Soils of regeneration: exploring conceptualizations of the natural world as a context for an ecologically-sensitive curriculum

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SOILS OF REGENERATION: 
EXPLORING CONCEPTUALIZATIONS OF THE NATURAL WORLD AS A 
CONTEXT FOR AN ECOLOGICALLY-SENSITIVE CURRICULUM

A Dissertation

Submitted to the Graduate Faculty of the 
Louisiana State University and 
Agricultural and Mechanical College 
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in

The Department of Curriculum and Instruction

by

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To the memory of my father, Raymond J. DeMoor, August 3, 1925-March 14, 2003

My father was a strong-willed man. Born in early August, he was a Leo, the lion, and a lion he was. Left-brained; right-minded. A person of strong conviction and perseverance. He knew what he liked, and what he liked was right. Dad had a particular liking for a cozy, orange chair in which he chose to sit and read or watch television. Over the years the velveteen chair cover became faded and worn, much to my mother's agitation. Finally, my dad reluctantly agreed to purchase a new chair. After a long day of shopping, my parents decided upon a large, overstuffed, teal recliner, with thin ribs of cranberry, brown, rose and gray running through its soft fabric. Once the chair was delivered, however, dad refused to sit in it, choosing instead the worn orange chair that had now been moved to an upstairs bedroom.

This went on for months until my dad got lung cancer and could no longer climb the stairs to the orange chair. Begrudgingly, he began to sit in the teal chair, which proved to be more comfortable and suited to his needs. In time, the teal chair became "his" chair and he would sit in it by the hour, reading and nodding off intermittently. My dad died early this morning, before the break of dawn--his dawn. After we said our final good-byes and returned from the hospital, I climbed into the teal chair. Sitting alone in the dimly lit room, I reflected on our stormy past relationship that had only recently subsided into a more peaceful way of being. I let the chair hold me.

It is time for humanity to sit in a new chair. Education is key to our necessary repositioning for a more viable ecological future. And so it is with a spirit of gratitude and love that I dedicate this dissertation to my beloved father, Raymond DeMoor, who is now at peace in God's eternal teal embrace.
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I give thanks to the Creator for dreaming the Universe; to the Universe for imagining Earth; to Earth for providing and sustaining the web of life. I give thanks to the soil that is the source of our being and to the landscapes, flora, and fauna that shaped me and continue to ground me in Spirit, wonder, and awe.

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navigate differences while sharing in the heart and soul of the "cosmic egg." Petra challenged me at every turn while ultimately showing unflinching confidence in my abilities; after bringing forth all that was within me, she stood firmly beside me. For this I am deeply grateful.

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And I acknowledge with gratitude Dr. Elwood Holton, the Dean's Representative on my doctoral committee, who showed incredible openness to and support of my work even though it lay outside of his field. His willingness to stretch across boundaries inspires me to further stretch into worlds outside of my immediate comfort zone and think more broadly.

I am eternally indebted to my friend and mentor, Dr. Kathleen O'Gorman of Loyola University. Kathleen introduced me to the Universe as the ultimate context for meaning-making, to the field of Religion and Ecology, and to Thomas Berry and Sr. Miriam Therese MacGillis, whose work and friendship have inspired and guided me. Kathleen helped me to discover my life's path and has walked with me for the past 10 years, supporting me, empowering me, and providing opportunities to bring my creative energy and vision into the world through ritual, curriculum design, guest speaking, and teaching. My present work is a direct outgrowth of her superb and loving mentorship.

I am grateful to many for generously assisting me in various ways during my doctoral journey, asking nothing in return. My dear friend, Jonathan Reily, provided a writing studio for me on his land in the country, opening the doors of his home and heart to me. Gerald Fonseka and Emily Romaine made the time on Jonathan's land all the more welcoming and fun. Camille Burkely shared her home in Baton Rouge with me one night per week during the time of my LSU coursework, substituting a cozy bedroom for the rocky mantle of ground at the KOA campground upon which I pitched my tent during my first semester at LSU, in order to accommodate a demanding schedule. My brother Steve crossed over the chasm of radically opposing political views to offer a financial hand to me in order to pay someone to proofread my work when I could not afford to do so. And
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I remember with gratitude and love my father, Raymond DeMoor, my uncles Edward and Robert Zehr, and my dog, Henry, all of whom died, within close proximity to one another, before my doctoral journey was complete. I can only imagine how much richer the educational conversation would have been had my brilliant and engaging Uncle Ed remained in my life and my Uncle Bob, in his elfish way, continued to both poke at me and cheer me on.

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ABSTRACT

David Orr (1994) asserts that the ecological crisis is a crisis of education. This study explores the relationship between the ecological crisis and education by examining the role that language plays in shaping perceptions of the natural world. Toward this end it analyzes narratives of science, literature and other disciplines that conceptualize the natural world as object and as subject. It evaluates how particular metaphors used in reference to the natural world enhance or impede ecological understanding and the cultivation of responsibility and stewardship and considers ways in which these conceptualizations might be used as a basis for new curriculum theorizing.

In looking at our relationship to Earth, this dissertation explores the notion of intersubjectivity (Abram, 1996) as expressed in philosophical and theoretical writings on participatory consciousness (Berman, 1981, Abram, 1996), empathic fusion (Goizueta, 1995), and bodymind or embodied knowing (Hocking, Haskell, & Linds, 1999). Marginal or in-between spaces emerge from these narratives as important and potentially transformative sites of relationship and meaning making wherein dualities are reconciled and physical and metaphysical realms merge. The implications of these particular findings form the theoretical core of this work's conclusions.

This dissertation makes an original contribution to the field of curriculum theory in the following ways: It situates discursive knowledge in the larger context of the natural world, with nature as text and conversation partner in the process of knowledge construction. In dialog with the natural world, it explores new curricular spaces of mystery and spirit. It suggests soil, roots, and mycorrhizae as rich and regenerative metaphors for curriculum theorizing. It highlights the work of the nature writers as a
resource for engendering new understandings of the natural world as having voice, identity, and agency, suggests this body of literature as a curricular resource for cultivating ecological understandings, and places this literature in conversation with the field of curriculum theory. Finally, it argues for a both/and dialogic position regarding the notions of local knowledge and metanarrative. In these ways, it seeks to philosophically fund a move away from an ecologically disabling anthropocentrism and toward a greater intimacy with the natural world.
CHAPTER ONE:
ECOLOGICAL CRISIS AS EDUCATIONAL CRISIS

A group of first grade students gathers around the small community garden on the City Hall lawn in Covington, Louisiana, a small town of less than 9,000 residents, surrounded by farmland, horse farms, and light industry. Bearded and blue-jeaned, Bo Gallop, who heads the Covington Gardens Partnership, smiles warmly beneath his hallmark straw hat, grabs a handful of green leaves, and pulls a carrot from the ground. While continuing to speak to the students about organic gardening, he rinses the freshly harvested carrot in water, then offers a bite to the young boy standing nearest him. The boy physically recoils, complaining, "I'm not going to eat that! Look where it came from!"

The child's statement indicates a failure to comprehend our human connection with and dependence upon the natural world. His lack of awareness of where his food comes from raises important educational questions. How do children understand Earth and soil, food and agriculture? What conceptualizations of nature shape these understandings? What are students learning or not learning that is resulting in an ecological crisis?

At the root of these questions lies the belief that schools teach implicitly and explicitly values and beliefs about our relationship with the environment. In The Educational Imagination (1985) Elliot W. Eisner argues for the existence of a "null curriculum," or that curriculum which is not taught in schools. He contends that what schools do not teach has significant effects on "the kinds of options one is able to consider, the alternatives that one can examine, and the perspectives from which one can view a situation or problem" (Eisner, 1985, p. 97). David Orr (1992, 1994, 2001) asserts
that all education is some form of environmental education. Orr's view of school and curriculum encompasses overt, null and hidden curricula (Longstreet & Shane, 1993). He includes in his educational vision such things as architectural design, construction materials, waste disposal facilities, energy sources and landscaping of the school building itself. In doing so, Orr provides an example of how one might approach the unseen realities of null and hidden curricula in overall curriculum design.

There are many other unseen facets of an ecologically-sensitive curriculum that one might also address. These facets may include the ways in which the natural world is conceptualized and how these conceptualizations are expressed in human narratives. According to discourses of ecofeminism and Deep Ecology\(^1\), views of nature that promulgate objectification of and subsequent disconnection from the natural world may be one of the root causes of the ecological problems of our times. A global ecological crisis may be exacerbated by such objectification.

The purpose of this research is to explore the relationship between the ecological crisis and education. It will do so by exploring the role that language plays in shaping perceptions of the natural world. It will analyze narratives that conceptualize the natural world as object and as subject, and the human-Earth relationships that result from these conceptualizations. It will evaluate how particular metaphors used in reference to the natural world enhance or impede ecological understanding and the cultivation of responsibility and stewardship. Finally, it will consider ways in which these conceptualizations might be used as a basis for new curriculum theorizing and how this theorizing might underpin a curriculum for ecological viability.
Although there is a body of literature that proposes that there is a need to reconceptualize the natural world as a subject\(^2\) rather than an object and to cultivate a relationship of intimacy with it, curricular models based on this reconceptualization have not yet been developed. Doll (1993), Orr (1992, 1994), Sterling (2001) and others suggest that a living systems or whole systems model, based on the dynamics of the natural world, may have much to offer curriculum theory. Douglas Burton-Christie (1994) points to literature, especially that of the nature writers, as a resource for engendering new ways of understanding and relating to the natural world, yet this rich and promising terrain remains largely unexplored by curriculum theory. This dissertation responds to both of these views as it interrogates narratives of science and literature, as well as other related fields. By including multidisciplinary narratives, this research reflects the complex interconnectivity of ecosystems and thus embodies an ecological worldview.

**Chapter Outline**

The chapter begins by investigating the claim that there is, in fact, an ecological crisis—a central underlying assumption upon which the dissertation is constructed. It presents the main issues and arguments that support this assumption as well as viewpoints of writers who attempt to deconstruct the allegation of ecological crisis, putting them in conversation with one another. The chapter then moves to a discussion of ecology and education and considers the notion of the environmental crisis as a crisis of education itself, engaging the writings of David Orr, Stephen Sterling, and Thomas Berry, who critique higher education. Through the eyes of John Borowski, Stephen Sterling and C.A. Bowers, it considers a connection between a modern, mechanistic
conceptual paradigm, influenced by Cartesian philosophy, and a utilitarian market philosophy, both of which impact present-day educational endeavors. While these writers call for a paradigm shift from a modern to an ecological educational paradigm, Lincoln and Guba, Sterling, Doll, and others suggest how this shift might look. The introductory chapter concludes by identifying research questions and outlining the contexts of the remaining dissertation chapters.

**Literature Review**

Is There an Ecological Crisis?

A wide range of sources, including the U.S. Environmental Protection Agency, The United Nations Environment Programme, The Ecological Society of America, Worldwatch Institute, and the Union of Concerned Scientists, indicate that there may be an ecological crisis--that the health and viability of the life systems and life forms on earth may be threatened. Unless action is taken to correct the situation, these organizations suggest, Earth could be rendered inhospitable to human life.

In “A History of our Future” (2003), Chris Bright of Worldwatch Institute cautions that, depending upon the extent of misery and biological impoverishment we are ready to accept, “we have only one or perhaps two generations in which to reinvent ourselves” (Bright, 2003, p. 5). He outlines five primary challenges we face. First is the challenge of global population increase, which now exceeds 6.2 billion, more than double what it was in 1950, and is projected to rise to between 7.9 and 10.9 billion by 2050. Nearly 1.2 billion, or a quarter of the world’s population, live in the developing countries in which most of the increase will occur—countries in which 1.2 billion people are classed by the
World Bank as living in “absolute poverty” (p. 5). Living on less than the equivalent of $1 a day, they are particularly vulnerable to disease, drought and food shortages.

Profound geochemical flux is a second threat, as certain forms of pollution alter the global chemical cycles regulating key ecosystem processes such as the carbon cycle. Trapping heat, carbon dioxide may provoke rapid climate change. Yet, according to Bright, in 2001 annual carbon emissions from fossil fuel combustion reached a record 6.55 billion tons, which drove the atmospheric concentration of carbon dioxide to 370.9 parts per million—the highest it has been in at least 420,000 years and perhaps in 20 million years (Bright, 2003, p. 5). According to the Environmental Media Services (EMS), in October 2000 the Intergovernmental Panel on Climate Change (IPCC) reported that the greenhouse effect could drive global temperatures up as much as 11 degrees F by the year 2100, which is a heat increase greater than the 9 degree warming that has occurred since the last ice age (EMS, 2003, climate, para. 13, 14). Nitrogen and phosphorus, both of which regulate plant growth, are also undergoing similar amplifications (Bright, 2003, p. 6).

Bright identifies as a third area of concern the increasing long-term risks associated with toxic chemicals. He reports that the annual global production of hazardous waste has reached 300-500 million tons per year, contaminating aquifers, a major source of irrigation and drinking water, with petrochemicals, heavy metals, nitrates from fertilizer, and other toxins. Many synthetic chemicals, such as those used in plastics, pesticides, lubricants, solvents, etc., or those created unintentionally as manufacturing byproducts or breakdown products of manufactured materials, have been associated with cancer,
immunodeficiency, hormonal abnormalities, and birth defects in wildlife and in people (Bright, 2003, pp. 6, 7).

An unprecedented degree of biotic mixing poses a fourth threat as growing numbers of organisms move through the global trading system and emerge into regions where they are not native. If these exotic organisms find nothing in their new habitat to keep their population in check, they may rapidly reproduce, outcompeting native species for essential resources, launch an epidemic or prey directly on natives (Bright, 2003, p. 7).

Bright finds pervasive ecological decline to be a fifth area of ecological concern. He explains that tropical forests, the most diverse ecosystems on the planet, are disappearing at a rate exceeding 140,000 square kilometers per year. Wetlands have been reduced by more than 50 percent over the past century, and coral reeds are suffering the effects of overfishing, pollution, the spread of disease and rising sea surface temperatures (Bright, 2003, p. 8). As of January 31, 2001, 1,244 U.S. species (508 animals and 735 plants) are listed as endangered. The Endangered Species Act passed in 1973 was due for reauthorization in 1993, but renewal legislation has not been enacted (EMS, 2003, para. 8, 1, 2). David Toolan, S. J. (2001) adds that the biodiversity of the available gene pool is effectively irreplaceable because natural selection cannot refill the gap left by extinctions in any meaningful human time scale (Toolan, 2001). Michael Pollan (2001), corroborates this view when he notes that, "To shrink the sheer diversity of life, as the grafters and monoculturists and genetic engineers would do, is to shrink evolution's possibilities, which is to say, the future open to all of us" (Pollan, 2001, p. 244).
The environment is further degraded by the existence of up to 450,000 brownfield sites within the United States. A recent Environmental Protection Agency (EPA) nationwide study of 32 common toxic air pollutants reveals that for 20 million Americans, pollutants pose a cancer risk 100 times greater than is acceptable by EPA standards (EMS, 2003, air pollution, para. 2). In the U.S., 50,000 to 100,000 deaths per year are associated with air pollution. Despite the Clean Water Act (CWA) of 1977, more than 40 percent of U.S. rivers, lakes and estuaries are still too polluted for safe fishing or swimming (EMS, 2003, cleanwater, para. 1, 3). According to the U.S. EPA Toxics Release Inventory, in 2000, industry was allowed to legally dump more than 260 million pounds of toxic chemicals directly into American waters (para. 5). Health agencies in 49 states issued advisories against eating fish in some of the state’s waters due to unsafe levels of contaminants such as PCBs and mercury (para. 6).

Scientists are also concerned about issues of biological safety, such as the results of genetically engineered seeds cross-pollinating unadulterated plants growing nearby. In 1998 researchers from the University of Chicago found that genetically engineered mustard plants passed their modified genes on to wild mustard plants at a rate 20 times greater than is normal. Weeds pollinated by engineered plants can pass the new genes to their offspring, posing the possibility of creating “superweeds” that are resistant to many herbicides. Because biotechnology is young, scientists cannot yet predict the way in which new DNA will express itself in new plants. While the European Commission is creating an emergency response plan to deal with the consequences of genetically engineered crops wreaking havoc in the environment, the U.S. has no such plan, claiming that genetically engineered plants are safe (EMS, 2003, biosafety protocol, para. 1-4).
The ecological challenges summarized here have drawn the attention of governmental and non-governmental organizations worldwide. The Ecological Society of America (ESA), a non-partisan, nonprofit organization of scientists founded in 1915, seeks to promote ecological science and raise the public's level of awareness of its importance. Frank B. Golley (1988), research professor at the University of Georgia and former president of the ESA, in *A Primer for Environmental Literacy* advocates environmental literacy and the capacity to understand connections between humans and the natural world around them. And, although environmentalists are not able to predict the exact effects of human behaviors on the environment, he urges the reader to be mindful of limits and observe the natural dynamics of the Earth.

Founded by scientist Lester Brown in 1974, Worldwatch Institute offers interdisciplinary research and a global focus which have made it a leading source of information regarding environmental, social, and economic trends (About Worldwatch, 2003, para. 1). The work of this organization promotes a transition to an environmentally sustainable and socially just society. Its independent research is funded primarily by donations from private foundations and individuals. Reporting both positive and negative environmental news, Worldwatch's "State of the World 2003" touts the headline, "Impossible' Environmental Revolution is already Happening" (Worldwatch, State of the World 2003). The report documents, for example, a 30% increase in the use of solar energy in Germany, Japan, and Spain and an 81% decline in the production of ozone-depleting chlorofluorocarbons, resulting in slowed growth of the Antarctic ozone hole. While providing encouraging statistics in many areas of environmental concern, the report also addresses serious global threats that continue to undermine societies and
ecosystems worldwide including, for example, bird extinctions that are running about 50
times the natural rate because of habitat loss and other human activities, the death of
5,500 children each day from diseases linked to polluted food, air, and water, and an
increased rate of global ice melt that has more than doubled since 1988.

While a large body of scientific, literary, political and philanthropic writing
suggests that there is an environmental crisis, others argue against the notion that humans
are inviting ecological disaster and imperiling human and other forms of life by our
treatment of the environment. Gregg Easterbrook (1995), a former Newsweek writer and
current editor of the New Republic, wrote a book entitled A Moment on Earth: The
Coming Age of Environmental Optimism, in which he challenges some central tenets of
the environmental movement. Distinguishing himself as an "ecorealist," Easterbrook
corns the scare tactics of environmentalist-doomsayers and accuses them of stressing
bad news and suppressing good news about advances in environmental conditions
throughout the world. Easterbrook includes the following among his claims for
environmental wellbeing: that all environmental errors except extinction are reversible;
that the human population is not an enemy of nature; that nature makes its own poisons,
pollutants and diseases, which are much worse than those of human creation; that natural
recoveries from ecological problems occurs with great speed; that nature is ultimately in
control of the earth. Underscoring the tenacity of nature, he continues,

Biological life has survived ice ages, cosmic and solar radiation, volcanism, the
reversal of the magnetic poles, the rearrangement of continents, the
transformation of plains and mountain ranges, fluctuations in the ocean currents
and jet streams…and collisions with asteroids and comets bearing more force than
nuclear bombs. (Easterbrook, 1995, p. 25)
Arguing against the work of Greg Easterbrook, Toolan (2001) asserts that Easterbrook's work minimizes environmental concerns and strips them of a sense of urgency. Drawing upon statistics generated by the United Nations, Toolan dismantles Easterbrook's argument on many fronts. He argues that while industrial agriculture has expanded the food supply, it has also led to the abandonment of traditional methods of soil preservation due to monoculture, continuous cropping and overgrazing. In 1992, after studying worldwide soil health, the UN concluded that 11 percent of the earth's arable land has suffered severe degradation over the last forty-five years (Toolan, 2001, p. 85-86). From the evidence at hand, it appears we have passed critical thresholds in the global production of food per capita, which has been declining for several years (p. 86). In his rebuttal of Easterbrook, Toolan also discusses issues of population increase, water supply, deforestation and loss of biodiversity, issues that have already been addressed here.

