistent with the quantum condition. Emphasizing the principles of diversity and symbiosis, which are, for Naess, "the ability to coexist and cooperate in complex interrelationships,"⁴⁶ Naess advocates an ecological egalitarian ethos. His personal philosophy, Ecosophy T, especially shows striking parallelisms with Bohm's quantum theory. The "sophia" or wisdom component in ecosophy signifies both scientific knowledge and value priorities. Viewing reality as fundamentally relational, Ecosophy T posits a metaphysics of interrelatedness. Naess advocates ecosophy as "*a philosophical world-view or system inspired by the conditions of life in the ecosphere.*"⁴⁷ The basic principle of ecosophy is to promote the view that "all are intimately interconnected."⁴⁸ This direct correlation to Bohm's theory of undivided wholeness, "in which all parts of the universe ... merge and unite in one totality,"⁴⁹ is an affirmation, on the part of the ecophilosopher, of the mathematical laws of the quantum theory. Both Bohm and Naess emphasize the internal relations of all things, the subatomic particles, biological forms, flora and fauna, and human beings, existing in a flowing movement. Naess's ecosophy shows a profound awareness of the intrinsic principle of this holomovement as the primary reality. Furthermore, both Bohm and Naess give it an ontological primacy. Ecosophy T also takes into consideration the diversity of social and cultural formations and aims to explore both the cultural and the ecological perspectives in a global context through a deep questioning of value priorities. In order to avoid the problem of privileging one perspective among others, Naess states that the world must be understood "as a collection of things with constant or changing qualities."⁵⁰ Since his argument is grounded in Heraclitus's dictum that everything flows, he is able to avoid falling into totalizations. Similarly,

Bohm maintains that “one has to view the world in terms of universal flux of events and processes”⁵¹

The idea of our interrelated experience of life as a flowing process led Naess to develop his comprehensive concept of ecological self. In fact, the fundamental laws of the quantum phenomena find their most noteworthy expression in the ecological descriptions of Naess’s notion of selfhood. Being an integral part of the web of life, Naess’s all-encompassing self transcends the habit of fragmentary thought and binary logic. Naess explains his notion of this wider self as a process of self-realization that fosters the desire to act in the interests of nature, since it also involves the interests of one’s own self. In his words: “Through the wider self every living being is intimately connected, and from this intimacy follows the capacity of *identification* and, as a natural consequence, the practice of non-violence.”⁵² Self-realization, in this sense, is actualization of our inherent potentialities which Naess calls the “unfolding potentialities” of the self echoing Bohm’s process of enfoldment and unfoldment in the holomovement. Accordingly, each wider self enfolds the whole and other selves, and thus forms internal relations to all other parts of the whole. For Bohm this internal relationship is directly experienced in consciousness: “The content of consciousness of each human being is, evidently, an enfoldment of the totality of existence, physical and mental, internal and external.”⁵³ Therefore, each human being is internally related to others as well as to nature and the whole ecosystem. Naess explains this relatedness as an unfolding process of the self in its connection to the entire ecosphere, the “connection our unfolding self has with an unsurveyable variety and richness of natural phenomena, predominantly with the life in the ecosphere, but also with non-organic nature.”⁵⁴

This conceptualization of interconnectedness explains the notion of unfolding potentialities in Naess’s understanding of ecological consciousness. In terms of holistic quantum states, ecological consciousness enacts the implicate order of the universe. Attaining ecological self-realization in this sense is, for Naess, “the ultimate goal or purpose for being in the world.”⁵⁵ Accepting this goal apparently leads one to ecological wisdom and thus to the protection of the environment.

Ecosophy T has evidently informed the formulation of the platform principles of the deep ecology movement with its premise of biospherical egalitarianism (principle 2), and relational, total-field image (principle 1). However, in the new set of principles, which became the widely recognized platform of deep ecology, the metaphysical notion of interrelatedness of all things is replaced by the

“intrinsic value” of the natural world. The new platform foregrounds the idea of non-interference, and underlines the value of non-human life. The platform advocates a non-anthropocentric view by pointing to the “richness and diversity of life forms” (principle 2), and emphatically states, “humans have no right to reduce this richness” (principle 3).⁵⁶ With these principles the intrinsic value of nature becomes the philosophical foundation of deep ecology, and the metaphysics of interconnectedness is minimalized if not totally excluded. For this reason, Naess’s original version of the principles of deep ecology and especially his ecosophical affirmation of the quantum model of relationality are notably more consistent with quantum theory’s holistic vision.

Although the works of radical ecology, such as social ecology and ecofeminism, do present perspectives of the holistic process with as much value as Naess’s ecosophy, they fail to move beyond their mutual critique of one another to focus more on their shared claims about finding acceptable solutions to the ecological crisis. Their arguments on moral, social, cultural, economic and ideological grounds fail to create a consensus. Some focus on crisis avoidance, others propose a highly idealized neoromantic concept of unity with nature, or advocate “bio-regional” narratives as the basis for a new environmental ethics, while yet others argue for Earth-centered spirituality, or Gaia theory,⁵⁸ without realizing that their arguments lack an effective theoretical grounding despite a few attempts to integrate critical theory with ecological issues. The unprecedented seriousness of the environmental crisis, however, demands a high degree of consensus.