More recently, the investigation of Bjorn Lomborg (2003) by the Danish Committees on Scientific Dishonesty (UVVU, or DCSD in English) raises the ecological debate to a highly visible level of scrutiny, engaging the academic and scientific communities worldwide. The study serves as an important test case in the argument as to whether there is, in fact, an environmental crisis. Lomborg, an associate professor of statistics at Denmark's University of Aarhus and a former member of Greenpeace, was investigated as a result of complaints of scientific dishonesty filed against him.

The complaints were directed at Lomborg's book, *The Skeptical Environmentalist*, and investigated whether the findings in this work, which asserted that there is no environmental crisis, should be considered science. The crux of Lomborg's
argument, which targeted Worldwatch Institute and Scientific American magazine as well as other sources of information concerning the environment, rested on the issues of human welfare, prosperity, pollution, chemicals, biodiversity and global warming. Lomborg argued that there are enough resources for continued prosperity, that the pollution problem has been diminished, that fear of species extinctions and chemicals are exaggerated, and that the huge amounts of money spent to reduce global warming are ill-advised. He concludes:

Children born today - in both the industrialized world and developing countries - will live longer and be healthier. They will get more food, a better education, a higher standard of living, more leisure time and far more possibilities - without the global environment being destroyed. And that is a beautiful world. (DCSD, 2003, section 2, para. 7)

Lomborg's work stimulated extensive international public discussion and debate. Initially it was received with positive media attention from The New York Times, The Wall Street Journal, the Economist, the Washington Post, and other publications. But the tide quickly turned under the scrutiny of environmental groups, academics, and the scientific community at large. Scientific American magazine devoted 11 pages in their January 2002 issue to the controversy, engaging four leading experts in the task of assessing Lomborg's treatment of the fields of global warming, energy, population and biodiversity, who provided a detailed rebuttal of Lomborg's findings. The arguments lobbied against Lomborg's work include neglecting complexities, selective reporting of data, "egregious distortions" and "feeble analyses", dismissive rhetoric, lack of understanding of environmental issues, misreadings and misunderstandings of statistical data, assertions based on single citations that are not representative of the literature,
superficiality, simplistic and misleading calculations, factual errors, poor research and presentation (DCSD, 2003, section 3).

Lomborg's work was also criticized by *Time Magazine*, in their September 2, 2002 issue, and by Peter Raven, chair of the American Association for the Advancement of Science. Peter Raven and Edward O. Wilson were among a dozen esteemed scientists who demanded that Cambridge University Press, Lomborg's publisher, transfer publishing rights to a nonscholarly press, complaining, "We are deeply disturbed that Cambridge University Press would publish and promote an error-filled, poorly referenced and non-peer-reviewed work" (DCSD, 2003, section 3, para. 32).

The Danish *Working Party* found Lomborg guilty of "large-scale infractions of the researchers' code of conduct...acting at variance with good scientific practice" (DCSD, section 8, para. 1). The official ruling held that Lomborg's work fell within the concept of scientific dishonesty. "In view of subjective requirements made in terms of intent or gross negligence, however, Bjorn Lomborg's publication cannot fall within the bounds of this characterization. Conversely, the publication is deemed clearly contrary to the standards of good scientific practice" (DCSD, 2003, section 8, para. 4, 5).

The widespread and vehement outcry by the worldwide scientific community against Lomborg's work is resonant with the abiding concerns expressed by the Union of Concerned Scientists (UCS), a nonprofit partnership of scientists and citizens. Established in 1969, UCS states its mission is "to ensure that all people have clean air, energy and transportation, as well as food that is produced in a safe and sustainable manner. We strive for a future that is free from the threats of global warming and nuclear war, and a planet that supports a rich diversity of life..." (UCS, Mission, 2003). The
founding document of this organization is a statement issued in 1968 by faculty of the Massachusetts Institute of Technology (MIT), who objected to what they perceived as a misuse of scientific and technical knowledge, particularly in Vietnam. They therefore called on scientists and engineers at MIT and throughout the U.S. to unite for concerted "actions against dangers already unleashed and leadership toward a more responsible exploitation of scientific knowledge" (UCS, Founding Document, para. 3).

In the course of their history, the UCS has issued various statements of grave concern. Among these are a World Scientists' Warning to Humanity, issued in 1992 by 1,700 of the world's leading scientists, including the majority of Nobel laureates in the sciences. It warned humanity that:

Human beings and the natural world are on a collision course….If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about…The environment is suffering critical stress… (UCS, World Scientists' Warning to Humanity, 1992, para. 1, 2)

The warning covers issues including the atmosphere, water resources, oceans, soil, forests, living species, and population. Urging developed nations to "act now," the UCS cautions, "A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated" (para. 13).

During the 1997 Kyoto Climate Summit, the UCS issued a Call to Action that was signed by more than 1,500 scientists from 63 countries, including 110 Nobel laureates and 60 U.S. national Medal of Science winners. Addressed to political, industrial, religious, and scientific leaders, it warns: "Human activities inflict harsh and
often irreversible damage on the environment and on critical resources" (UCS, World Scientists' Call for Action, 1997, para. 2). They maintain that these activities endanger the future of humans and other life forms of the Earth. The Call to Action urges voluntary measures with legally binding commitments to reduce industrial nations' emissions of heat-trapping gases.

One of the most extensive environmental treaties of all time, the Kyoto Protocol addresses international global climate policy. The Protocol would require former Eastern bloc nations and industrial nations to collectively reduce their greenhouse gas emissions by 5.2 percent between 1990 and 2008. While there is a building momentum for bringing the Kyoto Protocol into force, following ratification by the European Union and Japan in the summer of 2002, the United States, the world's largest emitter of greenhouse gases, has not yet signed the treaty. A ten-year review of the protocol exposes the limitations of a strictly voluntary approach, citing records in global CO2 concentrations and global temperatures, and the upward trends in global and most national emissions.

The Kyoto Summit was an outgrowth of The United Nations Conference on Environment and Development (UNCED), also known as The Earth Summit, which was held in Rio de Janeiro, Brazil, from June 3 - 14, 1992. Bringing together diplomats, scientists, policy makers, the media, and non-governmental representatives from 179 countries, the Earth Summit focused on ways for all members of the world community to cooperate in addressing global environmental problems including pollution, climate change, the depletion of the ozone layer, the use and management of marine and freshwater resources, deforestation, desertification and land degradation, hazardous waste, and loss of biodiversity. As a result of the summit, Agenda 21, a program for
international action on environmental and developmental issues, was drafted in the hope that it would guide international policy development into the twenty-first century.

Ten years later, from August 26 to September 4, 2002, world leaders, international agencies, business leaders, United Nations agencies, financial institutions, and non-governmental organizations again gathered, this time in Johannesburg, South Africa, for the United Nations World Summit on Sustainable Development (WSSD) for the purpose of assessing global change since the Earth Summit in Rio. It was widely held at the summit that progress in implementing sustainable development since the 1992 Earth Summit had been "extremely disappointing," with poverty and environmental degradation worsening (Johannesburg Summit, 2003, para. 1). The summit resulted in the formation of 280 partnership agreements among the U.N., business, governmental and non-governmental groups to produce cleaner vehicles, and a "Water for Life" project to provide clean water and sanitation in Africa and Central Asia. Governments agreed on a series of commitments regarding poverty, water, energy, health, desertification, biodiversity and ecosystem management, and funding was pledged to support these initiatives.

Perhaps the most universal statement of the need for ecological education and stewardship may be found in the Preamble of the Earth Charter, issued in March 2000 by the United Nations:

We stand at a critical moment in Earth's history, a time when humanity must choose its future. As the world becomes increasingly interdependent and fragile, the future at once holds great period and great promise. To move forward we must recognize that in the midst of a magnificent diversity of cultures and life forms we are one human family and one Earth community with a common destiny. We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice and a culture of peace. Towards this end, it is imperative that we, the peoples of Earth, declare
our responsibility to one another, to the greater community of life, and to future generations... (The Earth Charter, 2000)

The language of this document reflects a tone of urgency indicative of crisis, calling for cooperation and action for a viable future.

In the wake of the 2002 World Summit on Sustainable Development in Johannesburg, Worldwatch Institute offers hope that the combined efforts of businesses, citizens' groups, and local governments will result in sustainable economic growth. It also takes note of a growing number of alliances between environmentalists and religious people and organizations to further the cause of environmental health and social justice.

Religious Organizations on Behalf of the Environment

The newly formed alliance between religious organizations and the environmental movement is significant because it indicates the gravity of the situation; ecology is not only a scientific issue, but a moral, ethical one, laden with religious values. Gary Gardner (2003) of Worldwatch Institute, in “Engaging Religion in the Quest for a Sustainable World,” finds the emerging alliance between religious and environmental groups to be of historic significance, promising to heal a centuries-old rift in the West between science and religion, reintegrate head and heart, and reestablish spirituality as a conversation partner with science (Gardner, 2003). Gardner contends that a sustainable world cannot be built effectively without fully engaging the human spirit, given the central place of culture in national development and the central place of religion in many cultures.

According to Gardner, religious institutions and leaders can bring to the effort to build a sustainable world at least five strong assets: “the capacity to shape cosmologies (worldviews), moral authority, a large base of adherents, significant material resources,
and community-building capacity” (Gardner, 2003, p. 154). He finds that the pace of meetings and collaborations among environmental and religious groups has increased substantially since 1986, the year of the World Wide Fund for Nature conference held in Assisi, Italy. The first major meeting of its kind, it drew representatives of five of the world’s faiths to discuss strategies for addressing environmental issues.

Another such alliance is the National Religious Partnership for the Environment (NRPE) which networks among major Christian and Jewish denominations. Rev. Paul Gorman (2002), who has served as its Executive Director since its founding in 1993, refers to the scriptural teaching of "signs of the times" as designating a time in history when a generation is called to respond under very particular conditions to God. Gorman (2003) contends that "the relentless magnitude of environmental degradation is clearly the overarching social, political, economic and cultural challenge for our generation, linked with the ongoing struggle for social and economic justice. Many of us feel this is who we have to be here and now, religiously" (In "Conversations," 2002, p. 8). Jim Motavalli (2002) agrees, "Religious leaders are moving environmental concerns to the heart of their ministry, and they are calling on their congregants to take increasingly radical action" (Montavalli, 2002, p. 9). In "Stewards of the Earth," Montavalli makes a powerful statement regarding a worldwide, interfaith movement on behalf of environmental concerns.

When conservative evangelical Christians call for action on global warming, Hindu holy men dedicate themselves to saving sacred rivers and Buddhist monks work with Islamic mullahs to try to halt the extinction crisis, boundaries are clearly being redrawn in the ongoing struggle for the political hearts and minds of the world’s believers. (Montavalli, 2002, p. 3)
Churches throughout the world have issued strong statements of advocacy and stewardship in the midst of what they view as an ecological crisis. As early as January 1, 1990, Pope John Paul II, for the Celebration of the World Day of Peace, spoke in Vatican City on "The Ecological Crisis: A Common Responsibility." He begins, "In our day there is a growing awareness that world peace is threatened not only by the arms race, regional conflicts and continued injustices among peoples and nations, but also by a lack of due respect for nature, by the plundering of natural resources and by a progressive decline in the quality of life" (Christiansen and Grazer, 1996, p. 215). "Faced with the widespread destruction of the environment," the Pope grounds his moral discussion of the ecological in the biblical book of Genesis 1, affirming the goodness of creation, and claims "the urgent need for a new solidarity" (Christiansen and Grazer, 1996, p. 215, 219).

A year later, on November 14, 1991, the United States Catholic Conference of bishops issued a pastoral statement called "Renewing the Earth, an Invitation to Reflection and Action on Environment in Light of Catholic Social Teaching." Reiterating the theme of the Pope's statement, they write, "At its core, the environmental crisis is a moral challenge" (Christiansen and Grazer, 1996, p. 223). In the statement the U.S. bishops develop seven themes drawn from the tradition of Catholic social teaching. These include a "God-centered and sacramental view of the universe," grounding human accountability for the fate of the earth; a consistent respect for human life, extending it to include all of creation; a worldview that affirms the ethics of global interdependence and the common good; "an ethics of solidarity" that promotes cooperation and "a just structure of sharing in the world community;" equitable distribution of the world's
resources; an "option for the poor;" and a conception of "authentic development," that "respects human dignity and the limits of material growth" (p. 230).


Mary Evelyn Tucker (2002), a professor of religion at Bucknell University, frames the issue of ecology in a cosmological context and raises questions as to the role of religion in addressing ecological concerns. She writes:

The challenge for religions is both to rediscover and reinvent our role as citizens of the universe…If humans destroy this awesome matrix of mystery, where will we find sources of inspiration pointing us toward the unfathomable vastness of the sacred? Will religions assume a disengaged pose as species go extinct, forests are exterminated, soil, air and water are polluted beyond restoration, and human health and well being deteriorate? Or will they emerge from their own concerns to see that the survival of life on earth is also at stake? (Tucker, 2002, p. 12)

One can see that worldwide efforts are underway by governmental, non-governmental, religious, and grass roots organizations to address what is widely perceived to be an ecological crisis. Two international summits have been held within ten years of each other in order to collaborate efforts toward environmental progress, and
the Kyoto Protocol is in progress, despite U.S. non-cooperation. It appears that, although there are exceptions, the consensus among scientists, the academic community and the world community at large is that there is, in fact, an ecological crisis, and that attempts to discredit the environmental movement are met with a strong tide of resistance by individuals and alliances of scientists and educators. This dissertation, then, takes the position that the pressing environmental concerns of our time do, in fact, indicate that we are in a time of global ecological crisis and that we humans must act expediently if we are to survive as a species. It explores how education might be connected to this effort.

Ecological Crisis as Educational Crisis

Despite a growing global awareness of environmental issues, the need for educating the public is still great. The Public Linkage, Dialogue and Education Task Force of the President's Council on Sustainable Development (1997), under former President Bill Clinton, found that Americans are not ecologically literate. The task force cites the findings of a 1992 survey by Peter D. Hart Research Associates that only 1% of respondents had heard of the loss of biological diversity and only 1% consider endangered species to be a serious environmental problem. A 1994 Carnegie-Mellon University Study found that many well-educated people confused the issues of global warming and the depletion of the ozone layer, believing, for example, that giving up aerosol sprays, from which ozone-depleting chemicals have been federally banned for over 20 years, can effect climate change. The task force emphasizes the need for ongoing, lifelong education (President's Council on Sustainable Development, The Need for Public Dialogue on Sustainability, para. 2, 3).
While studies alert us to the need for ecological education, some educators see the environmental crisis as a crisis of education itself, raising questions as to its purpose, focus, and underlying assumptions. Environmental educator David Orr asserts that the global ecological crisis is "first and foremost a crisis of values, ideas, perspectives, and knowledge, which makes it a crisis of education, not one in education" (Orr, 1994, p. 126). He challenges educators to reconsider the substance, process, and purpose of education at all levels. For Stephen Sterling (2001) the ecological crisis also triggers searching questions about the purpose of education. "To ask what education is 'for' raises questions of philosophy and value about the nature of education…, and beyond this, about the nature of being human" (Sterling, 2001, p. 24). Orr, Sterling, and others seek the creation of a new educational model that might more successfully generate environmental change.

Orr (1992) raises the question as to what people will need to know to live responsibly and well in a finite world. He asserts that education that facilitates a transition to a sustainable society demands "an uncompromising commitment to life and its preservation" (author's italics) (Orr, 1992, p. 133). He defines this commitment as one that pervades learning and research at all levels and fosters health, harmony, balance, wholeness, and diversity as these qualities apply to both human and natural systems. For Orr, this commitment rests on "a deep sense of the sacredness of life expressed as love, nurture, creativity, wonder, faith, and justice" (p. 133).

Orr (1994) further proposes that education for the 21st century be concerned with issues of human survival. He asserts that those who are presently being educated will be faced with the tasks of accomplishing what we have either failed to do or have been
unwilling to do. These include stabilizing and reducing the emission of greenhouse gases, protecting biological diversity, reversing the destruction of forests, conserving soils, learning how to use energy and materials with great efficiency, utilizing solar energy, rebuilding the economy in order to eliminate waste and pollution, managing renewable resources and repairing the damage done to the earth over the past 200 years. No generation, he notes, has ever faced a more daunting task.

Cultural historian Thomas Berry (1988) proposes that educational institutions should be judged by the extent to which they foster or impede a mutually-enhancing human-Earth relationship. Berry (1988, 1999) criticizes higher education for failing in its fundamental task of educating humans for a viable future. He considers the government, the religious traditions, the university, and the commercial-industrial corporations to be the four basic establishments that determine human cultural life. All of these, in his estimation, are failing in their basic purpose because they presume "a radical discontinuity between the nonhuman and the human modes of being, with all the rights and all inherent values given to the human" (Berry, 1999, p. 72). This has resulted in "a devastating assault" on the nonhuman world (p. 73). Presently, Berry maintains, universities prepare students to dominate the natural world rather than for intimate presence with it. He proposes that humans come to view the natural world as a communion of subject rather than as a collection of objects (1988, 1999).

According to Berry (1999), one cannot resolve the situation by establishing a course or a program in ecology because ecology is not a course or program but rather the foundation of all courses, programs, and professions. For example, "ecology is not a part of medicine, medicine is an extension of ecology" (Berry, 1999, p. 84). Berry applies
this rationale to all academic and professional disciplines, defining each in relation to
their overall ecological context. Looking to a future on a damaged planet and a rising
human population, he contends that "the terms of survival will be severe beyond anything
we have known in the past," and that it is "time for universities to rethink themselves and
what they are doing" (p. 85).

Orr (1994) suggests that ecological literacy requires an understanding of the ways
that humans have become destructive and an appreciation of how social structures,
religion, science, politics, technology, patriarchy, culture and agriculture contribute to the
ecological situation. He proposes six foundations for ecological literacy: (1.) "all
education is environmental education", (2.) "environmental issues are complex and
cannot be understood through a single discipline or department…", (3.) "for inhabitants,
education occurs in part as a dialogue with a place and has the characteristics of good
conversation…" (4.) "the way education occurs is as important as its content…" (5.)
"experience in the natural world is both an essential part of understanding the
environment, and conducive to good thinking," (6.) "education relevant to the challenge
of building a sustainable society will enhance the learner's competence with natural
systems" (Orr, 1994, p. 89).

Orr (1994) maintains that no student should graduate from any educational
institution without understanding the laws of thermodynamics; the basic principles of
ecology; carrying capacity; energetics; least-cost, end-use analysis; limits of technology;
appropriate scale; sustainable agriculture and forestry; steady-state economics; and
environmental ethics (p. 14). To these he adds some practical things necessary to "the art
of living well in a place": growing food, building shelter, using solar energy, a knowledge
of local soils, flora, fauna and the local watershed (p. 14). While Orr's proposed curriculum is biased toward science, in exclusion of other important facets of a holistic education, it has validity in terms of education aimed at providing students with the knowledge needed to deal with ecological problems in the future.

The Need for an Educational Paradigm Shift

For Orr (1992) and others, education is part of the ecological problem. "The crisis of sustainability and the problems of education are in large measure a crisis of knowledge" (Orr, 1992, p. 155). "Knowledge, for all pretensions to the contrary, is biased by the way in which we determine social and economic priorities…science can be directed toward life-enhancing or life-destroying research, each performed with great rigor and dedication" (p. 143). He also sees the Cartesian structure of education itself as problematic in that it stresses reductionism, linearity and simple causation. In the interest of ecological education, Orr finds it necessary to encourage, instead, the perception of patterns, context, systems, and complex interdisciplinary networks of causation (p. 144). He suggests that ecological education cannot be realized within the modern paradigm, which emphasizes "human dominance over the natural world, consumption, economic growth, and science and technology, and is organized around nation-states and corporations" (p. 141). Despite the ecological concerns of our time, Orr expresses concern that educational institutions graduate large numbers of students who "have no clue how their personal prospects are intertwined with the vital signs of the earth" (p. 126). He maintains that the marriage between the academy and the worlds of power and commerce are a source of the corruption of education.
Orr's fear is echoed by John Borowski (2000) who, in "Who's Teaching our Children? The Corporate Takeover of Environmental Education," contends that public education, one of the pillars of our democracy, is now for sale as "industries and their front groups" attempt to justify "everything from deforestation to extinction of species" (Borowski, 2000, p. 4). He recalls his experience at The National Science Teachers Association (NSTA) convention, where The American Farm Bureau, an organization that has openly opposed environmental education, "propositioned teachers to reconsider the dangers of biocides. They were selling lies, and teachers were buying - quickly filling their bags with curricula as corrosive as the pesticides that the Farm Bureau promotes" (p. 4).

Borowski claims that environmental education is being assaulted in two ways. First, multi-national corporations are designing and distributing "environmental" curricula that are professionally produced, easy to use, often free and totally biased toward industry perspectives. Second, some of the most prominent right-wing think tanks in America are mounting a well-funded attack on genuine environmental education. Their objective is simple: protect industries that despoil the planet and defuse any potentially damaging influence of citizen awareness. (p. 5)

The article reveals, for example, that Exxon Corp. has invested $1.6 million to produce *The Energy Cube*, which consists of lab experiments, texts and a video asking students to make "responsible" energy choices. Borowski criticizes the program, however, for describing gasoline as solar power, failing to discuss the connection between petroleum and pollution, and representing offshore oil drilling as being beneficial for fishing (Borowski, 2000, p. 5). He also reports that *The Lorax*, a children's book with an environmental message by Dr. Seuss, has been banned in several schools, and that The Alabama Family Alliance produced a book entitled *Facts, Not Fear*, as a guide for fighting environmental education. This guide claims that the environment has
improved over the past few decades. Borowski draws a parallel between the manipulative tactics used by anti-environmental corporations and those employed by "Big Tobacco," both of which he believes contend for the hearts, minds, health, and collective future of our children (p. 6). Although Borowski's indictment of big business uses volatile and polarizing language, painting a dismal picture, he also cites organizations that are making a positive contribution to environmental education.

Sterling (2001) likewise finds education to be influenced by corporate culture, to the detriment of ecological education. He writes, "Western education, while founded on a mechanistic paradigm and overlaid by a utilitarian market philosophy, cannot much assist us towards sustainable lifestyles" (Sterling, 2001, p. 17). He sees current educational policy in his native England as stressing vocationalism over all else. Education is thus seen primarily as a key to economic competitiveness.

According to Sterling (2001), efforts at environmental education within a modernist, mechanistic educational paradigm can only be met with limited success. He argues for the need to change from transmissive towards transformative learning, which, in turn, requires a transformed educational paradigm. And he advocates a clearer understanding of the nature of an emergent, ecological, participatory worldview from which a strong ecological educational paradigm and culture can be cultivated. In Sterling's view, the ecological, participatory worldview can be interpreted in terms of 'whole systems thinking,' which helps to delineate the difference between a mechanistic and an ecological approach.

Educator C. A. Bowers (1993) similarly contends that the language of the machine/industrial model of education that characterizes education in the U.S. today
encourages the autonomous individual at the expense of the environment and encourages educators to think of the learning process in terms of “delivery systems, educational inputs and outputs, pre-packaged lessons and teaching procedures, and…engineering the learning environment” (Bowers, 1993, p. 205). The principals of ecology, Bowers claims, lead to a radically different set of guiding principles. Citing the work of Fritjof Capra of the Elmwood Institute, he gives the following as principles of ecological literacy: interdependence, sustainability, ecological cycles, energy flow, partnership, flexibility, diversity, and coevolution. Each of these has implications for the way in which we do education. Bowers suggests that our language must change to reflect metaphors for sustainability gleaned from the natural world. He asks that we see community as an ecology of life forms, energy and information webs that include humans as dependent members and that we speak in ways that allow for the influence of various cultural groups and for many forms of knowledge, including language, cultural artifacts, animals and plants (p. 168).

Sterling (2001) suggests that education for sustainability is about "integrating and balancing process (what education is) with purpose (what education is for), so that they are mutually informing and enhancing" (Sterling, 2001, p. 26). Orr (1992) fleshes out Sterling's proposal when he outlines goals for ecological education. These include the establishment of a community of all life that includes the natural world and celebrates the interdependence between all parts. He advocates personal wholeness and transcendence that will be aided by the restructuring of the learning environment so as to overcome academic specialization that separates intellect and experience. Orr suggests that education include an awareness of "the tragic in human affairs," coming to terms with the
severity of the ecological crisis without lapsing into paralysis or despair (Orr, 1992, p. 139).

An ecological worldview emphasizes relationship, but, as Sterling (2001) points out, educators often fail to see connections and patterns before them. He contends that ecological thinking is systemic, nonlinear, integrative, concerned with process and dynamics, and ultimately with wholeness. Orr (1994) finds, however, that the way that education is organized, drawing artificial divisions between disciplines, does not reflect the dynamics of the natural world. He advocates that the study of natural systems be included in the curriculum at all levels, kindergarten through Ph.D.

Orr elaborates that the ecological design in education entails "the careful meshing of human purposes with the larger patterns and flows of the natural world and the study of those patterns and flows to inform human purposes" (Orr, 1994, p. 104). It further requires the ability to comprehend those patterns that connect, seeing knowledge in its ecological context and integrating experience with theoretical knowledge (p. 108). Resonating with Orr's ideas about education, Sterling (2001) provides a list of descriptive keywords for an ecological education paradigm as follows: participative, democratic, co-evolutionary, collaborative, reflexive, process-oriented, dialogic, systemic, integrative, connective, adaptive, creative, holistic, synergetic, transformative & purposeful (Sterling, 2001, p. 24).

An understanding of relatedness that grows out of the dynamics of the natural world shows up in the work of some educational theorists. Lincoln and Guba (1985), Federick Ferré (1996), William Doll (1993), Stephen Sterling (2001), and others explore living systems, quantum physics, and other scientific and mathematical disciplines that
flow from an organic and evolutionary view of the universe. Drawing upon living systems theory and the open or process thought of Jerome Bruner, John Dewey, Jean Piaget, and Alfred North Whitehead, Doll (1993) takes an organic approach to education when he develops a postmodern curriculum theory that recognizes human beings as living systems and thus open systems. He maintains that educational development most successfully occurs when based on “the type of system that characterizes being human” (Doll, 1993, p. 58) and proposes the recognition of purposiveness, self-organization and communication as part of a post-modern educational paradigm that leads to transformation. These writings offer a fresh and promising perspective to the field of ecological education.

In proposing a 'positive feedback loop,' Sterling (2001) uses a metaphor derived from living systems to describe how education and society can change together in mutually affirming ways to create more sustainable patterns for both. In this loop, change towards sustainability in wider society supports sustainable education, which in turn supports change in wider society. In doing so, it takes us from a social reproduction model of education towards a vision of continuous co-evolution where education and society engage in a "relationship of mutual transformation…" (Sterling, 2001, p. 32).

Aldo Leopold writes, "Land...is a fountain of energy flowing through a circuit of soils, plants, and animals. Food chains are the living channels which conduct energy upward; death and decay return it to the soil" (In Finch and Elder, 1990, p. 415). Humans are an integral part of this circuit. A curriculum theory that grows directly out of this understanding might then be valuable in meeting the needs of our students who will inherit the challenge of addressing the ecological crisis.
Conclusion

According to the literature presented here, we are in the midst of an ecological crisis that must be addressed if we are to survive as a species. Such a position has strong implications for the field of curriculum theory. The ecological crisis may be viewed as a crisis of education—one with which educators will inevitably have to grapple. Merely teaching ecological science in schools is apparently not adequate in engendering an ecologically sensitive citizenry. This literature review suggests that curriculum theorists might go beyond the explicit curriculum to address the underlying conceptual paradigm that supports destructive behaviors toward Earth, examining the hidden curriculum of language and metaphor. In light of these understandings, this research will explore the following research questions.

Research Questions

1. How have human beings expressed, in narrative form, conceptualizations of their relationship with Earth, and how might these conceptualizations impede or enhance education that seeks to support long-term ecological viability and Earth stewardship?
2. What might the narratives of science and literature in particular offer us in terms of thinking in a more intersubjective way about the natural world and how might this engender the kind of reconnection with nature called for by deep ecologists?
3. What metaphors does literature about nature offer that might contribute to an ecologically-oriented curriculum theory and praxis?
4. How might the metaphors which conceptualize the natural world as "subject," shape curriculum theorizing on behalf of ecological concerns?
Dissertation Outline

Based on these research questions, the remaining chapters of the dissertation unfold as follows:

Chapter two looks at the theorizing of ecofeminism, Deep Ecology, and cultural history concerning the underlying roots of the ecological crisis. While viewing the matter from distinctive lenses, the objectification of the natural world is a core issue that surfaces in each of these bodies of writing. The ecofeminist argument, however, is a gendered one in which women identify their history of oppression under patriarchy with that of the natural world as oppressed. This hermeneutic is valuable in that it explores conceptualizations of the natural world through the voices and lives of those in whom the experience of oppression deeply resonates.

This chapter looks at how the natural world has been conceptualized as object in the narratives of seventeenth century science, examining some of its images, ideals, goals and epistemology. From a cultural history perspective, it explores some of the attitudes that shaped and continue to influence a culture of modernism that mitigate against the health and viability of the natural world. Finally, it probes the conceptual language of industrial agriculture as an extension of a modern mechanistic worldview.

Chapter three looks at the work of nature writers, naturalists, historians, and religious thinkers, chapter three considers conceptualizations of the natural world as subject, rather than as object, deconstructing the modern scientific idea of a dead, mechanistic universe. In doing so, it explores, in particular, two genres of literature—that of the nature writers and of children’s literature about nature. Moving from cosmology to land-based narratives, “sense of place” emerges an important theme of
these literary works, surfacing individual and communal connections to Earth. These literary conceptualizations suggest a bridge between science and art as they deconstruct modernist dualities of body/mind, head/heart, matter/spirit, human/nature.

Having looked at the notion of subjectivity, chapter four examines narratives of philosophy, literature, and science that investigate and depict the notion of human intersubjectivity with the natural world and intersubjectivity within the non-human natural world. It revisits “sense of place” as one that embraces “a complex network of relationships, connections and continuities” (Sheldrake, 2001, p. 3), exploring marginal, intersubjective spaces of meeting and reweaving. Finally, it looks at the garden, the soil, and the mycorrhizae within the soil as dynamic intersubjective spaces of connection and encounter.

The final chapter summarizes, discusses and interprets the findings of this research in light of its contribution to the field of curriculum theory.

Author’s Note

The following chapters are composed with an awareness that the designation of the natural world as "object" and "subject" are somewhat artificially contrived. In reality, these do not always readily fall into clean, discrete categories. Some of the narratives included in this study reveal ambivalence in attitudes about the natural world. Nor are the time frames within which these designations occur clean and neat historical periods, but rather overlap even into the present. The thematic separation of chapter three, which concerns the natural world as subject, from chapter four, which concerns the notion of intersubjectivity, is even more problematic in that these concepts are integral to one another. Once one experiences the natural world as subject, she or he has already
entered, to some degree, into an intersubjective relationship with it. This organizational structure works, however, to the extent that it gives us a way to examine the former as a conceptualization and the latter as an experience that arises from it.

I am aware of the ways in which the language used in this dissertation contributes to the notion of separation between "humans" and "the natural world"—these terms themselves artificially disconnected—and thereby am suspect of undermining my own central argument. Using the pronoun "it" to designate nature also seems to betray the expressed intention of this work. And yet, this is the language in current usage by which I might also most effectively communicate the content of the dissertation to the reader. I address this issue briefly in the final chapter by suggesting what a new language for ecological viability might look and sound like.

Further, I am conscious of the fact that by focusing on the negative effects of environmental degradation upon the human, I am participating in the very anthropocentrism that I seek to dislodge. I thus implicate myself in the problems whose solution I hope, with others, to craft. This is, perhaps, an excellent starting point for ecological conversation, as it acknowledges my own existence in the complex, nonlinear web of life, wherein cause and effect occur simultaneously as all of creation continues to interact in intimacy with itself.

End Notes

1 The fields of ecofeminism and Deep Ecology will be defined and explored in chapter two.

2 By "subject," I mean a living organism with which we, as humans, are in relationship. It has an identity, value and purpose outside of human being and our intellectual
constructions of it. The notion of the natural world as subject will be explored in depth later in this dissertation.

3 The IPCC, sponsored by the United Nations and the World Meteorological Organization, is a group of 2,500 of the world’s preeminent scientists from more than 100 nations.

4 “Brownfields” are defined by the EPA as “abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.”

5 The Danish version of this book is entitled Verdens sande tilstand, which literally means "The True State of the World."

6 In 1979, in his Apostolic Letter Inter Sanctos: AAS 71, Pope John Paul II proclaimed St. Francis of Assisi as the patron saint of those who work for ecology.

7 The word "subject" is used here to mean a subjective rather than objective view of nature. This subjectivity will be the focus of the third chapter.
CHAPTER TWO:  
THE NATURAL WORLD AS OBJECT

Introduction

This chapter examines the research and writings of ecofeminists, deep ecologists, and cultural historians in order to analyze some of the ways in which these three branches of study theorize differently regarding how Earth has been conceptualized as object. Dualism lies at the heart of this discussion which considers the notion of the natural world as object, as opposed to subject. The word "object" here is used to refer to a view of nature as a thing, without agency or animism, that is part of the machinery of a clockwork universe. Nature as "object" takes the form of a background against which human activity occurs and a resource provided for use by the human, who is "subject."

The narratives of this chapter suggest that the subject/object duality which results from a modern\(^1\) worldview finds expression in other, parallel dualities wherein one pole is privileged over the other, as follows: human (subject)/nature (object), man (subject)/woman (object), mind (subject)/body (object). While the narratives presented in this chapter choose different historical and ideological entry points into the conversation, they converge on the central subject/object duality regarding the human and the natural world, thus their inclusion here as conversation partners in the exploration of Earth as object.

Ecofeminism

Irene Diamond and Gloria Feman Orenstein (1990), describe ecofeminism\(^2\) as a "diverse range of women's efforts to save the Earth and the transformations of feminism in the West which have resulted from the new view of women and nature" as being liberated from male domination\(^3\) (Diamond & Orenstein, 1990, p. ix). They explain that
Ecofeminism involves an understanding of "how the larger culture's devaluation of natural processes was a product of masculine consciousness" and how this consciousness "denigrated and manipulated everything defined as 'other' whether nature, women, or Third World cultures" (p. x). Heather Eaton (2000) shares this view when she explains that misogyny and a fear of dependency on the natural world join forces to form the underpinnings of a patriarchal worldview. Ecofeminism, she asserts, challenges a patriarchal, hierarchical and dualistic worldview and finds the domination of the natural world and the oppression of women to be enmeshed (Eaton, 2000).

This has epistemological implications. Norman Habel expands this idea when he suggests that if the oppression of Earth is interconnected with the oppression of women, then "the way feminists have learned to discern the suppressed voice of women may assist us in discerning the suppressed voice of Earth" (Habel, 2000, p. 36). Ecofeminism is, then, an important hermeneutic for exploring the conceptualization of the natural world as object, thus its inclusion in this chapter.

The natural world as object is aligned with a feminist critique when Carolyn Merchant (1995) proposes that the ways in which the identities of both women and nature were constructed by science and culture have resulted in the objectification and subsequent abuse of both. She gives as examples the feminine personifications of Gaia from the Greek tradition, Eve from the Judeo-Christian religious tradition, and Isis from Egyptian history. Merchant claims that these personifications have been projected upon the natural world and explores the implications of these conceptualizations for the treatment of women and Earth. Because Eve figures prominently in the Judeo-Christian
tradition that has influenced the development of western culture within which this study is contextualized, I will focus primarily on this personification here.

Through the representation of nature as Eve, Merchant interrogates the grand narrative of the “fall and recovery,” whereby humans fall from innocence and grace and attempt to return to the Garden of Eden through labor in the Earth. This redemption theology, she contends, is reinforced by the Christian religion, modern science, and capitalism in an effort to recreate our original condition of paradise by turning the Earth back into a cultivated garden, thereby restoring the Garden of Eden. Merchant's contends that, in western agricultural society, this became the rationale behind the male drive to make female nature produce. According to this worldview, science and technology are employed to control nature and recover the garden. Merchant maintains that this is the “origin story of capitalism” . . . “While fallen Adam becomes the inventor of the tools and technologies that will restore the garden, fallen Eve becomes the Nature that must be tamed into submission” and thus redresses her rebellious behavior in the Garden of Eden (Merchant, 1995, p. 34). In this way, Merchant argues, the recovery of the garden lost in the “fall” served as the ideological roots of the Enlightenment idea of progress.

According to Merchant, this powerful narrative of recovery served as the ideology and legitimization for New World settlement, with capitalism, science, and technology as its implements of labor. In the New World a New Earth could be rebuilt as a new Eden. The rise of cities provided the next stage of the recovery narrative by means of the capitalist market: "The city epitomizes the transformation of female Nature into female Civilization through the mutually reinforcing powers of male energy and interest-earning capital” (Merchant, 1995, p. 49). Merchant sees the transformation of nature through
biotechnology as the most recent stage of this narrative. She notes, “In the recovered
Garden of Eden fruits ripen faster, have fewer seeds, need less water, require fewer
pesticides, contain less saturated fat, and have longer shelf lives” (p. 50-51).