It is very important to understand that ecological discourses also need a revision of interdisciplinary bridges between science, critical theory and ecology. Many environmental theorists, such as Bill Devall, Val Plumwood, Michael Zimmerman, Peter Marshall, Lynn White and others, have written on the failure of the dominant paradigm in Western cultures and on humanity’s necessary interdependence with nature, and have advocated an ecological conception of nature and called for a paradigm shift. Fritjof Capra announces that “the new paradigm may be called a holistic worldview, seeing the world as an integrated whole rather than a dissociated collection of parts. It may also be called an ecological view, if the term ‘ecological’ is used in a much broader and deeper sense than usual.”⁵⁹ Peter Marshall’s words also exemplify this approach: “A new vision of the world is emerging which recognizes the interrelatedness of all things and beings and which presents humanity as an integral part of the organic whole.”⁶⁰ A theoretical and scientific reconstitution of a new paradigm is necessary to adequately address both the global ecological crisis and the ongoing exploitation of nature.

This has been a central concern in the works of deep ecology, which perceives the world as interconnected and interdependent, recognizing the intrinsic value of all living organisms and resisting the present forms of oppression, domination and destruction of nature. The works of Arne Naess, George Sessions, Bill Devall, Alan Drengson, Joanna Macy, Warwick Fox and others are important in calling attention to the need for holistic discourses, but they could not affect a discursive shift. In other words, no visible change is seen in the related areas of social knowledge. Arne Naess himself acknowledges this when he writes in “Deep Ecology for the Twenty-Second Century:” “The deep ecology movement is concerned with what can be done *today*, but I see no definite victories scarcely before the twenty-second century.”⁶¹

What is lacking in these attempts is a distinctive engagement of quantum and critical theory with the discourse of deep ecological philosophy. What we need is a discursive transformation in the whole of human perception of the world—such as the Cartesian partition had achieved. Political practice alone, or social activism itself, cannot transgress the still dominant disciplinary formations. The discourses of the human sciences are still linked to certain conditions and can only be transformed by new modes of operation based on conceptual shifts, from notions of fragmentation towards wholeness.

A New Postmodern Approach

The new paradigm shift can only be fully realized and infiltrated into mass consciousness and cultural forms by a fundamental change in our thinking, our attitudes and practices, and in our entire knowledge of the world. Such a change can come by crossing the boundaries between ecological, cultural, ethical and critical theory and by building new discourses based on ecocentric values, as well as by absorbing the lessons and holistic theory of quantum physics. Extending the insights, especially of contemporary critical theory, into radical ecology’s narratives requires a rethinking of both of their statements in a relational way. Scientific insight is necessary in enabling an effective social transformation of present dichotomies in Western thought, and critical theory is necessary in producing a discursive transformation, hence, the need to formulate a reconstructive theory towards possible answers to the problems.

Here I refer specifically to a new ecological postmodern theory that can provide a basis for a critical evaluation of the relations between deep ecology and quantum theory concentrating on the idea of interconnectedness of the universe. Developing a new discourse as such is necessary to describe, communicate, appropriate and to infiltrate this

new paradigm. The environmental crisis itself shows the need for a transformative way of organizing ideas from trans-disciplinary fields which leads to a philosophy of affirmation based on Bohm's concept of the holomovement. As Bohm aptly states, "revolutionary changes in physics have always involved the perception of new order and attention to the development of new ways of using language that are appropriate to the communication of such order."⁶² Hence the need for change in our forms of knowledge in parallel with the epistemic shift in quantum physics. How then, can we relate and connect discourses from three different disciplines in an effective way to build an interconnected discursive practice? How can we blend scientific theory with the postmodern narrative strategies and deep ecology perspectives without producing what Baudrillard calls disconnected "floating theories" in the realm of undecidability?⁶³ The answer may lie in the analogy of "rhizome," a new concept that Deleuze and Guattari have introduced in their attempt to direct theory against the hierarchic system of Western rationality. Rhizome is defined as "connection" which "brings into play very different regimes of signs, and even nonsign states ... it is composed not of units but of dimensions, or rather directions in motion."⁶⁴ The concept of rhizome in which any point can be connected to another within a multidimensional space resembles the quantum concept of holomovement, and is derived from the root systems of bulbs and tubers as an alternative to the kind of system based on a tree whose central trunk controls the rest of its branches—a model that dominates Western thought. Rhizome provides a conceptual opportunity to formulate the central relations among postmodern, ecological and quantum theories. As such, it is a transformatory concept to show how interconnections between different discourses meet to provide a potential for discursive change. Rhizome can be useful in describing an epistemic shift in the status of our knowledge. Thus, it can be argued that, at this historical moment, bringing postmodernism, quantum theory and the philosophy of deep ecology together in the context of their common emancipatory ideas is of crucial significance.

Deleuze and Guattari's outline of the principles of rhizome is especially helpful in linking the three discourses. Principles 1 and 2 pertain to "connection and heterogeneity: any point of rhizome can be connected to anything other"⁶⁵ which then can be used in relating postmodern theory to radical ecology's codes in the sense that their critique of the Western system of binary thought are the points that connect them. This, then, links them to the radical postulates of quantum theory which also rejects dualistic thought patterns. The connection is then established in what we can call the semiotic flow of their respective critical questioning of traditional authority and the dominant structures

of Western culture. Thus, the “semiotic chains” of their basic arguments are connected to their “diverse modes of coding” that bring into play their “*collective assemblages of enunciation*.”⁶⁶ Principle 3 is multiplicity which “has neither subject nor object, only determinations, magnitudes, and dimensions that cannot increase in number without the multiplicity changing in nature.”⁶⁷ Furthermore, “increase in the dimensions of a multiplicity that necessarily changes in nature as it expands its connections”⁶⁸ pertains to the deconstructive approach in all three discourses concerning the major “epithets of the Establishment” as Suellen Campbell calls them,⁶⁹ meaning logocentrism, phallogocentrism, patriarchy and technocracy which are challenged and attacked as the “structures of interwoven thought and power, concept and institution.”⁷⁰ This common critical stance in three discourses, and their subversion of these concepts paradoxically lead all to the concept of multiplicity in the sense that all put emphasis on the idea of reality as a “process,” “dynamic flow” and “diversity” in which multiplicity of different linguistic codes, life forms and subatomic particles enter into a holographic play each reflecting an image of the whole complex domain of reality. What matters in this polyphonic rhizome is the fact that “multiplicity never allows itself to be overcoded” but the rhizome includes a “*plane of consistency of multiplicities*”⁷¹ which then makes quantum theory consistent with the narratives of postmodernism and deep ecology. This is an alternative way of producing a new episteme, symbolically represented by the rhizome, that unites the multiplicities of different discourses. Within the rhizome postmodernism, deep ecology and quantum physics can easily co-exist through the interplay of their own systems of logic. The polyphonic fusion of these three discourses opens a multidimensional discursive practice encompassing cultural and bio-diversity which can be related to people’s individual experiences in different cultural formations. The principle of multiplicity allows for the richness of biological and cultural forms to be analyzed in perspective. Paradoxically, enough multiplicity can provide a unifying ecocentric prospective for environmental protection. Finally, the fourth “Principle of asignifying rupture: against the oversignifying breaks separating structures or cutting across a single structure” shows that even though the rhizome “contains lines of segmentarity” these lines “always tie back to one another”⁷² which echoes the fundamental principle of quantum theory, that “one can never posit a dualism or a dichotomy”⁷³ which also runs parallel to the basic philosophy of the deep ecology movement.

Theorizing the link between postmodernism, quantum physics and ecology is crucial in understanding and solving today’s ecological problems. Thus, integrating the discourse of postmodernism in the

analysis of the environmental crisis is necessary in forming a reconstructive postmodern theory of radical ecology. Postmodernism offers a radically different ontology which not only consorts with the basic arguments of radical ecologists, but also with the current philosophical implications of quantum theory. There are, in fact, many striking connections between postmodernism and radical ecological philosophy. Their basic critique of the materialistic worldview bears significant similarities to be explored. Their interrogative stance against polarity in our thinking brings deep ecology and postmodernism to a shared critique of the privileging of economy over ecology and separation over a unified awareness of life. Environmental crisis itself has revealed the deficiency of this binary thinking; or in Devall and Sessions's words, we must "see through these erroneous and dangerous illusions."⁷⁴ What this implies is that the ecological perception of the world and the postmodern challenge of logocentrism need to be related on a discursive level to formulate a reconstructive postmodern theory of radical ecology grounded in the scientific insights of quantum mechanics.

The paradigm shift in physics is of special significance because it not only gives evidence that anthropocentrism has proved to be globally destructive, but also because it has enabled the new view to be carried over to the life sciences. As David Bohm states, "these sorts of discussions cannot be restricted to science alone. We have to include the whole range of human activities."⁷⁵ In this regard, postmodernism critically demonstrates the radical character of this scientific ontology in ways that point to significant parallelisms between the two.⁷⁶ Similarly postmodernism shares a number of significant points with environmental philosophies so they can be related together on theoretical grounds.⁷⁷ As Arran Gare argues, "reflection on the postmodern condition and reflection on the environmental crisis have much in common. They both involve efforts to understand the culture of modern civilization and how it has come to its present state."⁷⁸ Gare, however, blames the present crisis on the fragmentation of the postmodern world and characterizes postmodernism as a celebration of disorientation and fragmentation. This is typical of the many accounts of postmodernism which imply a playful acceptance of disconnected fragments of reality. Given the postmodern scepticism of unity, this definition apparently informs the general postmodern theory. It is wrong, however, to reduce postmodernism to one defining position, because postmodern discourse itself rests on conflicting positions of different theoretical discussions. In fact, postmodernism is, as Linda Hutcheon has stated, a contradictory phenomenon, "one that uses and abuses, installs and then subverts, the very concepts it challenges."⁷⁹ In

Hutcheon's view, postmodernism is a radical contesting of Cartesian worldview as a system of closed meanings.