In Merchant's ecofeminist analysis, nature is first feminized, then objectified as a commodity. Sandra Harding (1991), in Whose Science? Whose Knowledge? Thinking from Women's Lives, further elucidates the process that Merchant describes when she purports that “nature as the object-of-human-knowledge” does not come to us “naked,” but rather “already constituted in social thought” (Harding, 1991, p. 147). Nature, in this respect, simulates “an intentional being” (p. 147); in the case of Merchant's analysis above, this intentional being is female.

Knowledge construction is key to Merchant's argument as well as she describes vision as “a dominating way of knowing,” which replaced earlier oral, tactile, and sensory modes of knowing, wherein all of the senses were engaged. This way of knowing was, in her eyes, an important factor in the objectification of the natural world. David Toolan (2001) reinforces this view when he attributes Gutenberg's invention of the printing press as an event on par with Columbus' discovery of America, altering Western consciousness. Mass literacy, he contends, greatly intensified the dominance of vision and the distancing of the viewer from that which is seen. "Womb-like nature vanishes; we now stand 'outside' it—in effect, as a spectator . . . its effect enables us to read the whole history of consciousness as the gradual emancipation of humans from an embeddedness in nature" (Toolan, 2001, p. 46-47). He continues, …nature could now be stilled, dissected, and analyzed to an extent never previously possible or imaginable. That is, modern science became possible" (p. 47).
Merchant similarly explains that the distancing from nature as an object to be viewed was enabled by the development of perspective in art, the Copernican view of the Earth from above, the microscope, telescope, and camera. She explains, “…the mind’s eye of cognitive, mathematical reasoning coupled with the empirical eye of observation and experimentation forms the core of the positivist scientific method” (Merchant, 1995, p. 66).

In discussing the rise of modern science and technology, the image of the veil becomes for Merchant a metaphor for layers or levels of disclosure of both women and nature. Merchant describes the probing eyes of patriarchy as lifting the veils of women and nature accordingly. By the 19th Century, she claims, feminized representations of nature have women removing their own veils and exposing their secrets voluntarily. By the 20th Century, through the use of the microscope, the veil is lifted from matter itself to expose the secrets of the atom as atomic science is developed.

According to Merchant, these textual representations suggest both voyeurism and sexual assaults on nature when interpreted within the historical context of the language and metaphors of science and their evolution; “Positivism and ocularcentrism thus combine knowledge with power over nature” (Merchant, 1995, p. 66). She asserts that science and history have shared, and continue to share, a methodological approach to the study of nature that results in its domination (p. 70).

This chapter has identified the basic tenets and epistemology of ecofeminism and considered briefly how they may be illustrated in the story of Eve in the garden and the rise of modern science, both of which will be later revisited. From an ecofeminist perspective, these events reflect a patriarchal consciousness that conceptualizes woman
and nature as objects of domination by male subjects. Gender, then, becomes a template for explaining the subject/object duality. This approach is clearly biased and reductive in that it, at times, views reality through the limiting lens of gender, reads the present into the past, denies women's participation in patriarchy, and reduces a worldwide event of ecological abuse to a western phenomenon.

While affirming core ecological values of relatedness and holism and identifying important epistemological issues, feminist readings of the present scientific/ecological situation are problematic when they project contemporary understandings of ecology and the equality of women into the past. By doing so, ecofeminists may overlook women's complicity in perpetrating the patriarchy to which they object in both the past and present, despite strong pockets of resistance.

It is also problematic to restrict ecological abuse to a modern, western, male phenomenon. Clive Ponting (1991), in A Green History of the World: The Environment and the Collapse of Great Civilizations, reveals that human degradation of the environment has been part of the human story throughout the world over the past 10,000 years (Ponting, 1991). Further, while seeking to dismantle "the androcentric and anthropocentric biases of Western civilization" (Diamond & Orenstein, 1990, p. xi) and to eliminate male-gender bias (Eaton, 2000) ecofeminists run the danger of constructing another gender-based dualism that mitigates against their expressed intention of engendering the holism that characterizes ecological systems and epistemologies.

Still, an ecofeminist reading of cultural history cannot be entirely dismissed nor the connection between the oppression of Earth and of women or any group or species be wholly disregarded. The joint themes of patriarchy and domination, although more

Whereas, in the writings of deep ecologists (which will be examined later in this chapter), the rise of modern science is a watershed event in the objectification and subsequent abuse of nature, ecofeminists see it as a moment of deeper entrenchment in a long tradition of patriarchy. For ecofeminists, the feminization of nature during the modern era becomes especially problematic when joined to the tools and epistemology of a mechanistic scientific worldview that further creates and reifies rather than reconciles what they see as destructive dualities.

Francis Bacon, Rene Descartes, and Isaac Newton figure prominently in ecofeminist critiques of modern science. The following sections present the outlines of these critiques, focusing primarily upon Descartes in whose writings the object/subject duality is most pronounced and therefore most damaging when applied to human/Earth relations.

Francis Bacon

Examining the writings of philosopher Francis Bacon (1561-1626), the “father of modern science,” Merchant (1995) argues that Bacon used language as a political device to reduce female nature to a resource for economic production (Merchant, 1995, p. 80). Drawing upon the courtroom imagery of witch trials, he depicted nature as a female to be tortured through mechanical inventions. Bacon wrote that, nature must be “bound into
service” and made a “slave” (Merchant, p. 81). This is language to which Merchant strongly objects, especially in the context of nature as female.

Scientist Evelyn Fox Keller (1985), in Reflections on Gender and Science, also examines the language of modern science when she presents gender and science as social constructions. Keller purports that science has been produced almost entirely by white, middle-class men under the influence of a particular ideal of masculinity in such a way as to subjugate the personal, the emotional, and the sexual—those domains of human experience which have been relegated to women (Keller, 1985, p. 9). Like Merchant, she traces this impulse back to Francis Bacon and his use of sexual and aggressive language in reference to the natural world. Keller observes

By promising power and domination, [science] provided an efficacious antidote to the threats men had come to conflate with women and sexuality. . . . In the ideological system that emerged and prevailed, science was a purely male and chaste venture, seeking dominion over, rather than comingling with, a female nature; it promised, and indeed helped promote, the simultaneous vanquishing of nature and of female voracity. (p. 61)

Keller concludes that fears of both nature and women, in all their regenerative power, could subside with the success of modern science, which was defined in opposition to everything female. Keller asserts, “With the one reduced to its mechanical substrate, and the other to her asexual virtue, the essence of Mater could be both tamed and conquered; male potency was confirmed” (Keller, 1985, p. 64). In the view of these ecofeminist writers, nature is first feminized, then objectified through neutering, conquering, abusing, or dehumanizing.

William E. Doll (personal communication, February 3, 2003), however, argues that to view Bacon as sexist or anti-environmental is to read the present into the past, for neither were a part of the consciousness of his time. Doll writes that Bacon's views on
nature are a mixture of both the desire to conquer and a deep respect. He cites Bacon's third aphorism in New Organon, in which nature is to be conquered by obedience, confirming the charges of some ecofeminists concerning potentially offensive language. Doll, however, also quotes Bacon's first aphorism that "Man is Nature's agent," his fourth aphorism that "All man can do . . . is to bring natural bodies together . . . nature does the rest internally," and his tenth aphorism that "The subtlety of nature far surpasses the subtlety of sense and intellect" (Doll, personal communication, February 3, 2003). These aphorisms indicate that Bacon, at the same time, holds nature in respect.6

Merchant (1980) herself, in The Death of Nature: Women, Ecology, and the Scientific Revolution, reminds us that Bacon was not responsible for the later uses of his philosophy. Due to his influential social standing and his knowledge of the important developments of his day, however, “his language, style, nuance, and metaphor become a mirror reflecting his class perspective” (Merchant, 1980, p. 165). She maintains that the Baconian program which was so integral to the rise of Western science represented a set of values about nature and science that served to reinforce early capitalist tendencies toward growth and progress. While Bacon could not have foreseen where his goals might eventually lead, and while he could not be held responsible for modern attitudes, Merchant contends that he was very sensitive to the trends and directions of his own time and he eloquently voiced them. Perhaps this might also be said of the patriarchs of modern science as a whole.

Rene’ Descartes

Norah Martin, in New Ways of Knowing and Being Known, asserts that Rene' Descartes (1596-1650), following upon the heels of Bacon, further objectified nature by
separating the realm of mind from matter. Searching for a certain or "pure" basis for
knowledge, Descartes believed that the mind alone was capable of achieving knowledge;
thus, the senses were not to be trusted. Mind was separated so completely from the world
that he could not be certain there was a world. The body was merely a machine to which
the mind is temporarily attached, and God resided outside of a cold, indifferent universe,
operating the machine from afar, as the soul operates the bodily machine. For Descartes,
it was impossible to know an infinite universe, thus perception required disentangling the
various objects of knowledge from the whole. Knowledge required "a knower purified of
all bias, perspective, and emotional attachment," which only could be achieved through a
transcendence of the body and all of its distractions, serving only to obscure thought (In
Dempsey & Butkus, 1999, p. 33). The Cartesian model of knowledge is grounded in
objectivity; the "known" is the realm in which the distorting effects of human interest and
activity have been eliminated. Science, then, for Martin, becomes equated with
spectatorship. The passive reception of ideas replaces participation in a living cosmos.

Martin's reading of Descartes, while illuminating, may be further fine-tuned.
Cartesian scholars Douglas Burnham and James Fieser (2001) more thoroughly explore
Descartes' epistemology. They explain that, in Descartes' search for a foundation for
philosophy, he rejected whatever could be doubted,7 including the credulity of his own
senses. In peeling away the layers of beliefs and opinions which clouded his view of the
truth, Descartes finds little remaining—"only the simple fact of doubting itself, and the
inescapable inference that something exists doubting, namely Descartes himself"
(Burnham & Fieser, 2001, Descartes, para. 2). It is interesting to note that, in this
intellectual act of self-discovery, Descartes finds himself to be "a thinking thing," thus
objectifying not only that which surrounds him (whose existence is held in doubt), but even himself\(^8\) (Descartes, 1640, *Meditations on First Philosophy*, Preface, para. 3).

Descartes elaborates:

I am a thinking (conscious) thing, that is, a being who doubts, affirms, denies, knows a few objects, and is ignorant of many—[who loves, hates], wills, refuses, who imagines likewise, and perceives; for, as I before remarked, although the things which I perceive or imagine are perhaps nothing at all apart from me [and in themselves], I am nevertheless assured that those modes of consciousness which I call perceptions and imaginations, in as far only as they are modes of consciousness, exist in me. (Descartes, 1640, *Meditation III*, Item #1)

Descartes' next task, Burnham & Fieser (2001) expound, ". . . is to reconstruct our knowledge piece by piece, such that at no stage is the possibility of doubt allowed to creep back in" (Burnham & Fieser, 2001, Descartes, para. 3).

Using this methodology, Descartes seeks to show that knowledge is genuinely possible and that one can construct a mathematically-based scientific knowledge.\(^9\)

Burnham & Fieser (2001) characterize Descartes' skepticism concerning human ability to know the natural world as follows: "... the world created by God was intended by Him to be known, provided only that human beings go about the activity of knowing properly. How the activity of knowing might be properly conducted is the issue of methodology" (Burnham & Fieser, 2001, Discourse on Method, para. 1). They further explain that, for Descartes, "knowledge within the mental realm precedes knowledge of the material realm . . . we understand the physical world through an act of mind" and "a more perfect or complex idea has greater *objective reality* than a less perfect or complex idea" (Burnham & Fieser, 2001, Descartes, *Meditation 2*, para. 7, 8, *Meditation 3*, para. 8). Cartesian physics thus becomes predicated on "the rational justification for a universal, mathematical/quantitative understanding of nature" (Burnham & Fieser, 2001, Descartes,
As Martin and others point out, this reductive approach to knowledge has implications for how the natural world is conceptualized and for the actions arising from these conceptualizations.

Descartes, however, does not end his argument here. Through a complex series of deliberations, he eventually reconciles his mind/body dualism, at least to some degree. In *Principles*, Descartes resolves that although mind and body may be separated in principle, they are actually in a union that is close and intimate. Their union is so close that much of our mental life is dependent upon the body (Burnham & Fieser, 2001, *The Relation Between Mind & Body*, para. 4). Drawing upon Descartes' personal correspondence, the authors continue, "That is to say, the ideas we have of the body and mind in union are different from, and irreducible to, the ideas we have of either extended matter, or of thinking substance" (para. 4). Descartes illuminates this reconciliation moreover when he enumerates those things which nature can teach us. They are "(1) I have a body in need of food, (2) mind and body are connected, and (3) there are external bodies or objects" (Burnham & Fieser, 2001, Descartes, *The Validity of Sense Perception*, para. 1). Nature, however, may also deceive us, such as in the case of optical illusions and other phenomena, and error is also tied to the structure of our physical bodies, but Descartes proposes that we can counteract this problem with proper understanding. Thus, we can ultimately rely on our senses (para. 3).

Descartes, then, comes full circle; yet, the backside of the arc is seemingly neglected by those who hold his philosophy responsibility for present-day dualistic conceptualizations of reality that have resulted in adverse behaviors toward the natural world. Burnham (personal communication, March 6, 2003) reminds us that,
nonetheless, it does not matter what Descartes actually said, but rather what others during his time thought he said. Given this caveat, Martin’s critique of Descartes is valid.

Martin, however, may be somewhat overstating Descartes’ overall impact on the consciousness of his time. According to Burnham & Fieser (2001), Descartes' philosophical and scientific work was never accepted as an official new philosophy, but rather was condemned on religious grounds in 1663 by the Church of Rome and was quickly supplanted in Britain and France by empirically minded approaches and the triumph of Newtonian physics on an even wider scale. Thus, it perhaps cannot be given the weight ascribed to it by Martin and others in terms of its contribution to a philosophy which underlies our current ecological crisis.

Burnham (personal communication, March 6, 2003) expresses discomfort with the notion of laying responsibility for a general intellectual movement at the feet of a particular person. He contends that Descartes "argued through the relation between mind and body, and between both and God, in a particular way," but not through the lens of present-day ecofeminism. He continues

The dominant trend of thought in the period (and for centuries before) had to do with the 'superiority' of humans to nature (and of man to woman). Descartes was a drop in the ocean. Moreover, the roots of this dominant trend are wider, and philosophers are the least important of all. (Burnham, personal communication, March 6, 2003)

This somewhat detailed exposition and critique of Cartesian epistemology is illustrative of a process that might be applied to a vast array of scientists and thinkers in order to move more fully illuminate the intellectual, historical, and cultural processes whereby nature was objectified by modern scientists. Rather than apply this magnifying lens to each thinker of the modern period, perhaps it would be more useful here to use
this brief exercise as a reminder of the intricacies and complexities of the subject matter and as a caution against reductionism or colonization of historical knowledge by any intellectual camp.

Since Isaac Newton has been held responsible for "the death of nature" (Merchant, 1980), this discussion of modern science and the objectification of nature will briefly touch upon his ideas. It will move from there to a critique of the founding of the Royal Society in London in 1662 in which modern science becomes formally institutionalized.

Isaac Newton

Following Descartes, Isaac Newton (1642-1727), by formulating laws of gravity and motion, further constructed an objective, mechanical universe of deterministic law. Toolan (2001) marks this development as the beginning of our present-day ecological crisis. For, with Newton's theory of dynamical motion, he formulated immutable laws for integral systems that are stable and closed; they do not interact with their environment. The start of the process is identical with its end and the whole process can be reversed without changing anything; "nature is stuck in the same groove and simply repeats itself, going nowhere" (Toolan, 2001, p. 53). Philosopher Michel Serres (1982) similarly reflects, "Classical physics is a science of dead things and a strategy to kill . . . . The laws are the same everywhere. . . . There is nothing to be learned, to be discovered, to be invented . . . " (Serres, 1982, p. 100).

Likewise, for Merchant (1980), Newtonian science is deadly; “the removal of animistic, organic assumptions about the cosmos constituted the death of nature—the most far-reaching effect of the Scientific Revolution” (Merchant, 1980, p. 193). The
mechanical framework of nature, now viewed as “a system of dead, inert particles moved by external, rather than inherent forces,” legitimated its manipulation (p. 193). In exploring the notion of machines as structural models for western ontology and epistemology, Merchant (1980) writes

The imagery, iconography, and literary metaphor associated with machines extended the experiences of everyday life to the realm of imagination, where machines became symbols for the ordering of life itself. Out of such symbolic universes evolve conceptual universes as new definitions of reality replace the old. As the machine and clock increased their symbolic power as root metaphors...the symbolic force of the organism declined in plausibility and the organic conceptual framework underwent a fundamental transformation. (p. 227)

Merchant (1980) summarizes seventeenth-century assumptions about the structure of being, knowledge, and method which make possible the human manipulation and control of nature, outlining them as follows: (1) Matter is composed of particles (the ontological assumption), (2) The universe is a natural order (the principle of identity), (3) Knowledge and information can be abstracted from the natural world (the assumption of context independence), (4) Problems can be analyzed into parts that can be manipulated by mathematics (the methodological assumption), (5) Some data are discrete (the epistemological assumption) (p. 228). These assumptions would become foundational to the establishment of modern science and its methods in the 17th Century and continue on into the present.

Keeping in mind Burnham's wider perspective of intellectual history, this chapter extends the discussion of the epistemology of modern science into the twentieth century in order to better understand how what has come to be know as a Cartesian epistemology, joined with a Newtonian vision of a mechanistic universe, have become enfleshed in the practice of science. It does so with the caveat that words which refer to
Descartes and Newton connect us to broad intellectual movements as well as to individual scientists. The discussion that follows is, again, from a feminist perspective as it continues to explore the notion of the natural world as object.

The Modern Scientific Method

In looking at the struggles of scientist Barbara McClintock (1902-1992), Keller proposes that the modern scientific method itself has also been colonized in such a way as to create further distance between male and female, the natural world, and the human. McClintock, Keller explains, was largely overlooked by the male scientific community because she refused to impose upon her data preconceived notions of what it would reveal, going against the grain of prevailing scientific practices. McClintock instead modeled the practice of "listening" to the material. Keller asserts that since scientists have the answer they know in advance what it will reveal. So anything it does not tell them is not recognized as being there, or they think it is a mistake and discard it. McClintock urged that the scientific method respect complexity and difference, for "making difference understandable does not mean making it disappear" (Keller, 1985, p. 163).

Keller continues, “. . . the recognition of difference provides a starting point for relatedness. It serves both as a clue to new modes of connectedness in nature, and as an invitation to engagement with nature" (Keller, 1985, p. 163). What is crucial, Keller claims, is that McClintock was able to risk the suspension of boundaries between subject and object without jeopardizing science because science, for her, was not premised on that division. “Indeed, the intimacy she experiences with the objects she studies—intimacy born of a lifetime of cultivated attentiveness—is a wellspring of her powers as a
scientist” (p. 164). She asserts, “In this world of difference, division is relinquished without generating chaos. Self and other, mind and nature, survive not in mutual alienation, or in symbiotic fusion, but in structural integrity” (p. 165). These notions will form the basis of our discussion of intersubjectivity in the third chapter.

Margaret Wertheim (1997), in Pythagorus' Trousers: God, Physics, and the Gender Wars, also raises questions as to how science has been colonized by males, linking the issue with mathematics and religion. The natural world is again objectified, this time through mathematical reductionism. Wertheim asserts that scientists today increasingly seek to describe the world in the language of mathematics and that it is the mathematical world picture of the physicist which is endorsed by public institutions in our society.