Much of the debate around postmodernism is especially concerned with the problems of representation, death of the author, decentering of the subject, textual playfulness, dissolution of perspectives, hesitancy to truth claims and loss of fixed reference points, as well as with discontinuity and indeterminacy of human experience. So, it is not surprising to see that in this framework the physical world is irrevocably derealized and everything in it becomes part of a self-perpetuating textuality. In this case, there arise mere interpretations about other interpretations in a constant play of signifiers where the self dissolves into fragments, reality into discontinuity and all thinking process into a well of total relativism. Obviously, this is not the way to the solutions of environmental problems, and this is not the kind of discourse that can be related to the holistic worldview of deep ecology and quantum theory. This version of postmodernism is mostly anthropocentric and explains away all reality as a social construction where nature too becomes a social construct. Within this frame of receding firm ground, however, there is one important aspect of postmodernism that should not be overlooked: postmodern discourse involves a thinking that transcends the binarism of Western thought, and thus avoids creating another totalizing theory based on old paradigms of duality. As Hutcheon writes, "postmodernism takes an interrogative stand against totalizing systems,"⁸⁰ and thus foregrounds how all discourses legitimize power. Since it subverts all authoritative discourses and persistently questions the existing order, it seeks to highlight plurality of viewpoints in its attempt to find non-totalizing alternatives. In fact, postmodernism disputes what Bohm calls a "universal tendency to treat our knowledge as a set of basically fixed truths."⁸¹ It rejects the privileging of one discourse over others, undermining all attempts to impose metanarratives which claim authority as generalized "truths." In other words, postmodernism contains the promise of non-dualistic worldviews among the plurality of its definitions.⁸² In this sense, then, it can be characterized as a fundamental critique of traditional epistemologies comprising the possibility to incorporate an ecocentric worldview as the basis for a radical ecological theory. Its desire to find new liberatory perspectives, then, should not be taken as detours to cognitive relativism.

In the light of this approach, it is important to define postmodernism as an "unfolding concept" that focuses on the notion of "process," of change and flow. As Brenda K. Marshall succinctly puts it, "Its definition lies in change and chance."⁸³ Therefore, it is fruitless to equate the discourse of postmodernism only with such limiting terms

and phrases as depthlessness, fragmentation, celebration of surfaces, breakdown of coherence, discontinuity and disconnection. The reason why these notions are foregrounded is because postmodernism names the actual discrepancies in today's social structures where reality really turns into multiple versions of endless inflow of media images. Postmodernism emphatically highlights this discordant line of reality in the public sphere in order to draw attention to the disconnection between humans and the environment. It is a way of displaying the crisis of Western epistemology in subversive poses. This is exactly what postmodernism does. It does not dismantle the structure of our world, but it successfully demonstrates how it has already been dismantled by our present discursive formations behind which lies the widespread tendency to fragment the world, to disconnect and to disorient human culture from nature. This is what postmodernism emphatically exposes as the major crisis of today's failing theories, practices and views, so that an ecocentric approach becomes a major theoretical necessity to face the thoroughly problematized perceptions of nature and culture today. As such, the postmodern discourse can engage liberatory forms of ecocentric theories.

A reconstructive postmodern theory of radical ecology integrates concepts like plurality, diversity, contextuality, relationality, difference, and especially process, which makes it conceptually complicit with the affirmative discourse of deep ecology. This situates postmodernism in the philosophy of process which sees the natural world as a creative process of becoming and unfolding, and thus directly corresponds to the quantum notion of dynamic flow which in turn forms the basic philosophical premise of deep ecology.

This kind of postmodernism is ecocentric, because, in Gare's words, it "is associated with respect for non-Western societies and cultures, for the previously suppressed ideas of minorities, for nature worship and Eastern religions and for non-human forms of life."⁸⁴ Postmodernism, as such, circulates through the works of deep ecologists. Warwick Fox's words attest to this: "Deep ecology is concerned with encouraging an egalitarian attitude on the part of humans not only toward all *members* of the ecosphere, but even toward all identifiable *entities* or *forms* in the ecosphere."⁸⁵ Ecological postmodernism then confronts the environmental crisis by providing a discursive change in our conceptual fields. In this regard, constructing new narratives of the emerging paradigm that transmit holistic knowledge is the key that scholars should focus on. As Michel Foucault has shown, knowledge is sustained by discursive formations and postmodern discourse can generate an appropriate ecocentric orientation in our knowledge of the world. It can provide new ways of writing, interpreting and living in the

world by means of *rhizomic* narratives. Although the ecosystem cannot be constituted by discursive formations, our patterns of thought can, and thus without dissolving the bio-diversity into such formations we can gain a considerable insight into our own orientation toward their present domination and destruction by conceiving how these formations have contributed to our destructive methods of progress.

As Ihab Hassan writes, postmodernism decanonizes the erratic master codes: “We deconstruct, displace, demystify the logocentric, ethnocentric, phallogocentric order of things.”⁸⁶ To this, deep ecology has added anthropocentric order of things which is the root of all others. What we need today is a theoretical emphasis on our participatory relation with the rest of the community on this planet. An ecocentric postmodern theory, drawing from the holistic theory of quantum physics, can in fact orient academic studies for effective work to be done towards solutions of environmental problems. Therefore, it has all the potential to become a defining aspect of the new paradigm that quantum physics has initiated. In fact, as Steven Best and Douglas Kellner argue, the postmodern turn in the spheres of literature and culture has already produced a new paradigm. As they conceptualize it, “the ‘postmodern paradigm’ signifies *both* specific shifts within virtually every contemporary theoretical discipline and artistic field *and* the coalescing of these changes into a larger worldview that influences culture and society in general, as well as the values and practices of everyday life.”⁸⁷ From this viewpoint, the common perspectives among postmodernism, deep ecology and quantum theory coalesce into this “emergent postmodern paradigm”⁸⁸ which enacts the unfolding process of holistic logic that overcomes the myth of fragmentation.

A holistic reconceptualization of postmodernism then helps determine how the multiplicity of perspectives blend and merge to form a dynamic account of a discursive shift which can enable a holistic worldview to be the only relevant reference point in building a new paradigm. In the face of a massive environmental destruction, a reconstructive theory urgently needs a recourse to such a reference point. That is why lingering in relativistic theorizing becomes meaningless today. Here what is required is “the unicity of the referent as a guarantee for the possibility of agreement”⁸⁹ as Lyotard aptly puts it. As Arne Naess points out, “the task is to find a form of togetherness with nature which is to our greatest benefit”⁹⁰ Similarly, Michael Zimmermann states that “humanity’s highest possibility is to bear witness to and to participate in the great process of life itself.”⁹¹ The unicity of referent then lies in the vital connection between the ecosystem and human consciousness. Thus, the task is to develop ecocentric discourses which are consistent with the implicit order of nature. We need to recognize and install in

our socio-cultural narratives the inherent worth of all beings. A postmodern ecological perspective, in this sense, results in what Bill Devall and George Sessions call “the all-inclusive Self-realization” where Self stands for “organic wholeness.”⁹² As they express it, “there are no boundaries and everything is interrelated.”⁹³

Does this mean that ecological postmodernism would attempt to construct another grand narrative based on fixed references, essentializing the concepts of nature, ecology and the environment? Not necessarily, because ecocentric theories do provide a way of grounding new narratives in ecological awareness, but because the very nature of postmodern discourse is to reject any form of totalizations, the emerging ecocentric narratives would be “multidimensional” in Arne Naess’s words. They would privilege “unity in diversity” if any, and would be rhizomic in nature. The only fixed reference point would be an ecocentric perspective and that is itself by nature multidimensional as bio- and cultural diversity demands. This, then, would form a new philosophical model: a rhizomic multi-narrative, one that is “connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight.”⁹⁴ This idea of rhizomic narrative remarkably corresponds to Bohm’s notion of the implicate order of the universe. It renders all anthropocentric perceptions of reality as degradations of this order. Furthermore, such narratives would draw attention to the contextual nature of meaning. In *Wholeness and the Implicate Order*, David Bohm warns us, in a postmodern manner, about “the universal tendency to treat our knowledge as a set of basically fixed truths, and thus not of the nature of process.”⁹⁵ In an interview conducted by Renée Weber, Bohm also emphatically draws attention to the postmodern characteristic of meaning by rejecting the claims to any fixed meaning. He says that “there is no *final* meaning. The whole point of meaning is that the content is in a context, which in turn is in a context, and therefore meaning is not final. We are always discovering it, and that discovery of meaning is itself a part of reality.”⁹⁶ The postmodern rhizomic narrative itself enables this process of meaning unfoldment in its very nature as Deleuze and Guattari have outlined.

Rhizomic narrative as such entertains relations analogous to those between deep ecology and the subatomic interconnections. Thus an ecocentric postmodern discourse producing rhizomic narratives represents a great revolution in our very modes of thinking and acting in the world. Moreover, rhizomic narratives can be constructed in David Bohm’s new mode of language, rhemode, whereby the primary role of movement in the very process of language would reveal the narrative itself to enact the dynamic flow of interactive ideas and

solutions while keeping its focus on the one-ness of the content of thought.

A postmodern rhizomic narrative based on the logic of the rhemode would be totally complicit with the holistic view of both deep ecology and quantum theory. An ecocentric attitude, as such, is more consistent with the implicit order of reality as quantum theory emphatically underlines. In this respect, new ecocentric narratives, highlighting the interconnectedness of the ecosystem, would pave the way for a radical change of consciousness so that our attitude will be more in accord with the interrelations of that which we are also a part. What follows is that, without change in our basic practices, values and epistemologies, it is likely that we will cause the whole ecosystem to collapse into utter destruction. It is because, as David Bohm notes, “the essential point ... is that there is no absolutely sharp ‘cut’ or break between consciousness, life, and matter, whether animate or inanimate.”⁹⁷ Then we need to realize that, “the environmental crisis is the ultimate source of disorientation”⁹⁸ as the outcome of our fragmented thought. An ecocentric postmodern approach to the environmental crisis makes us aware of this and opens new doors of perception so that we develop a new vision of the interrelation of all things within the natural world. Then our way of thinking would no longer be penetrated by fragmentation.