Tracing the rise of physics in Western culture as a religiously inspired enterprise, Wertheim (1997) asserts that women's struggles to gain entry into science parallel their struggle to gain entry into the clergy. She writes, "... just as women are breaking into most denominations of the Christian clergy, except Roman Catholicism, so they are now breaking into most denominations of the 'church scientific,' except physics. Physics is thus the Catholic Church of science" (Wertheim, 1997, p. 9).

Wertheim (1997) maintains that male clergy prior to the seventeenth-century intellectual revolution forged a niche for quantitative science within the very bosom of Christianity by conceptualizing the Judeo-Christian God as a divine mathematician, thereby creating a Pythagorean strand of Christianity. According to Wertheim, physics emerged from this Pythagoreanism in the age of Galileo and Newton. Science and religion began to distance themselves from one another with the dawning of eighteenth-
century Enlightenment thought, and the West entered a dualistic age in which the physical and the spiritual grew increasingly apart. Yet, despite the secular climate of modern science, physicists continue to preserve a "quasi-religious attitude" toward their work (p. 12). This priestly conception of the physicist, Wertheim claims, continues to serve as "a powerful obstacle to women" (p. 12).

According to Wertheim (1997), it is important that women participate in science, particularly physics, because if they are marginalized they will not be able to play significant roles in developing the technologies that spin out of science, deciding how these technologies are used, or determining the directions and goals of science itself. In her view, women are needed in physics as a balancing influence that will make physics more ethical.

While generating ethical practices in science is surely a worthy goal, the flaw in Wertheim's argument is the insinuation that men cannot also dismantle the machinery of patriarchy or bring ethical values to the scientific endeavor. The field of Deep Ecology demonstrates that the changes envisioned by Wertheim and other ecofeminists are also desired by men who are equally concerned with the ecological crisis and able to participate in the birthing of a new, more holistic and ecologically viable epistemological paradigm.

Before moving further into a critique of modern science, the next section of this chapter will present the thematic outlines of the Deep Ecology movement. It will then look at the rise of modern science, marked by the establishment of the Royal Society of London in 1662, as an occasion in which deep ecologists and ecofeminists walk for a time hand-in-hand as they seek to trace the path by which nature has become objectified.
It is important to note that these scholars may wear more than one hat at a time, and so the distinctions between these two hermeneutics becomes blurred; the conversation, at times, muddied. One might also remember that, although some of the leading voices of the Deep Ecology movement are male, it is a field of study richly shared by both men and women.

**Deep Ecology**

Like ecofeminism, the larger literature of the Deep Ecology movement places the human disconnection from the natural world and its subsequent objectification at the heart of the ecological crisis and identifies the conceptual language used to depict the natural world as object or "other" as contributing to this disconnection. The main concern of Deep Ecology, however, is not primarily to critique patriarchy, although the issue does surface, but rather to bring about a major paradigm shift in perception, values, and lifestyles in order to redress the destructiveness of modern industrial societies. It is characterized by a move from anthropocentrism, which focuses on the human, to ecocentrism, which focuses on the natural world. In doing so, it moves past the issue of male privilege to that of the privileging of the human over all other life forms.

The Deep Ecology movement emerged in the 1960s as a philosophical and scientific, social/political movement within the overall Ecological Revolution, which is usually dated from the publication of Rachel Carson's *Silent Spring* in 1962. While educators and curriculum theorists grapple with ways to transform education, the Deep Ecology movement, introduced into environmental literature by Norwegian philosopher Arne Naess, seeks to examine the values that underlie educational and ecological issues. At the 1972 Third World Futures conference in Bucharest, Naess coined the term "Deep
Ecology" when he distinguished it from what he called "shallow" ecology, characterized as an "anthropocentric technocratic environmental movement" (Sessions, 1995, p. xii). According to Naess, ecophilosophy, which forms the basis of Deep Ecology, is a philosophy of "ecological harmony or equilibrium," that emphasizes a connection to and respect for nature and the inherent worth of all beings (Drengson, 1999).

George Sessions (1983), one of the founders of the Deep Ecology movement contends that, since humans are a part of nature, our full humanity can only be realized when we have defined ourselves in relation to nature’s totality. He defines the “ecological perspective” as the awareness of interrelatedness and intermingling between all individuals and species of Earth and asserts that all of nature has equal intrinsic value and the right to fulfill its own self-realization (Sessions, 1983, p. 34). Sessions warns against giving children the illusion that anything exists in isolation and encourages us to give them direct experiences of nature.

Edward O. Wilson (1986), in his Pulitzer prize-winning work on the subject, resonates with Naess and Sessions when he coins the word "biophilia" to refer to our natural affinity for life. Biophilia, he contends, is the essence of our humanity, and we find ourselves as we accept our place in the matrix of living organisms and species to which we are bound. Advocating for ecological stewardship, he warns that obligatory and intricate relationships, made possible by countless modifications of nucleic acid molecules occurring over eons of time, must be maintained if organisms are to survive (Wilson, 1986). More simply put, biophilia locates human life within the natural world rather than apart from it.
Psychologist and political activist Chellis Glendinning (1995) adds a compelling voice to the chorus when she posits the notion that western civilization is suffering from "Original Trauma," which results from "the systemic removal of our lives from nature, from natural cycles, from the life force itself" (Sessions, 1995, p. 37). This separation, she claims, is culturally manifested in the recognized symptoms of post-traumatic stress disorder, which are hyperreactions, inappropriate outbursts of anger, psychic numbing, constriction of emotions, and loss of a sense of control over our destiny. As part of the healing process, Glendinning proposes that western culture recover the wisdom of earth-based, ecological and indigenous cultures.  

David Abram (1996), in The Spell of the Sensuous: Perception and Language in a More-than-human World, affirms this view when he asserts that, for a thousand generations, human beings viewed themselves as part of the wider community of nature, carrying on active relationships with other people, animals, plants, and natural objects which we only recently have come to think of as inanimate. Ecological writer and poet Gary Synder (1989), adds, "A culture that alienates itself from the very ground of its own being—from wilderness outside . . . and from that other wilderness within—is doomed to a very destructive behavior, ultimately perhaps self-destructive behavior" (Synder, 1989, p. 184).

Stephen Sterling (2001) echoes this view when he asserts that inadequate perceptions rooted in a mechanistic worldview are a fundamental force behind what he views as an ecological crisis. He writes, "We reify borders which blind us to the connective and dynamic reality they demarcate: humans/nature; local/global; present/future, cause/effect..." (Sterling, 2001, p. 16). Merchant (1992), in Radical
Ecology: The Search for a Livable World, explains that Deep Ecology calls for "a total transformation in science and worldviews that will replace the mechanistic framework…with an ecological framework of interconnectedness and reciprocity" (Merchant, 1992, p. 11).

While these writers represent only a small sampling of the field, they clearly articulate the salient themes of Deep Ecology. Deep ecologists, however, are criticized on several fronts, including a perceived lack of political critique, a failure to extend the concept of interrelated systems to embrace technology or global capitalism, an emphasis on human population control, and socioeconomic and scientific naivete' (Merchant, 1992, pp. 102-103). In "The Politics of Mystical Ecology," Stephan Elkins (1989-90) charges that ecological systems theory is as equally reductive as the mechanistic worldview it seeks to replace, selecting ecological relations over other forms of relatedness.

Acknowledging the validity of this reproach, one might still argue that differing forms of reductionism lead to radically different results. Since reductionism is inevitable, the question that one might then raise is what form of reductionism best serves the goal of ecological viability. The writings of deep ecologists and ecofeminists strongly suggest that a holistic, organic approach to the natural world is more conducive to ecological health than a mechanistic one.

Deep ecologists and ecofeminists share the values of interrelatedness and connectivity as they deconstruct a mechanistic worldview. Both seek to critique the conceptual language of modern science as one of separation from and objectification of the natural world. Having looked at the major themes of Deep Ecology, this chapter
turns again to the story of the rise of modern science as a shared conversation among ecofeminists and deep ecologists.

**The Royal Society and the Rise of Modern Science**

In an effort to ascertain the philosophical and scientific underpinnings of our present-day ecological problems, this chapter has looked at the claims of some writers who identify Bacon, Descartes, and Newton as key figures in undermining an organic, animistic worldview. It is also important to consider these thinkers in the context of the larger, overall shift in scientific consciousness, marked by the founding of the Royal Society in London in 1662. While this event is characterized by deep ecologists as a paradigm shift in western intellectual history, ecofeminists view it as reinforcing a patriarchy that was already established and whose effects upon women and Earth were already well underway.

According to physicist Fritjof Capra (1995), who may be identified here as affiliated with Deep Ecology, the rise of modern science represented a triumph of a clockwork universe over more organic conceptualizations of the natural world. He likens Descartes' central metaphor of the human body as a clock to present day images of the human brain as a computer, which he sees as a continuation of a mechanistic view of nature that replaces notions of the body as a living organism. Capra asserts that we must draw a clear distinction between human and machine intelligence. Human decisions, he contends, are never completely rational, but always colored by emotion. He connects the mechanistic, fragmented worldview of seventeenth century science with domination and control of nature. There is, however, no mention of patriarchy in his analysis (Capra, 1995).
Sessions (1995) sees the rise of modern science as a strengthening of the anthropocentrism of the Greek and Judeo-Christian traditions, as manifested in the writings of Bacon, Descartes and Gottfried Leibniz. This worldview, he contends, was reinforced by Renaissance anthropocentric humanism. Sessions, however, sees the development of modern science as a two-edged sword. While, in the short run, it objectified the natural world, in the long run it led to the cultivation of a heliocentric astronomy, biological and cosmic evolution, and eventually, the science of ecology which "stepped across the anthropocentric threshold…and pointed toward an ecocentric orientation to the world" (Sessions, 1995, p. 163). Like Capra, Sessions does not address the issue of patriarchy in his discussion of modern science.

In a feminist critique of this epistemological transition, Evelyn Fox Keller (1985) examines the language of sex and gender in debates that accompanied the birth of modern science. In doing so she asserts that, in acts of naming, the scientist both constructs and contains nature depending upon the relations and perspectives he chooses. Keller contends that, in order to understand the development of modern science, we must consider how metaphors of gender have been used to form the particular set of values, aims, and goals embodied in the venture of science.

According to Keller (1985), intellectual debates that precipitated the founding of the Royal Society in London expose the hermetic and mechanical as two competing philosophies and visions of science. The hermetic philosophy, inspired by Paracelsus of the Renaissance alchemists, depicted material nature as being suffused with spirit. Such a philosophy could only be understood through the heart, hand, and mind. In contrast, the mechanical philosophy divorced matter from spirit.
Keller (1985) maintains that the difference between these two conceptions of science and power are manifested in the opposing sexual metaphors used to express them. The root metaphor employed by Bacon was that of “a chaste and lawful marriage between Mind and Nature” that would bind nature to man’s service as his slave. (Keller, 1985, p. 48). The root metaphor of the alchemists was coition—“the conjunction of mind and matter, the merging of male and female” (Keller, 1985, p. 48). A woman’s ability to give birth proved that she too was created in God’s image. When Baconian science rejected the more participatory and erotic language of the alchemists, Keller contends, it defeated the view of nature and woman as Godly (p. 52). At the end of the 1650s, moderate churchmen who were exponents of this philosophy triumphed over the alchemists, and in 1662 they became founding members of the Royal Society. The stated intention of the now institutionalized new science was to raise a Masculine Philosophy. Its central metaphor, Keller maintains, was science as power.

Doll (personal communication, February 2, 2003) places the issue of science as power in a larger historical context when he explains that the humanist movement of the 16th Century, which led to the scientific movement of the 17th century, was one of shifting from "the adoration of God (and Aristotle) to an awakening of man's rational powers and hence to a conquering of his own power over himself (Descartes' rationalism) and his power over nature (Bacon)" (Doll, personal communication, February 3, 2003, para. 5). Doll explains that up to the 17th Century and beyond, humanity was "beholden to a capricious natural world" (para. 5). Alchemy, science, and rational thought tried to discern the secrets of nature in order to benefit humanity.
Scientist Stanley Jeyaraja Tambiah (1990), in *Magic, Science, Religion, and the Scope of Rationality*, affirms this line of thinking when he links the Protestant ethic, the values associated with capitalism, and scientific-technological interests, asserting these forces were well integrated and mutually supporting (p. 12-13). He explains that the Royal Society, based on Baconian teaching, combined Puritan piety with the utilitarianism and empiricism of science in what society member John Wilkins depicted as an effort to “discover the true nature of the Works of God” (Tambiah, 1990, p. 13). Another member proclaimed that the experimental study of nature was a way for men to venerate God.

By placing the rise of modern science, and subsequently the objectification of nature, within a larger historical and cultural matrix, and by aligning it with religious aspirations, Doll and Tambiah attempt to degender, depersonalize, and devillainize it. Their arguments, however, are mitigated by the fact that the God whom these seventeenth-century scientist-philosophers sought to serve and glorify was culturally constructed as white and male, as evidenced by the language and artwork of the period, carrying with it all the patriarchal associations that accompany this image. Still, their critiques are valuable in that they take a step back to embrace a more comprehensive view of a complex, intellectual transition that some might seek to colonize or trivialize according to a particular agenda.

In summary, according to some deep ecologists and ecofeminists, the objectification of the natural world and subsequent disconnection from it form the underlying basis of our present ecological crisis. Some writers attribute this objectification to specific scientist-philosophers such as Francis Bacon, Rene Descartes,
and Isaac Newton. Others argue that these men are merely representatives of broader-based intellectual trends that culminated in the 1662 founding of the Royal Society in London. What the writers cited in this study more readily agree upon are the effects of this modern scientific consciousness.

A visual orientation replaced an oral-audial one as a mechanical universe gradually eclipsed an organic one. Chemistry triumphed over alchemy, representing a move from a participatory to a more extractive, disconnected approach to science and the natural world it sought to comprehend. Ecofeminists diverge from this common narrative, however, in their explicit equation of chemistry with masculine and alchemy with feminine ways of knowing and being, encoding gender into the epistemological shift. Joining other cultural, religious and economic currents of the times, modern science and technology congealed into an ever-strengthening stream of industrialism that lies at the root of many of our concrete, present-day ecological problems.

The narratives explored thus far shed light upon the rise of modern science and its conceptualizations. Those who explore cultural history provide another important facet of the modernist paradigm that has proven to be detrimental to the environment. The following is a brief look at this dimension of a complex worldview.

**The Culture of Modernism**

C.A. Bowers (1993), in *Education, Cultural Myths, and the Ecological Crisis: Toward Deep Changes*, expands the discourse on the underlying causes of the ecological crisis to include an examination of anthropocentrism, cultural beliefs in progress, rational process, and individualism. In identifying anthropocentrism as a central force in the degradation of the natural world, Bowers resonates with Deep Ecology, which enlarges
our vision beyond the issue of male privilege to that of privileging the human at the expense of the environment. He fills out the discourse from a cultural and educational perspective. A critique of patriarchy, however, is notably absent in his work.

Anthropocentrism, Bowers explains, privileges humans over other life forms by virtue of their rationality, with the natural world as “an ancillary resource to be managed” (Bowers, 1993, p. 47). He provides an example of the quandary that this kind of thinking creates when he writes, “Anthropocentrism does not foster a sense of interdependency in which a loss of topsoil . . . is experienced as diminishing human worth and capability. The loss of topsoil rather is viewed as a problem requiring a technological solution” (p. 47).

Bowers (1993) locates anthropocentrism in a modern rationalist model of reality that is individualistic and competitive, and places authority in the rational process of individuals. Tacit and more contextually grounded forms of knowledge are rejected. The modern rationalist model grew out of the Enlightenment, which gave the authority to reason and the belief in the inevitability of progress. This model is premised on an uncritical belief that change is progressive; thus, the past is not important. The memory of rational people in this paradigm holds no place for primal cultures whose members view themselves as participants in the natural world and its systems (Bowers, 1993, p. 171). Nor is the future important, as the needs and desires of one generation are met at the expense of the next.

Bowers finds the values associated with progress and modernity to be problematic as humans seek to overcome illness and death, the drudgery of work, the suppression of human freedom, and barriers to material success. Bowers identifies the negative
consequences of making the individual self the basic social unit. Within this eschewed form of individualism, he explains, living in interdependence with the human and natural worlds is viewed as an unwelcomed constraint on individual freedom (Bowers, 1993).

According to Thomas Berry (1988), the values about which Bowers writes result largely from a traumatic moment in Western history. The Black Death, or the Plague, which reached Europe in 1347, killed roughly one-third of its population within two years. In response to the Plague and other social upheavals of the 14th Century, two discreet developmental directions ensued: one religious, the other social. Each of these had negative consequences for the environment.

The first was a religious movement toward redemption out of the tragic world. Berry (1988) argues that the excessive emphasis on redemption was to the neglect of the revelatory import of the natural world. Creation became less important while redemption-centered religion experienced “an intensive preoccupation with the personality of the Savior, the interior spiritual life of the faithful, and with the salvific community” (Berry, 1988, p. 126). This trend is only now beginning to be reversed, with a growing interest in creation-centered spiritualities.

The second major consequence of the Black Death was a move toward greater control of the physical world to escape its pain and to increase its utility, leading toward the scientific secular community of today. “Pushed by obscure forces in the unconscious depths of Western culture," science sought to understand and control Earth (Berry, 1988, p. 127). These tendencies found expression in Enlightenment ideals of the 18th Century, professing a belief in absolute progress of the human mind.
The tenets of modern rationalism, individualism, and competition fueled the Industrial Revolution. With an ever-expanding horizon of possibilities came the expectation that the range of consumer choices would continually expand, along with personal knowledge, wealth, power, and an ever-evolving technology that would solve all of our problems. Bowers (1993) claims that the cultural beliefs of modern rationalism and industrialism continue to drive our educational ideology, thus strengthening a destructive philosophical paradigm that has proven disastrous to the natural systems of life.

Toolan (2001) sheds further light on Bowers' cultural analysis and the objectification of the natural world when he explains the connection between classical physics and economic materialism. In Newtonian mechanics, nature resembles a machine made of replaceable parts. This leads to the mistaken belief that nature will never run out of supplies and growth will be endless. Little attention is paid to the dynamics or needs of what Wendell Berry calls the "Great Economy" of the planet into which our human sub-economies must fit. The basic laws of ecology are not taken into account by Adam Smith (1723-90), the founder of free market economics.

According to this model, nature is valued only as a dead commodity rather than as part of a living ecosystem. According to Donald Worster (1993), "Industrialism has sought not the preservation but the total domination of the natural order and its radical transformation into consumer goods . . . industrialists . . . have regarded as most useless of all those very qualities of stability, harmony, symbiosis, and integration that characterize the living world in composite. . . ." (Worster, 1993, p. 179). The natural world is thus reduced from a living system to an object.
Toolan (2001) suggests that the object-thinking of a Newtonian cosmology implies a Great Engineer who constructs the cosmic clockworks, then retreats beyond the heavens, cut off from creation. God becomes another object out there; "an utterly remote and largely otiose 'thing' envisioned as some kind of spy satellite circling the Earth" (Toolan, 2001, p. 58). The inert, mechanistic landscape no longer mediates the sacred.