To conclude with David Bohm’s remarks: “The question is how our meanings are related to those of the universe as a whole. We could say that our action toward the whole universe is a result of what it means to us. Now since we are saying that everything acts according to a similar principle, we can say that the rest of the universe acts signa-somatically to us according to what we mean to it.”⁹⁹ Indeed humans can generate a creative unfoldment of the Cosmic process of harmony within the world if they can reorient their thinking in this direction. This is crucially significant for understanding our participatory role in the ecosystem and the wholeness of existence within the very fabric of the holomovement.

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Notes

¹ See Norris 1998.

² Radical Ecology is the theoretical dimension of radical environmental philosophy including the deep ecology movement, ecosophy, ecofeminism, social ecology and bio-regionalism, all of which make a call for a transformation in our thinking, policies and actions concerning the ecosystem.

³ Sessions 1995, p. x.

⁴ Environmentalism became a grassroots popular movement in the 1960s as a result of conservation and preservation efforts. Apart from Rachel Carson's *Silent Spring* (1962), Steward Udall's *The Quiet Crisis* (1963) was also effective in socially initiating this movement and developing an ecological perspective. The main inspiration, however, came from Aldo Leopold's idea of "land ethic" in *A Sand County Almanac* (1949). For the social and ecological criticism of the 1960s see: Roszak 1972.

⁵ See Arne Naess's short paper published in 1973, "The Shallow and the Deep, Long-Range Ecology Movements: A Summary," originally published in *Inquiry* 16, where he pointed out the distinction between shallow ecology and deep ecology. This paper is based on the talk Naess gave in Bucharest in 1972 at the Third World Future Research Conference.

⁶ Arne Naess's platform principles aim to establish shared objectives within the general ecology movement so that people from diverse backgrounds can share common concerns for the ecological communities of the planet. The principles were originally formulated by Arne Naess and later revised into a new platform by Naess and George Sessions in 1984. See: Devall and Sessions 1985; Sessions 1995; and Witoszek and Brennan 1999.

⁷ Descartes divided the world into substances that he defined as mutually exclusive of one another. Thus the division between mind and body is based on the separation of the mental world (nonspatial sphere) from the physical world (matter), creating a radical dualism in human thought.

⁸ Lyotard 1991, p. xxiii.

⁹ Heisenberg 1958, p. 105.

¹⁰ Hobbes 's idea of mechanistic materialism in his political philosophy, discussed in *Leviathan*, is derived from his mechanistic conception of nature. For a detailed commentary see: Merchant, 1989.

¹¹ Bohm 1987, p. 2.

¹² Meyer 1997.

¹³ Heisenberg 1958, p. 79.

¹⁴ *Ibid.*, p. 80.

¹⁵ Plumwood 1993, p.70.

¹⁶ The separation of humans as the privileged agents of creation from nature as the lifeless object to be utilized results from the mechanistic worldview which found its justification in the mathematical laws of Newtonian mechanics. Because these laws provided clear and distinct descriptions of a mechanical universe, a powerful metadiscourse was created in almost all areas of human knowledge in the seventeenth century. Based on the Cartesian division and the Newtonian mechanistic model, such a metadiscourse came to be closely associated with the triumph of science in the following centuries. The scientific metaphor of mechanism so easily ordered social and political discourses of the West because the physical laws, which reduced nature into a state of inert and nonliving entity, seemed to provide a valid conceptual framework for social values based on the idea of progress. This inevitably led to the ongoing exploitation of nature. Hence the dominant paradigm of material progress in Western culture.

¹⁷ Capra 1997, p. 6.

¹⁸ Quoted in Plotnitsky 1994, p.141.

¹⁹ For the quantum-theoretical issues see Brown and Harré 1988; Herbert 1985. Physicists found quantum properties strange because they had no frame of reference to determine scientific results. First, as Einstein had discovered, space, time and motion were interrelated, and second, at the subatomic level, reality was quantized; that is, particles made quantum leaps from one energy state to another. Measuring a photon, for example, in one place had an instantaneous result somewhere else, so quantum measurements would always be about probabilities. At the subatomic level, reality is energy, and both the position and velocity of a particle cannot be determined at once. Heisenberg proved that one can measure the speed of an electron, or its position, but not both at once. In other words, the better one measured the electron's position, the less one knew its velocity. The behaviour of subatomic particles was totally indeterminate, only definable by the laws of statistics. Heisenberg tried to measure an electron's position and velocity by bouncing a photon off an electron, but saw that when a photon and an electron collide there appeared a range of possible outcomes, not one specific outcome. Another puzzle the physicists faced was that of the nature of light. Light, which had been accepted as waves before, now appeared to be made up of particles. They also saw that light behaved both as waves and as particles, which led to the famous debates over wave-particle duality. Was light a particle with wavelike properties, or was it a wave that behaved like a stream of particles? The paradox arose because we can observe photons acting like waves, and also like particles, but not both at once. This problem was addressed first by de Broglie in 1924, then advanced by Schrödinger who developed a wave mechanics