The Conceptual Landscape of Agriculture

The metaphorical 'wasteland' described by Toolan takes concrete shape as the "clean fields" of modern, industrial agriculture. A "clean field" is one that has been chemically cleansed of weeds, insects, and disease, rendering it, in Pollan's perception, "a lifeless gray powder" (Pollan, 2001, p. 217). Pollan describes a potato plant grown in such soil, "doused with so much pesticide that their leaves wear a dull, white chemical bloom" (p. 217), as a grotesque depiction of the effects of human control. This scenario is another outgrowth of a mechanistic worldview that objectifies the natural world and privileges the human over other forms of life. A discussion of agriculture here is pertinent to the overall theme of ecological education because food is the most direct connection that many of our students have with the nature and because agriculture has a tremendous impact upon the environment.18

While the word "farming" may conjure pastoral images in the popular imagination, the reality of industrialized factory farming, from which most of us acquire our food, is a far cry from the agrarian dreams of Jefferson and his followers. How did we get here? "As above, so below," or so the saying goes. From Newton's clockwork universe above to time-released toxins engineered into the growth cycle of seeds, the objectification of the natural world becomes literally internalized, not only in concept, but
as food. Pollan (2001) asserts that the metaphors used to describe the natural world profoundly influence the "style and extent of our attempts at control" (Pollan, 2001, p. 191). He continues, "It makes a difference in (and to) the world if one conceives of a farm as a factory. . . . Now we're about to find out what happens when people begin approaching the genes of our food plants as software" (p. 191).

Pollan (2001) explains that, with genetic engineering, agriculture has entered the information age. He reports that, borrowing from Microsoft, Monsanto has adapted the metaphor of "operating system" to run a new generation of plants. Genetically modified plants are defined as intellectual property under recent trade agreements. Monsanto's genetically modified NewLeaf potato plants are registered with the Environmental Protection Agency as a pesticide. Pollan explains that a gene borrowed from one strain of *Bacillus thuringiensis* (Bt), a common bacteria found in the soil, gives the potato cells the needed information for manufacturing a toxin that is lethal to the Colorado potato beetle. Because the NewLeaf potato is the intellectual property of Monsanto, to save and replant a spud is to break federal law.

The distribution of hybrid seeds and their accompanying reliance on fertilizers, pesticides, and herbicides became a worldwide phenomenon with the post-World War II advent of modern agricultural practices. Seeds were specifically bred to respond to chemical use in order to produce higher yields, and genetically nondiverse hybrid varieties—requiring ever-increasing amounts of chemical manipulation and energy expense—replaced vast acreages of locally adapted crops (Kimbrell, 2002).

With "terminator technology," the objectification and manipulation of the natural world through biotechnology becomes ever more deadly. Monsanto Corp. currently
owns the patent on a process whereby seeds are genetically engineered to kill their own seeds in the second generation, making it impossible for farmers to save and replant them, thereby increasing the value of proprietary seed owned by U.S.-seed companies. The genetic components of this process are a gene for a toxin that will kill the seed, a promoter sequence that activates the toxin during the late stages of seed maturation, and a third gene that produces a suppressor to keep the toxin turned off until it is exposed to an outside stimulus (Bruce, 2000). Use of this "terminator technology," which is banned in the US, would create a monopoly that could have a devastating effect on the Third World and on poor US farmers.

War is another conceptual frame for envisioning agriculture. In Andrew Kimbrell's view, this metaphor in turn renders the farmer as soldier and the practice of farming as chemical warfare. He explains that farm production increased by one third during World War II. Because the Marshall Plan committed the United States to playing a leading role in feeding and rebuilding war-ravaged Europe, demand for American agricultural goods remained high even after the war. The government promoted this contribution to the war effort both during and after the war. During the war, Farm Journal and other leading farm magazines sported ads telling farmers that they were "Soldiers of the Soil," that "Food Fights for Freedom" and "wars are fought with food" (Kimbrell, 2002, p. 23). In 1946, farmers were urged, "don't let up, 'the war isn't over for the farmer,' the battle for full production must continue, and thanks to the war, we have some new weapons for you" (p. 23). And, in 1944, farming publications proudly announced that the revolutionary inventions developed for the war effort would soon be
coming home to the farm. DDT, or *dichlorodiphenyltrichloroethane*, was touted as the most promising of these products.\textsuperscript{24}

Using the language of war to characterize and promote industrial agriculture demonstrates a hostility toward nature that results from its objectification. The natural world, Kimbrell contends, is becoming increasingly absent from our experience and awareness as we slowly merge with the machine in our thought processes. In this context, notions of sustainability are no longer grounded in nature, but industrial expressions instead. In a mechanistic society, he maintains, corporate values determine the organization of human activity and our relationship to nature, and in doing so separate people, places, and products from their histories.

**Conclusion**

Deep ecologists and ecofeminists\textsuperscript{25} identify the disconnection from the natural world as a root cause of our present ecological crisis. This disconnection, they maintain, both shapes and is shaped by a mechanistic conceptualization of the natural world and its subsequent objectification and commodification. According to some ecofeminist readings of history, the natural world was first feminized and then objectified, resulting in its interrogation, rape, abuse, and plunder. With the rise of modern science in the 17th Century, which engaged an epistemology that increasingly separated the mind from the body, the knower from the known, and the human from the natural world, nature came to be envisioned as a giant machine or clock. Although this conceptualization is often attributed to specific scientist-philosophers such as Francis Bacon, Rene Descartes, and Isaac Newton, it can only be fully understood in the context of a complex historical matrix of events.
Bowers extends the discussion of the modern, industrial/cultural matrix which shaped attitudes toward the natural world to include notions of anthropocentrism, rationalism, progress, and industry, united under the overarching narrative of an Enlightenment belief in absolute progress of the human mind. Thus was formed a cultural paradigm which has resulted in destructive behaviors toward Earth and its life systems.

With the post-World War II rise of industrial agriculture, the objectification of nature is expressed in still more conceptualizations and metaphors. Industrial agriculture becomes conceptualized as warfare and farmers as soldiers. Plants are conceived of as operating systems and software. Some hybrid and genetically engineered plants are registered as intellectual property. Potatoes are pesticides and seeds are suicidal terminators. With these conceptualizations, Earth, as nurturing mother, turns on her children; her food deadly.

From the literature reviewed in this chapter, it appears that conceptualizations of the natural world as object clearly impede education that seeks to support long-term ecological viability and Earth stewardship. Personifications of Earth as female are only ecologically helpful when a culture holds women in reverence. Mechanistic conceptualizations of the natural world also hinder the cultivation of ecological consciousness as they render living systems non-living and sentient Earth impervious to pain. Within this worldview, strategies for care and maintenance become extractive, mechanical or technological, often failing to insure long-term viability. Economics premised on mechanistic conceptualizations of nature do not take into account the true
cost, in terms of damage to the life systems of Earth, of commerce and industry, creating a false impression of health and renewability.

The image of war, when applied to agriculture, in the end becomes a war against humanity, poisoning the plants, soils, air and watersheds that sustain human life, and a terminator mentality threatens to exterminate life as we know it. Conceptualizing plants as operating systems results in manipulative technologies that do not honor the intrinsic nature of the plants and genetic modifications are often performed without sufficient knowledge of the long-term effects of these alterations.

Conceptualizing the natural world as object does not lead to the goal of ecological viability. The needed move from anthropocentrism to biophilia (an idea which will be explored shortly) can only occur if Earth is envisioned as living. This shift entails a reconceptualization of the natural world as subject, rather than object. The following chapter examines narratives that portray the natural world as subject in order to explore what they might offer in terms of thinking in a more connected or intersubjective way about the natural world and how these conceptualizations might contribute to an ecologically-oriented curriculum.

There is a change of tone in the next chapter as it moves from science to literature in order to uncover other ways of conceptualizing the natural world. The tonal shift is mitigated, however, in the works of the nature writers who join science to artistry in biologically accurate yet beautiful and interpretive works of literature as they bring the subjectivity of their own being to bear upon their prose. As in the case of ecofeminists, deep ecologists, and cultural historians, all hermeneutical lenses both expand and limit
our perceptions of reality. The following chapter will examine Earth through still more lenses.

End Notes

1 By "modern" I mean the worldview that resulted from the scientific revolution of the seventeenth century. I will more thoroughly explain and explore this worldview later in this chapter.

2 Although the term "ecofeminism" was coined by French feminist Francoise d'Eaubonne (1974), ecofeminism emerged predominantly in North America in the 1970's. Ecofeminism originated among social and ecological activists and academics from the fields of feminism, socialism, anti-racism, critical theory and ecology (Eaton, 2000). It has been described as a third wave of feminism in which ecology and feminism converge into a new social theory and political movement (Sturgeon, 1997, Plumwood, 1993).

3 In this description we can detect an alliance between the natural world and women as they share a history of oppression and a liberation movement whose beginnings are located by the authors in the 1960s. The "new view" of women emerged with the recognition of a woman's right to fully and equally participate with men in creating culture. The "new view" of nature is one of emancipation from human domination.

4 I use the term "the Earth" here to faithfully represent Merchant's language in presenting her argument. When speaking of Earth in my own voice, however, I will not use the article "the," as it objectifies Earth, in my opinion. We do not speak of "the Mars" or "the Venus." Thus my use of the word "Earth" in this way is consistent with conventional English speech patterns that refer to other planets. I do find it interesting and telling to note that we do, in fact, appear to objectify Earth and Sun in this way.


6 Perhaps these contrasting conceptualizations of nature are indicative of Bacon’s own ambivalence toward women.

7 In their writings on Descartes’ Meditations on First Philosophy, Burnham & Feiser refer to this as “hyperbolic doubt.”

8 Descartes uses this language throughout his Meditations. In Meditation 7, item 7, however, he refers to himself as “a thinking being,” but returns again in item 8 to the previous language of “a thinking thing.”

9 In his first Meditation, item 8, Descartes reflects, “…for whether I am awake or dreaming, it remains true that two and three make five, and that a square has but four
sides; nor does it seem possible that truths so apparent can ever fall under a suspicion of falsity [or incertitude].”

10 Burnham & Feiser cite Principles, part one, 48, I, 208-9.

11 Burnham & Feiser’s source is Descartes’ Correspondence with Elisabeth, letters of May 21, 1643, and June 28, 1643, respectively: III, 217 ff; III, 226 FF. It is important to note that, even though Descartes is able to reconcile mind and body in everyday life, scientific knowing, in his view, is still achieved by mind alone.


13 Thomas Berry illuminates the notion of ecocentrism when he writes, To be viable, the human community must move from its present anthropocentric norm to a geocentric norm of reality and value. Within the solar system, the earth is the immediate context of human existence...” Extending our view out past the solar system, the galaxy, and into the universe, he asserts, "To establish this comprehensive context is important; it is the only satisfactory referent in our quest for a viable presence of the human within the larger dynamics of the universe" (Sessions, 1995, p. 8).

14 In this work, Carson, a marine biologist, denounces the indiscriminate use of pesticides, raising larger questions about the effects of modern technology on human health and the environment.

15 According to Naess, "shallow" ecology was concerned primarily with pollution, resource depletion, and "the health and affluence of people in the developed countries" (Session, 1995, p. xii).

16 In 1984 Naess and Sessions developed a Deep Ecology platform that consists of eight points:

1. The well-being and flourishing of human and nonhuman Life on Earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes.
2. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves.
3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.
4. The flourishing of human life and cultures is compatible with a substantial decrease in human population. The flourishing of nonhuman life requires such a decrease.
5. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening.
6. Policies must therefore be changed. These policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present.
7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great.
8. Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes. (Sessions, 1995, p. 89).

17 Thomas Berry similarly describes "a deep cultural pathology" that is overtaking western civilization (Session, 1995, p. 9).

18 Our food now travels an average of 2,000 to 3,000 miles from the farm to the grocery store, using non-renewal fossil fuels for transport.

19 Intellectual property is defined in such a way as to specifically exclude innovations that are not private, marketable property of an individual or corporation. By this definition, a corporation’s potato, for example, is protected as intellectual property, but the seeds or plants of a tribe are not protected.

20 Bt behaves differently in genetically modified crops than in ordinary ones. The genetically modified Bt toxin builds up in the soil, instead of breaking down quickly in nature. We don’t know what effect this new Bt in the environment has on beneficial insects, although tests have indicated that it is lethal to monarch butterflies. There also is the danger that Bt, a natural pesticide, will be rendered impotent against insects that adapt to it in response to large concentrations of it in the soil.

21 This patent was purchased in 1998 from the USDA, who jointly funded its development with the use of tax money.

22 Half of the world's farmers are poor—they can't afford to buy seed every season—yet these farmers grow 15-20% of the world's food, directly feeding at least 1.4 billion people (Shand & Mooney, 1998). While there may be potential benefits to some forms of gene technology, especially in the area of medicine, there arguably are more dangers than benefits to genetically engineered crops. These include the hidden risks involved in moving genes across species lines, ecological risks including crop diseases resulting from developing new monocultures, potential problems of disease resistance and vulnerability, and possible health risks to farm workers or consumers (Lappe & Bailey, 1998). The greatest risk, according to Geri Guidetti of the Ark Institute, is the possibility of the gradual spread of sterility in seeding plants, resulting in a global catastrophe that could eventually wipe out higher life forms from the planet, including humans (Guidetti, 1998). Martha L. Crouch, of Indiana University, has confirmed Guidetti’s fear, publishing a series of papers specifying how the resulting castrated plants will be able to sterilize nearby normal species via their pollen, passing the toxin gene to other plant species through cross-pollination (Ruiz-Maarrero, 2002, Terminator Seeds, para 4). In response to public outcry, the use of this technology in the US has been banned temporarily, but
while this technology lies dormant in this country, scientists in several other industrialized countries presently are developing their own versions of it.

23 Kimbrell supports this claim by providing striking facsimiles of product ads from the period saturated with war imagery.

24 DDT was first widely utilized in the war, although chemists had known about its chemical insecticidal qualities for decades.
CHAPTER THREE:
"SAY SOMETHING!" AND IT SAYS, "I BURN":
THE NATURAL WORLD AS SUBJECT

Introduction

This chapter considers the conceptualization of the natural world as "subject," rather than "object," and examines how twentieth-century religious writers, historians, and nature writers might contribute to this understanding, bringing this study into the present. The body of the chapter falls into three main sections.

The first section presents the concept of nature as subject. This conceptualization is articulated by religious writers Thomas Merton, Gerard Manley Hopkins, and The Earth Bible Team. These writers are included because of their appreciation for the intrinsic value of all of creation that grows out of a distinctive religious worldview in which all of life is sacred. This worldview represents a creation-centered spirituality that has historically existed alongside of the mechanical worldview of modern science despite patriarchy. Also included are writings by naturalists John Muir and Aldo Leopold, who combine scientific understandings with passion for the beauty of nature, seeking to protect and preserve it. The section also explores conceptualizations of nature as subject as expressed by cultural historians Clive Ponting, Henry Hobhouse, and Michael Pollan. In the works of these revisionist writers, the natural world emerges as protagonist and partner with the human in shaping the course of historical events, thus representing a unique view of history from a non-anthropocentric worldview.

Having established the notion of the natural world as subject, the second section of this chapter examines the role of nature in shaping human language and meaning-making. Through the writings of scientists, educators, nature writers and authors of
children's literature, it looks at nature as a source of language and, through cognitive science and literature, it explores "sense of place" and force or causality as root metaphors of that language. It probes the role of stories in connecting us back to the land and the memories it holds for its inhabitants, thus providing a sense of place and belonging. Maria Montessori, Aline Wolf and Thomas Berry advocate the universe itself as a starting point for cultivating a sense of place and of oneself within it, while Rachel Carson and Annie Dillard marvel at the sense of wonder it evokes.

From the idea of nature as a source of language, inspiration, and belonging, the third section explores the literature of nature in order to see what images or metaphors it offers to an ecologically-oriented curriculum theory. It begins with the land-based narratives or agodzaahi of the Apache, Native American tales and legends, and the Dreaming Songs of the Aborigines to discover the "logos" of the land (Abram, 1996, p. 268). Douglas Burton-Christie, Thomas Lyon, Robert Finch and John Elder introduce the literary genre of nature writing as a resource for re-imagining one's relationship with the natural world. The inclusion of nature writing by Rachel Carson and Loren Eiseley is noteworthy, as these writers are scientists who connect with nature in a personal way, thus deconstructing notions of scientists as cold, impersonal, and voyeuristic. Annie Dillard, a third nature writer, readily admits, "I am no scientist…As a thinker I keep discovering that beauty itself is as much a fact, and a mystery…” (Dillard, 1997). These writers are joined by Ursula LeGuin, who writes fiction, science fiction, and poetry.1

The writings of this section are grouped thematically in order to present conceptualizations of the natural world as self, teacher, and shaman or mediator of the divine. This thematic organization serves to illustrate some of the many possible ways in
which the natural world surfaces in literature as subject. These categories, however, are admittedly contrived, and thus limiting as well as illuminating. They are not, in reality, clear-cut. As the excerpts of this section will demonstrate, the natural world may function in many roles, on many levels, simultaneously, not holding itself to any rigid categorization. Hopefully, these categories are helpful, nonetheless, in presenting new ways of conceptualizing the natural world in the interest of more fully exploring its subjectivity.

The Natural World as Subject

Thomas Berry (1988, 1999) maintains that the universe is not a collection of objects, but a communion of subjects. These two conceptualizations lead to greatly differing results in terms of their ecological implications. The concept of the natural world as subject is premised on the belief that it has intrinsic value in and of itself apart from any value humans ascribe to it, any human use of it, or any human intellectual constructions of it.

Contemplative religious writer, Thomas Merton (1915-1968) illustrates this value when he takes a stand against the prevailing winds of commercialism and consumerism and venerates something so seemingly ordinary as rain. He complains that the only way to make something actual in society's eyes is to place it on the market. Merton predicts, "The time will come when they will sell you even your rain." He counters, "At the moment it is still free, and I am in it. I celebrate its gratuity and its meaninglessness . . . Nobody started it, nobody is going to stop it. It will talk as long as it wants, this rain. As long as it talks I am going to listen" (In Finch & Elder, 1990, p. 599-600). Merton's experience of singing quails yields a similar reflection: "Their noise is absolutely
useless, and so is the delight I take in it. There is nothing I would rather hear, not because it is a better noise than other noises, but because it is the voice of the present moment, the present festival" (p. 607). In these passages, nature has a distinctive voice.

Jesuit poet Gerard Manley Hopkins (1844-1889) affirms the intrinsic value of nature when he writes in his journals of "inscape," which is the word that he uses to describe the integrity of every natural landscape or object. Inscape respects the particular shape and texture of each aspect of creation. In his poem, "Pied Beauty," for example, Hopkins celebrates whatever is dappled:

Glory be to God for dappled things-
  For skies of couple-colour as a brinded cow,
    For rose-moles all in stipple upon trout that swim,
Fresh-firecoal chestnut falls; finches' wings;
  Landscape plotted and pieced-fold, fallow, and plough,
    And all trades, their gear and tackle and trim.
All things counter, original, spare, strange;
  Whatever is fickle, freckled (who knows how?)
    With swift, slow; sweet, sour, adazzle, dim;
He fathers-forth whose beauty is past change.
  Praise him

Hopkins marvels, "All the world is full of inscape, and chance left free to act falls into an order as well as a purpose" (In Gardner, 1953, p. 130). Hopkins' notion of "inscape" may serve as a starting point toward a new way of thinking about the natural world that is resonant with an ecological consciousness which honors each, individual thing as a valuable and integral part of an interconnected whole.

The writings of naturalist John Muir vividly illustrate the notion of inscape. In "A Wind-Storm in the Forests," (1894) he describes the winds as "blessing" the Sierra Nevada Forests and animating them into speech in such a way as to elicit the distinctive voice of each tree. Of the Silver Pines he writes, "Colossal spires 200 feet in height
 waved like supple goldenrods chanting and bowing as if in worship, while the whole mass of their long, tremulous foliage was rekindled into one continuous blaze of white sun-fire" (In Finch & Elder, 1990, p. 279). In another passage he recalls

Even when the grand anthem had swelled to its highest pitch, I could distinctly hear the varying tones of individual trees--Spruce, and Fir, and Pine, and leafless Oak--and even the infinitely gentle rustle of the withered grasses at my feet. Each was expressing itself in its own way--singing its own song, and making its own particular gesture…" (p. 283)

Muir's writing here depicts the oral-audial orientation to life of which Toolan and Merchant consider as being more intimate than a visual orientation. It therefore represents a facet of a larger experiential paradigm which deep ecologists and feminists seek to recover in order to generate ecological consciousness.

In Muir's work the capacity to appeal to the human senses enhances the discrete subjectivity of each living entity. He appeals to sight and smell as well as sound: "the varied gestures of the multitude were seen to fine advantage, so that one could recognize the different species at a distance of several miles by this means alone, as well as by their forms and colors, and the way they reflected the light" (In Finch & Elder, p. 285). His description of fragrance is particularly sensual and lucid.

The fragrance of the woods was less marked than that produced during warm rain, when so many balsamic buds and leaves are steeped like tea; but, from the chafing of resiny branches against each other, and the incessant attrition of myriads of needles, the gale was spiced to a very tonic degree. And besides the fragrance from these local sources there were traces of scents brought from afar. For this wind came first from the sea, rubbing against its fresh, briny waves, then distilled through the redwoods, threading rich ferny gulches, and spreading itself in broad undulating currents over many a flower-enameled ridge of the coast mountains. . .(p. 285)

The intrinsic value of the natural world, as exemplified in the writings of Merton and Muir, is the underlying rationale for creating The Earth Bible project in which the
Earth Bible Team\(^2\) (2002) reads the Earth as a subject rather than an object as they endeavor to expose the anthropocentric and patriarchal biases of Judeo-Christian scripture. Adapting the basic feminist hermeneutic of suspicion and retrieval (Schussler Fiorenza, 1985, 1992), they seek to "move beyond identifying ecological themes in creation theology to identifying with Earth in its ecojustice struggle" (Habel, 2000, p. 35). Rather then reflecting about the Earth, they seek to reflect \textit{with} Earth. In doing so, they elaborate the following \textit{Guiding Ecojustice Principles}.

1. The Principle of Intrinsic Worth: The universe, Earth and all its components have intrinsic worth/value.
2. Principle of Interconnectedness: Earth is a community of interconnected living things that are mutually dependent on each other for life and survival.
3. Principle of Voice: Earth is a subject capable of raising its voice in celebration and against injustice.
4. Principle of Purpose: The universe, Earth and all its components, are part of a dynamic cosmic design within which each piece has a place in the overall goal of that design.
5. Principle of Mutual Custodianship: Earth is a balanced and diverse domain where responsible custodians can function as partners, rather than rulers, to sustain a balanced and diverse Earth community.
6. Principle of Resistance: Earth and its components not only suffer from injustices at the hands of humans, but actively resist them in the struggle for justice. (Habel, 2000, p. 53)

While perhaps guilty of anthropomorphizing Earth themselves, these writers contribute to a growing body of literature and critique that views the natural world as subject and ascribes to it agency independent of the human.

Recognizing the intrinsic value and rights of nature, naturalist Aldo Leopold (1949) proposed the formulation of a "land ethic" which has become a major influence upon American attitudes toward the environment (In Finch & Elder, 1990). Leopold explains that an ecological ethic is "a limitation on freedom of action in the struggle for existence" (p. 407). Finding the land-relation of his time to be strictly economic, Leopold
seeks a new ethic that would function as "a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path or social expediency is not discernable to the average individual" (p. 408).

For Leopold, ethics are community based, adding that the land ethic enlarges the boundaries of the community beyond the human to include the land and its many life forms. A land ethic would not prevent alteration, management, or use of the land and its resources, but would affirm its right to continued existence and, in some cases, in a natural state. Leopold's land ethic seeks to change the role of humans from conqueror of the land, which he sees as eventually self-defeating, to the status of "plain member and citizen of it" (In Finch & Elder, 1990, p. 408).

Merton, Hopkins, the Earth Bible Team, and Leopold provide fresh and insightful ways to conceptualize the natural world as subject. In celebrating rain, Merton seeks to awaken the reader to the intrinsic value of nature and of the present moment. Hopkins gives a name to this intrinsic value, calling it "inscape." The Earth Bible seeks to identify with Earth as it interrogates the Bible for its anthropocentric and patriarchal underpinnings. In proposing a land ethic, Leopold includes the natural world in a discussion of moral concerns, claiming the rights of the natural world alongside of human rights and expanding the notion of community to embrace the non-human. The subjective or intrinsic value of the natural world of which these authors write is apparent in the following interpretations of history.

The Natural World as Subject of History

Leopold's affirmation of the subjectivity of nature is reflected in his ecological interpretation of history. Citing the settlement of the Mississippi Valley as an example,
he asserts that many historical events previously conceived solely in terms of human enterprise were, in fact, biotic interactions between people and land. Writing of the colonial migrations to the cane-lands of Kentucky, he muses

It is time now to ponder the fact that the cane-lands, when subjected to the particular mixture of forces represented by the cow, plow, fire, and axes of the pioneer, become blue-grass. What if the plant succession inherent in this dark and bloody ground had, under the impact of these forces, given us some worthless sedge, shrub, or weed? Would Boone and Kenton have held out? Would there have been any overflow into Ohio, Indiana, Illinois, and Missouri? Any Louisiana Purchase? Any transcontinental union of new states? Any Civil War? (In Finch & Elder, 1990, p. 409)

Leopold concludes that the plant succession steered the course of history and that the pioneer merely demonstrated what successions inhered in the land. He suggests that if history were taught in this spirit, the concept of land would truly penetrate our intellectual life.

Sir Clive Ponting (1991), in his revisionist Green History of the World: The Environment and the Collapse of Great Civilizations, does just that when he provides an environmental reading of the rise and fall of civilizations, including the Sumerians, the Egyptians, and the Mayans. Ponting's work, which shows how past civilizations have destroyed themselves by ignoring environmental limits, is brought into the present as he tackles issues of agriculture, world hunger, and overconsumption of resources by the West, arguing that industry and fossil fuels have accelerated the pace at which humanity is destroying itself.

In a similar vein, Henry Hobhouse (1990), in Seeds of Change: Five Plants That Transformed Mankind, explores how five plants--quinine, sugar cane, tea, cotton and potato--have influenced the course of human history. Although criticized for its Eurocentrism and occasional overstatements, this work is a fascinating study, showing
both the positive and negative aspects of human relations with the life forms of the planet, as both mutually shaped the other. Rather than being reductionist, Hobhouse's botanical approach to history underscores the complexity of human relations with the earth as they unfold through time.

Michael Pollan (2001) also makes nature a protagonist of his critical reflections in *The Botany of Desire: A Plant's-eye View of the World* (2001) when he tells the story of four plants—the apple, the tulip, the cannabis, and the potato—and "the human desires that link their destinies to our own" (Pollan, 2001, p. xvi). The overall theme of this piece is the complex reciprocal relationship between the human and natural worlds, told basically from the plant's point of view. Pollan turns around the term "domesticated species," however, asserting that the domesticated plants have also domesticated the human in "a clever evolutionary strategy for advancing their own interests" (p. xvi). While humans have spent the last few thousand years remaking various plant species through artificial selection, Pollan asserts that, at the same time, these plants have been remaking them.

Reminding us of the coevolutionary journey of the bees and flowers, Pollan contends that "human desires form a part of natural history in the same way the hummingbird's love of red does, or the ant's taste for the aphid's honeydew. I think of them as the human equivalent of nectar" (Pollan, 2001, p. xvii). According to Pollan, the advent of agriculture occurred when a group of angiosperms were able to get humans to move and think for them, thus ensuring their continued propagation.

Leopold, Ponting, Hobhouse, and Pollan provide a change in perspective from nature as passive to nature as active, underscoring its subjectivity. Writing the natural world back into the narratives of history from which they have been largely excluded
demonstrates a move from a human-centered view to one of humans being part of and interacting with the larger natural world. By presenting history as a co-evolutionary journey shared by humans and the natural world, Pollan projects the notion of the subjectivity of nature back in time to the beginning of human existence\textsuperscript{5}. He suggests that both plants and people have an agenda based upon their desires, which are in turn based upon their instinctual will to survive.

In Pollan's animate portrayal, the plants exercise will and are able to communicate it in some manner that can be 'read' and responded to by humans. The following section, explores the notion of nature as a language in itself and as a source of human language and meaning-making.

**Language and the Natural World**

Ralph Waldo Emerson (1835) affirms the view that nature has subjectivity and agency when he observes that "...nature is already, in its forms and tendencies, describing its own design" (In Finch & Elder, 1990, p. 145). He finds that, "The stars awaken a certain reverence, because though always present, they are inaccessible . . ." (p. 146). Writing of the fields and the woods near his home, he reflects, "I am not alone and unacknowledged. They nod to me, and I to them" (p. 148). Perhaps his greatest affirmation of the natural world's subjectivity is his depiction of it, written in 1833, as a language and himself as a student of the language:

Nature is a language, and every new fact that we learn is a new word; but rightly seen, taken all together, it is not merely a language, but the language put together into a most significant and universal book. I wish to learn the language, not that I may learn a new set of nouns and verbs, but that I may read the great book which is written in that tongue. (p. 149)
In this spirit, marine biologist and writer, Rachel Carson\(^6\) (1907-1964), in "The Edge of the Sea" (1955), finds a world of meaning in a single creature--the crab, which serves as a metaphor for life:

I have seen hundreds of ghost crabs in other settings, but suddenly I was filled with the odd sensation that for the first time I knew the creature in its own world--that I understood as never before, the essence of its being . . . The little crab alone with the sea became a symbol that stood for life itself--for the delicate, destructible, yet incredibly vital force that somehow holds its place amid the harsh realities of the inorganic world. (In Finch & Elder, 1990, p. 523)

Emerson and Carson present ways in which one might read the text of the natural world as subject. Other writers ground and contextualize Earth as subject in a sense of place, which they propose may be understood as a root metaphor for human language and meaning-making, experience, and memory.

**Sense of Place**

Coming to know the natural world as subject requires that one develop an awareness of and sensitivity to the particularities of nature in one's localized settings. This is a prerequisite for cultivating what has become known in cross-disciplinary narratives as a "sense of place." Theologian Burton-Christie (1999) cites Simone Weil as he affirms the need to be rooted as one that is fundamental to the human soul. To have a sense of place, he maintains, is to "feel oneself at home in the world" (Burton-Christie, 1999, p. 59). It is to belong.

The findings of cognitive science support the claim that sense of place is indeed central to human meaning-making. Drawing upon the work of Leonard Talmy, cognitive scientist Steven Pinker (1997) identifies location in space and force (agency, causation) as the two fundamental metaphors in language which generate all other metaphors. Many cognitive scientists, including Pinker, have concluded from their research on language
that a handful of concepts about places, paths, motions, agency, and causation underlie the literal or figurative meanings of tens of thousands of words and constructions in every language studied. They have been reinvented continually over time in many language families throughout the world. These root metaphors, Pinker and others propose, are the vocabulary and syntax of mentalese, the language of thought. Due to the combinatorial nature of language, these basic concepts are combined into more and more complex ideas.

Pinker explains that "the mind couches abstract concepts in concrete terms" (Pinker, 1997, p. 353). Evolutionary change occurs when body parts are copied and the resulting copy is then modified. If ancestral circuits for reasoning about space and force were copied, the copy's connections to eyes and muscles severed, and references to the physical world obscured, the circuits could serve as "a scaffolding whose slots are filled with symbols for more abstract concerns like states, passions and desires" (p. 355). Pinker cites the research of psychologist Melissa Bowerman who found that preschool children spontaneously create their own metaphors in which possession, circumstances, time and causation are symbolized by space and motion, such as in the case of the child who said, "You put me just bread and butter." Another child asked, "Can I have any reading behind the dinner?" And a third, while shelling peanuts, explained, "I'm taking these cracks bigger."

Pinker claims that the equation of space with abstract ideas comes naturally to them, as they could not have inherited them from earlier speakers. He also includes examples from adult speakers in which space and motion are used as metaphors for abstract ideas:
The message went from Paris to Istanbul.
The light went from green to red.
The meeting went from 3:00 to 4:00. (Pinker, 1997, p. 352)

Metaphors are built from metaphors as we stretch ideas and words to encompass new domains. By erasing the contents and filling in the blanks with new symbols, Pinker explains, more abstract domains are formed from inherited forms that have been adapted.

It is perhaps no coincidence, then, that "sense of place," a root metaphor of human language and meaning-making, is an emergent theme in the literature of ecology and environmentalism (Teran & Esteva, 2000; Nabhan & Trimble, 1994; Smith & Williams, 1999; Bowers, 1999; Fusco, 2000; Harvey, 1989-90; Milton, Cleveland & Bennett-Gates, 1995). Teran et al. (2000) argue that a sense of place is essential in reestablishing a bond between the human and natural worlds and in cultivating more responsible behaviors toward the places we inhabit. A renewed connection with the land impels us to "turn inward and transform our very habits of thinking and perceiving the world that have apparently severed us from our own intuitive sense of enchantment and wonder" (Kemple, 2000, p. 9).

David Orr (1992) paints a striking picture of this severing as he depicts a typical college campus as one of estrangement from one's environment. The curriculum on most college campuses is generally "imported from other locations, times, and domains of abstraction" (Orr, 1992, p. 103). Food, water, electricity, toilet paper, and other amenities are automatically supplied from "distant and unknown places . . . Its waste and garbage are transported to other equally unknown places" (Orr, 1992, p. 103). Orr finds that students thus learn to be indifferent to the ecology of their immediate place: "Four years in a place called a campus culminates in no great understanding of the place, or in the art
of living responsibly in that or any other place . . . students refer to the outside world as 'the real world'' (Orr, 1992, p. 103).

Frank Fromherz (1999) echoes Orr's observations when he identifies "a widely felt sense of displacement, uprootedness, and movement at a frenetic pace" as major signs of our times (Fromherz, 1999, p. 241). Perhaps this is due, in part, because people have lost the stories which, according to Fromherz, connect the storyteller and listener to places, experiences, and memories. He suggests that by contemplating a particular geography, one might recover a capacity to recollect the communities that have shaped human character. Particular places, he asserts, can unlock memories and lessons that may help restore a sense of roots.

One can see the beginnings of this process in *The Tree of Here* (recommended for ages five to nine) by Chaim Potek (1993). This story depicts a young boy’s relationship to a dogwood tree. “This tree makes me feel like I’m growing roots . . . It makes me feel like I’m really here”, says Jason. So, when Jason learns that he has to move yet again, he begins to grieve the oncoming loss of this special tree, and it him. After several conversations with the tree, it’s time to go, but Mr. Healy, a family friend, has the foresight to give Jason a small dogwood tree in a pot to take with him to his new home. The memories and stories connected with the tree will remind Jason of who he is as he adapts to his new surroundings.

Fromherz (1999) contends that a place might be filled with unrecognized memories and voices. One may be unaware that they were shaping her own voice and "giving form to the very language of her soul" (Fromherz, 1999, p. 243). Such is the case in the following reflection, written in 1997, as I traveled to my birthplace of St. Louis. In
this piece, entitled *Missouri Snow*, the landscape evokes in me forgotten memories and feelings that grow more vivid as I approach the city, reminding me of unresolved issues and unanswered questions within myself. What begins as rich description of the natural world becomes a reawakening of a sense of being victimized and the grateful realization that I’ve moved to a new, more empowered way of being in the world.

Snow, dusting small bushes and trees, articulating wispy intricacies ordinarily silent. Snow, the Master artist, choosing her lines carefully, finding the gesture in the form. White, long narrow rows of the farmer's field, marking the lines of toil seasons past. Supple limbs turn brittle. Soft grasses crunch. Snow, covering trees, changing full-color landscapes to black and white.

... Snow rests heavily on the topsides of branches and leaves, creating contrasts of dark and light, preempting the usual shadows of day, covering northern mosses, freezing time into ice and direction into query; pointing blindly in the direction of the snowstorm. The snow blankets reality and distorts images, muting some features of the landscape while accentuating others, imbuing it with new evocations...

... Melted snow hangs from a tiny tree, recrystallized into icicles that dangle as delicate frozen tears, blunting pointed surfaces, rendering thorns disabled-disarmed. Why must the weak suffer the most? And how did we learn to change our suffering into strength?

As I approach St. Louis, the place of my birth and childhood, I am predisposed by snow revelations to view my past life in new ways; to revisit, revise, reform my perceptions; to see my life with new understandings. For, just as the snow joins one vine to another along the rambling highway fence, so too my mind makes creative connections, tying together the thawing threads of my past journey. I pause awhile on the white landscape of my thoughts, grateful for the snow gift of sight. (unpublished essay)

In *A Sense of Place*, Fromherz (1999) explains that one may discover that her own story shares the same soil as those of others as she explores how communities of memory and a sense of place emerge in narrative. Drawing upon Robert Bellah's *Habits of the Heart*, he speaks of "communities of memory"—memories of achievements and shared sufferings that provide a sense of group identity and connection. Fromherz advocates that we, as humans, turn to our stories, not just as personal or autobiographical narratives,
but as "wellsprings of social and ecological memory vital to the development of ethical imagination and vision" (Fromherz, 1999, p. 242). He encourages us to enter into the communities of memory that have shaped our character and, in doing so, come to recognize these communities as ecological, geological, and cosmological.

This section has looked at the natural world as a source of human language and meaning-making, with sense of place at the center of this activity. Stories connect the listener to specific places and the experiences and memories they hold. Memories evoked by the land give form to the language of the soul, while communities of memory restore a sense of belonging to a larger community of life. The largest story, to which all other narratives belong, is the story of the universe itself. Maria Montessori, Aline Wolf, Thomas Berry and others propose the universe and its wonders as a starting point for education. Evolutionary science provides a new way to view oneself as a member of an emergent universe and a grand context for situating one's life.