theory to describe the possible shapes of electrons which, he thought, are not particles but standing waves, also quantized. Heisenberg later confirmed this theory through matrix mechanics, which represented the quantum system by a set of matrixes in which he mathematically demonstrated that particles are discontinuous and unlocalized. His famous Uncertainty Principle (1927) points to the radical indeterminacy and uncertainty of the speed and position of the particles. Heisenberg also pointed out that subatomic reality changes with each observation. The indeterminacy of the wave-particle duality finally found its best solution in Niels Bohr's 1927 Principle of Complementarity, which came to be known as the Copenhagen interpretation of quantum physics. Complementarity sees both particles and waves as mutually irreconcilable. With this, Bohr developed an anti-realist epistemology which most physicists follow today.

²⁰ Heisenberg, 1958, p. 107. John Stewart Bell first introduced the interconnectedness theorem in 1964. Bell argued that any model of reality must be non-local, which confirmed David Bohm's "hidden-variables" theory. Bell's theorem proved that, in the non-local reality, particles are connected by non-local influences. Thus information is transferred superluminally between the particles. Alain Aspect and his team successfully tested Bell's theorem in 1982.

²¹ Capra 1975, p. 78.

²² Ibid.

²³ In his *Quantum Reality: Beyond the New Physics* (1985), Nick Herbert cites several interpretations, such as (1) the Copenhagen Interpretation, which consists of two distinct parts: a. there is no reality in the absence of observation, and b. observation creates reality. According to the Copenhagen interpretation, the electron's dynamic attributes are *contextual*: what attributes it seems to have depend on how one measures it; (2) Bohm's theory of Undivided Wholeness of reality; (3) the many-worlds interpretation: reality consists of a steadily increasing number of parallel universes. Paul Davies and Hugh Everett champion this claim; (4) neorealism: the world is made up of ordinary objects; (5) consciousness creates reality and; (6) the duplex world of Heisenberg: the world is twofold, consisting of potentials and actualities (pp. 16–29).

²⁴ This is J. A. Wheeler's idea. For further elaboration of his views, see Selleri 1989, pp. 279–332. Wheeler explains his notion of participatory universe as such: "... to say that the world exists 'out there' independent of us, that view can no longer be upheld. There is a strange sense in which this is a 'participatory universe'" p. 297.

²⁵ Bohm 1987, p. 7.

²⁶ David Bohm developed his hidden-variables theory in 1952 as an alternative interpretation to the quantum-mechanical description of reality. Hidden variables are intrinsic properties that are specific for each particle. When a measurement is made, these hidden variables interact with the measuring device to produce a result. Bohm states that quantum particles always have a range of hidden variables, and that there are both waves and particles, and they are quite distinct. In his model, the electron is a particle having a definite position and a momentum. Moreover, each electron is connected to a new field that he called a "pilot-wave." Bohm thought that the pilot wave is invisible and can only be observed through its effect on its electron. For further information see Bohm 1957.

²⁷ Bohm and Hiley 1993, p. 6.

²⁸ For an argumentative account see especially d'Espagnat 1989, pp. 89–168. Also see Bohm and Peat 1989.

²⁹ Bohm 1987, p.12. The Implicate Order is an underlying order in the universe that is composed of energy and light. Electromagnetic waves travel throughout this energy field interrelating and crossing each other. Each wave carries information and their interweaving creates constant connections. These encoded waves affect one another through their interactions. Thus, the movement of this energy unfolds and enfolds information. Implicate Order is the enfolded whole which flows into every portion of itself generating a holographic reality. With these views, Bohm is the first physicist to suggest the possibility that our holographic universe is a multidimensional complex.

³⁰ Bohm 1980, p. 30.

³¹ *Ibid.*, p. 1.

³² *Ibid.*, p. 2.

³³ *Ibid.*, p. 3.

³⁴ *Ibid.*, p. 3.

³⁵ *Ibid.*, p. 27.

³⁶ *Ibid.*, p. xii.

³⁷ *Ibid.*, p. 25.

³⁸ *Ibid.*, p. 29.

³⁹ *Ibid.*, p. 30.

⁴⁰ *Ibid.*, p. 30.

⁴¹ *Ibid.*, p. 32.

⁴² Bohm 1987, pp. 10–11.

⁴³ Bohm 1980, p. 172.

⁴⁴ Bohm and Hiley 1993, p. 321.

⁴⁵ Naess 1980, p. 50.

⁴⁶ Naess 1999, p.4. These are Naess's original platform principles.

⁴⁷ Naess 1980, p. 38.

⁴⁸ *Ibid.*, p. 38.

⁴⁹ Bohm 1980, p. 11.

⁵⁰ Naess 1980, p. 50.

⁵¹ Bohm 1980, p. 9.

⁵² Naess 1995, p. 233.

⁵³ Bohm 1987, p. 21.

⁵⁴ Naess 1980, p. 164.

⁵⁵ Naess 1995, p. 237.

⁵⁶ Naess and Sessions 1999, p. 8.

⁵⁸ For a deeper discussion see Eisler 1990, pp. 23–34; and Harding “From Gaia Theory to Deep Ecology,” <<http://www.gn.apc/schumachercollege/articles/stephen.htm>>

⁵⁹ Capra 1997, p. 6.

⁶⁰ Marshall 1992, p. 5.

⁶¹ Naess 1995, p. 464.

⁶² Bohm, 1980, p. 111.

⁶³ See Baudrillard 1988, pp. 119–48. Here Baudrillard argues that theoretical production “spin[s] on its own disconnectedly, *en abîme*, towards an unknown reality.” p.147.

⁶⁴ Deleuze and Guattari 1992 [1988], p. 21.

⁶⁵ *Ibid.*, p. 7.

⁶⁶ *Ibid.*, p. 7.

⁶⁷ *Ibid.*, p. 8.

⁶⁸ *Ibid.*, p. 8.

⁶⁹ Campbell 1996, p. 127.

⁷⁰ *Ibid.*

⁷¹ Deleuze, and Guattari 1992 [1988], p. 9.

⁷² *Ibid.*

⁷³ *Ibid.*

⁷⁴ Devall and Sessions 1993, p. 39.

⁷⁵ Bohm and Peat 1989 [1987], p. 14.

⁷⁶ Various theorists have presented the paradigm shift in science as a postmodern paradigm and argued from the postmodern perspective. They view postmodern science as nondualistic and integrative of humanity and nature. Thus postmodern science emerges as an emancipatory new paradigm. In fact the concepts of organism, ecology and process figure prominently in much contemporary scientific discourse. For the implications and effects of postmodern paradigm in science see Toulmin 1982; Griffin 1988; and Best and Kellner 1997.

⁷⁷ For example, its insistence on change, process, organism and its challenge of authoritative dominance of grand narratives as well as its focus on multiperspectival outlook of multiplicity, diversity and anti-essentialism, enable postmodernism to be complicit with the environmental philosophies. In addition, both postmodernism and especially radical ecology demystify “those totalizing systems that unify with an aim to power” Hutcheon 1988, p. 186. But the key characteristics that correlates postmodernism and environmental philosophies is that they are critical of and reactionary to well-defined boundaries between spectator and scene, observer and the observed, and text and reality. In other words both adopt a participatory logic.

⁷⁸ Gare 1995, p.1.

⁷⁹ Hutcheon 1988, p. 3.

⁸⁰ *Ibid.*, p. 214.

⁸¹ Bohm 1980, p. 49.

⁸² Postmodernism is a problematic term. Since many critics discuss the term from various theoretical positions a consensual definition eludes scholarship. Those inimical to it (like Jameson, Eagleton, Bloom, Charles Newman, Graff) and those who are its advocates (like McHale, Hassan, Hans Bertens, Douwe Fokkema, Scholes and Hutcheon) characterize it in a variety of ideological and theoretical positions and in conflicting terms. Therefore, postmodernism has a multiplicity of perspectives. Yet in all its forms, political, aesthetic, poetic, critical and cultural, postmodernism insists on a pluralist character of meaning, reality and textuality. Drawing attention to this, Hans Bertens provides three distinct postmodern cultures: an avant-gardist postmodernism, a post-structuralist postmodernism and a sensuous aesthetic postmodernism. (Bertens 1991, p. 125.) In fact, as a term, postmodernism reflects a radical ontological and epistemological crisis in an age that witnessed the collapse of metaphysical centres and the reliability of higher discourses. For a range of perspectives on postmodernism see: Hassan 1987; Harvey 1989; Huyssen 1988; Jameson 1992; Fokkema and Bertens 1986; Hutcheon 1989; and Newman 1985

⁸³ Marshall 1992, p. 5.

⁸⁴ Gare 1995, p. 87.

⁸⁵ Fox 1995, p. 269.

⁸⁶ Hassan 1987, p.444.

⁸⁷ Best and Kellner 1997, p. xi.

⁸⁸ *Ibid.*

⁸⁹ Lyotard 1991, p. 28.

⁹⁰ Naess 1980, p. 168.

⁹¹ Zimmerman 1990, p. 140.

⁹² Devall and Sessions 1985, p. 40–41.

⁹³ *Ibid.*, p. 41.

⁹⁴ Deleuze and Guattari 1992, p. 21.

⁹⁵ Bohm 1980, p. 49.

⁹⁶ Weber 1987, p. 441.

⁹⁷ Bohm and Peat 1987, p. 211.

⁹⁸ Gare 1995, p. 6.

⁹⁹ Bohm 1987, p. 98.