Cosmic Education - A Starting Point

Maria Montessori (1870-1952) saw the universe itself as a starting point for cultivating in a child a sense of place that is central to one's personal and collective identity. Montessori was one of the first educators of the twentieth century to recognize the vital connection between human development and wellbeing and a sense of one's place in the larger, natural world in which one lives. In 1935 Montessori proposed a plan of cosmic education as a foundation stone of the Advanced Method, placing cosmology at the center of educational theory and practice in order that children attain a sense of purpose and belonging to something much larger than themselves. She writes:

Let us give [the child] a vision of the whole universe. The universe is an imposing reality, and an answer to all questions…The stars, earth, stones, life of
all kinds form a whole in relation with each other, and so close is this relation that we cannot understand a stone without some understanding of the great sun. (Montessori, 1948, p. 6)

Behind Montessori’s educational method lies the desire to uncover what she considers to be the true nature of the child. Montessori believed that the child is endowed with an inner power and sought to release this potentiality so as to guide humanity toward a more luminous future. Like Montessori, ecologist Rachel Carson believed in the innate powers and abilities of the child to experience wonder and to model a way of being with the world that is instructive to humanity. For, "a child's world is fresh and new and beautiful, full of wonder and excitement" (Carson, 1957, unnumbered pages).

Nature writer Annie Dillard vividly captures this sense when she goes to the creek seeking relaxation, but instead finds her heart set ablaze:

If the landscape reveals one certainty, it is that the extravagant gesture is the very stuff of creation. After one extravagant gesture of creation in the first place, the universe has continued to deal exclusively in extravagances, flinging intricacies and colossi down aeons of emptiness, heaping profusions on profligacies with ever-fresh vigor . . . I come down to the water to cool my eyes. But everywhere I look I see fire; that which isn’t flint is tinder, and the whole world sparks and flames. (Dillard, 1974, p. 58-62)

Wonder is but one of the many gifts the universe might offer. In Nurturing the Spirit, Aline Wolf (1996) promotes Montessori's philosophy of education, explaining that the cosmos, or universe, meaning “all created things viewed as constituting one system or whole,” implies a plan in which all of nature and all living beings are a part of a great unfolding (Wolf, 1996, p. 90). It is within this universal context, Montessori maintains, the child is brought to his or her true self, and sense of purpose. The idea of universal connectedness helps the mind of the child to stop wandering. “He is satisfied, having found the universal center of himself with all things,” (Montessori, 1948, p. 6).
An evolutionary universe also engenders a sense of connection in the realization that everything in the universe originated from the same source. Wolf proposes that a modern concept of an evolutionary universe generates new perspectives regarding peace, conservation, values, hope, gratitude, openness and our cosmic task. She maintains that a sense of universal connectedness among all of creation will lead to attitudes of stewardship, peace, and conservation. The most significant spiritual benefit of cosmic education, Wolf asserts, is the sense of purpose that it brings to our lives and a passion to fulfill our own deeper potential (Wolf, 1996, p. 93-96).

From the universe the teacher might move the students to a deeper awareness of the planet Earth, their continent, bioregion, and the particular places in which they dwell. At each of these levels, sense of place grounds us in the natural world as subject, situating knowledge and understanding in a particular context. The literature of nature vividly illustrates the subjectivity of nature and suggests the value and function of "place" in education. The following section explores this literature as various writers attempt to mediate the language of nature.

**The Literature of Nature**

**Land-Based Narratives**

David Abram (1996) describes the land as “the sensible site or matrix wherein meaning occurs and proliferates” (Abram, 1996, p. 140). Mrs. Annie Peaches, a 77-year-old Apache woman, reflects a Native American perspective when she contemplates, "The land is always stalking people. The land makes people live right. The land looks after us. The land looks after people" (Abram, 1996, p. 156). There is, in Apache society, a moral efficacy of the landscape that ensures mindful and respectful behavior in the
community, as communicated in stories that are regularly told within the village. These brief narratives, or *agodzaahi*, meaning "that which has happened," tell of people who suffered misfortune as a consequence of violating Apache standards for right behavior. They begin and end with a statement that indicates, with a place-name, exactly where the events in the story actually occurred. The place might even be considered to be the source or primary power that is expressing itself through the events that occur there (Abram, 1996, p. 162).

The *agodzaahi* are part of an oral tradition that is not easily accessible, but the written narratives of other indigenous peoples similarly illustrate the tendency toward moral teaching tied to the land and its inhabitants. The Native American concern with specific places, and the events and lessons tied to those places is reflected in a beautifully illustrated collection of ten North American legends (written for middle school-aged children) gathered by Joseph Bruchac (1999) under the title *Between Earth and Sky: Legends of Native American Sacred Places*. These sacred legends are connected to striking landscapes and the six directions-north, south, east, west, above, and below-and a seventh direction, that which is within us. They explain how things came to be, sharing themes of reverence, remembrance, and tradition, beginnings, endings, and cycles, while teaching that all the Earth is alive and sacred. The stories also teach that if we lose the sacred balance within, or fail to honor the sacred outside of ourselves, there are consequences for us and for the Earth. A particular place in the land, then, for an oral, indigenous culture, is never just a passive or inert backdrop for human activity, but rather an active participant in those activities.
The Dreamtime stories of the Aborigines provide yet another example of place-based narratives. The Dreaming, as an imaginative life of the terrain, is continually renewed as the Aboriginal people walk along their Ancestor's Dreaming track and sings the landscape into visibility. The Aborigine virtually becomes the Ancestor on his journey, and so "the storied earth is born afresh" (Abram, 1996, p. 170). Language is inseparable from song and story as the chanting of song cycles link the singer to the flora, fauna, or powers within the land. The Dreaming songs function in multiple ways as they orally recall viable routes through difficult terrain, provide codes of behavior for the community, and activate the memories of stories, intertwining earthly places with linguistic memory. The narratives respond directly to the land and, Abram maintains, the land to them. When these stories are removed from walking the land itself and committed to words on a page, the Dreaming power of these ancient stories is diminished (Abram, 1996, p. 177).

The land has its own articulations, contours, and rhythms that inspire teachings, stories, and songs. Abram proposes that through a reawakening of one's senses, along with a renewed trust in the intelligence of one's sensing body, she or he may once again begin to notice and respond to "the subtle logos of the land" (Abram, 1996, p. 268).

Nature Writing

The move from science to art occurs within this sensual realm. Burton-Christie (1994) contends that cooperation between science and art requires that the scientist abandon "the myth of objectivity toward, detachment from, or comprehensive knowledge of the subject matter" (Burton-Christie, 1994, p. 10). He maintains that poetry and literature play a crucial role in re-imagining our relationship with the natural world.
Language shapes worlds; as we think, so do we act (Lincoln & Guba, 1985). By creating mental images, the use of metaphors enhance the ability of language to shape understanding and behavior.

Bowers (1993) calls for new guiding metaphors, based on the functioning of the natural world, in order to cultivate ecological consciousness. Burton-Christie (1992) similarly argues that the ecological crisis compels one to reconsider those assumptions and attitudes toward the natural world that have led to its exploitation. He asks, "What sort of image do we have of nature? And what image will help us most in redressing our destructive posture toward the natural world?" (Burton-Christie, 1992, p. 399). These questions are key to this study as it considers the natural world as subject.

Literature about the natural world, especially the genre of nature writing provides a rich source of knowledge, imagery and metaphor, offering a starting point for addressing the issues and questions raised by Bowers and Burton-Christie. Thomas Lyon (1989), in *This Incomparable Land: A Book of American Nature Writing*, explains that the literary genre of nature writing, though not a neat and orderly field, has distinct characteristics that lend themselves to environmental and ecological educational concerns. The fundamental goal of nature writing is “to turn our attention outward toward the activity of nature” (Lyon, 1989, p. 7). Nature writing has its roots in the nature essay, which developed as a distinct genre near the close of the eighteenth century, drawing upon both Romanticism and science, and serving as an important synthesis. Lyon contends that the deepest influence upon these writers is their response to the land itself. Although, at its weakest, this literature has a tendency to lapse into "naïve romanticism and hyperbole" (Burton-Christie, 1993, p. 159), at its best it provides needed
"models of human life integrated into a beloved landscape" (In Finch & Elder, 1990, p. 20).

In nature writing, solid understandings of nature, openness, reflection, and artistry combine to create a literary genre that is resonant with the concerns of the ecological movement. Tracing the history of nature writing, Lyon (1989) notes a growing protest against environmental decline as America was settled and developed: “The nation’s fall from pristine wholeness burned itself into the mind of nature writers, so resplendent had been the original citings and reports” (Lyon, 1989, p. 22). Beginning around World War II, nature writers have increasingly critiqued environmental problems and proposed corrective measures.

Finch and Elder (1990) contend that in a time when much literary theory discovers only constructs of self-reflexive language, nature writing asserts the humane value of literature and the mature individual’s relationship with an understanding of fundamental physical and biological processes. They resolve, "All literature, by illuminating the full nature of human existence, asks a single question: how shall we live?" (In Finch & Elder, 1990, p. 28). That question has become particularly urgent in our present times.

Burton-Christie (1993) also connects the literary genre of nature writing with the concepts of responsibility and stewardship. He reflects, "By probing the texture of our emotional response to the natural world, and by asking what these feelings reveal to us about ourselves, our place in the world, and our responsibilities toward that world, nature writers are attempting to shed new light on that question" (Burton-Christie, 1993, p. 162). He observes that "...it is precisely the subtle, probing analysis of both the natural world
itself and the human person within that world that characterizes the best nature writing and that distinguishes it as literary genre" (Burton-Christie, 1993, p. 160).

Nature writers seek to observe and accurately describe the intricate working of nature so as to reveal "the subtle and complex patterns found in relationships among various species," patterns that ultimately "radiate outward to include the human observer" (Burton-Christie, 1993, p. 162). These patterns may serve as what Gregory Bateson (1984) describes in *Mind and Nature* as "the patterns which connect" (Bateson, 1984). This sense of connection, Burton-Christie and others maintain, leads to stewardship and responsible living.

Burton-Christie (1993) emphasizes the quality of the emotional response to nature and what this response engenders: "To the extent that we can still be moved by the natural world...we are acknowledging the possibility of responding to the earth as a living subject" (Burton-Christie, 1993, p. 162). Nature writer Annie Dillard (1994) writes, "Our life is a faint tracing on the surface of mystery, like the idle, curved tunnels of leaf miners on the face of a leaf" (Dillard, 1974, 1994, p. 287). When we lose the sense of the natural world as subject, Burton-Christie reflects, we diminish "the sense of the world as a place where the shimmering force of the transcendent, the elusive traces of mystery can shine through" (Burton-Christie, 1993, p. 162).

Finch and Elder (1990) illuminate the methodology of nature writing, noting how these writers respond to the natural world in ways that are both scientifically informed and marked by a concern for literary values and a personal voice that is a hallmark of the genre. They begin with a closely observed phenomenon and reflect on its meaning for them—or they might begin with an argumentative point of view, then venture out into a
natural setting that does not support this argument and change their point of view. Finch and Elder observe, "In an age that has learned that any theory is subject to almost constant revision, a hallmark of the modern nature essay is its insistent open-endedness" (Finch & Elder, 1990, p. 24). Nature writer Loren Eiseley (1907-1977) gives insight into this receptivity when he writes

> It is commonplace of all religious thought, even the most primitive, that the man seeking visions and insight must go apart from his fellows and live for a time in the wilderness. If he is of the proper sort, he will return with a message. It may not be a message from the god he set out to seek, but even if he has failed in that particular, he will have had a vision or seen a marvel, and these are always worth listening to and thinking about...One must seek, then, what only the solitary approach can give--a natural revelation. (In Finch & Elder, 1990, p. 525)

Although Eiseley generalizes as to the universality of this form of religious experience, his statement here may enrich one's understanding of a particular way of relating to nature.

Land-based narratives tie one back to the land, its peoples, codes of behavior and moral teachings. In the works of the nature writers one may learn the teachings of the land and uncover new ways in which the natural world is conceptualized as subject. Nature writing, which is characterized by human engagement with nature on physical, emotional, intellectual, and spiritual levels, provides a model of human-Earth relations that is conducive to inculcating an ecological consciousness. The literary samples that follow illustrate the ways in which nature reveals itself as subject, as perceived by the nature writers and by authors of children's literature. This literature review is grouped into four thematic categories: the natural world as self, as teacher, as healer, and as shaman or mediator of the sacred dimension of life.
The Natural World as Self

By reducing a mountain to human scale, nature writer Ursula K. LeGuin (b. 1929), in *A Very Warm Mountain*, attempts to make sense of the 1980 eruption of Mt. St. Helens near her Portland, Oregon, home. Reviewing the history of the mountain since Native American days, LeGuin discovers that the mountain has always been feminine, thus she finds that it is impossible not to take her personally. Of the mountain she recalls, "She put on hats of clouds, and took them off again, and tried a different shape, and sent them all skimming off across the sky. She wore veils: around the neck, across the breast: white, silver, silver-gray, gray-blue. Her taste was impeccable" (In Finch & Elder, 1990, p. 720).

In her reflection LeGuin cites a newspaper piece by Dr. William Hamilton of Portland State University that shows how some found in the mountain communal as well as personal expressions of meaning. Likening the mountain to a large breast, he complains that St. Helens' real damage to us is that the "perfection of the mother" has been spoiled with the removal of part of the breast: "Our metaphor has had a mastectomy…At some deep level, the eruption of Mt. St. Helens has become a new metaphor for the very opposite of stability--for the greatest of twentieth century fears--cancer" (In Finch & Elder, 1990, p. 720-721).

In another passage LeGuin reflects, "Part of the glory of it is being included in an event on the geologic scale. Being enlarged" (In Finch & Elder, 1990, p. 720). She argues that, in her eyes, Mt. St. Helens "was never part of a woman; she is a woman. And not a mother but a sister" (p. 721). LeGuin describes her satisfaction and exultation at each eruption as feminist solidarity, jeering, "You men think you're the only ones who
can make a really nasty mess? You think you got all the firepower, and God's on your side?" She continues:

And she spat dirt and smoke and steam. She blackened half her face, in those first March days, like an angry brat. She fouled herself like a mad old harridan. She swore and belched and farted, threatened and shook and swelled, and then she spoke. They heard her voice two hundred miles away. (p. 721)

Coming to terms with the unpredictability of the mountain, LeGuin resolves, "A threat: a terror: a fulfillment. This is what serenity is built on. This unmakes the metaphors. This is beyond us, and we must take it personally. This is the ground we walk on" (In Finch & Elder, 1990, p. 722).

The character of Wil Neuton, in Gary Paulson’s The Island (1988), demonstrates the human ability to be identified with the natural world in such a way as to find himself. In this novel, written on a secondary school level, Wil, a teenage artist and writer, goes off to live alone on an island in the center of a lake in northern Wisconsin in order to find himself as part of rather than separate from the universe in which he lives. Drawing studies of the heron, Wil reflects, "I could see the heron in all the things the heron was, without seeing the heron at all, and it changed me, made me look at all things that way, made me see in a new way and, finally, made me look at myself in that new way" (Paulson, 1988, p. 52-53). Wil's description of the creative process indicates a way of knowing without seeing. Although he looks at the heron while drawing him, his deeper knowing of it comes from imagining what it must feel like to be inside of the body of the bird. Joining the bird in this empathic way (a topic which will be developed in the next chapter) enables him to feel it within himself and thus to know it as his own self or subjectivity.
In discovering himself, Wil reconnects with the wildness within. Wildness, cultural historian Thomas Berry (1999) maintains, is at the root of the authentic spontaneities of any being (p. 51). He continues

It is that wellspring of creativity whence come the instinctive activities that enable all living beings to obtain their food, to find shelter, to bring forth their young; to sing and dance and fly through the air and swim through the depths of the seas . . . (Berry, 1999, p. 51)

For the universe, Berry asserts, carries within it the norm of authenticity of every spiritual as well as physical activity within it (p. 49). Abram affirms this view of wildness when he explains how our bodies have been formed in reciprocity with the textures, sounds, and shapes of an animate earth. He asserts, "We are human only in contact, and conviviality, with what is not human" (Abram, 1996, p. 22).

The literary works of LeGuin and Paulson illuminate some of the ways that humans identify themselves with Earth. The narratives that follow explore some of the ways that people learn from their encounters with nature.

The Natural World as Teacher

The literature of the nature writers suggests that by engaging with the natural world as subject, one might better understand how to live harmoniously within it. In these writings Earth educates the human to its functioning and dynamics and provides the information that humans need to create a viable future for the entire family of life, while also bringing us into our own fulfillment.

Nature writer Annie Dillard (1974), in Pilgrim at Tinker Creek, approaches the creeks as her teacher. She ponders

The creeks--Tinker and Carvin's--are an active mystery, fresh every minute. Theirs is the mystery of the continuous creation and all that providence implies: the uncertainty of vision, the horror of the fixed, the dissolution of the present, in
the intricacy of beauty, the pressure of fecundity, the elusiveness of the free, and the flawed nature of perfection. (In Finch & Elder, 1990, p. 819)

Dillard reads her own life into the text of the water. The creeks take her beyond the realm of biology and into the deeper self-knowledge for which she hungers. She continues, "Today I sit on dry grass at the end of the island by the slower side of the creek. I'm drawn to this spot. I come to it as to an oracle; I return to it as a man years later will seek out the battlefield where he lost a leg or an arm" (In Finch & Elder, 1990, p. 819).

In *The Judgment of the Birds*, by Loren Eiseley (1978), the reader is brought to the natural world as oracle in order to learn a lesson. Eiseley draws his readers into the world of a forest glade on the side of a mountain where they encounter the plight of the parents of a young nestling flying helplessly in circles while their offspring squirms in the beak of an enormous raven. The anguished outcries of the tiny parents illicit sounds of complaint from other birds in the glade. "No one dared to attack the raven. But they cried there in some instinctive common misery, the bereaved and the unbereaved." A bird of death, the raven had violated "a dim intangible ethic." The murderous raven, "the black bird at the heart of life," remained there, "formidable, unmoving, unperturbed, untouchable." Eiseley continues

> The sighing died. It was then I saw the judgment. It was the judgment of life against death...There, in that clearing, the crystal note of a song sparrow lifted hesitantly in the hush. And finally, after painful fluttering, another took the song, and then another, the song passing from one bird to another, doubtfully at first, as though some evil thing were being slowly forgotten. Till suddenly they took heart and sang from many throats joyously together as birds are known to sing. They sang because life is sweet and sunlight beautiful. They sang under the brooding shadow of the raven. In simple truth they had forgotten the raven, for they were the singers of life, and not of death. (Eiseley, 1978, p. 33-34)
Eiseley's prose here functions as parable. The word "parable" comes from the Greek word "ballein", which means to throw. Parable throws seeming opposites together, such as the Jew and the Good Samaritan. A present-day equivalent might be an Israeli and a Palestinian. Parable juxtaposes people, things, and situations that seem paradoxical and thereby reverses our expectations. Theologian John Dominic Crossan contends that while myth establishes world, parable subverts it (Crossan, 1994). Parable is not a comparison, but rather a contrast. Unitarian minister David Ord submits that

As parable shatters the myths by which we hold our lives together, it invites us to see ourselves with new eyes and find the magic within us that can transform our everyday experience of reality…True reconciliation of opposites meets us where and when our world is overturned and challenged at its depths. (Ord, 2003, p. 3)

It is in this light that we may read Eiseley's work as parable. The author juxtaposes images of murder, anguish, grief, and the violation of "a dim, intangible ethic" with those of sunlight and the clear and joyful songs of the birds in whose melodies Eiseley find a resounding affirmation of life. His observation that, "they sang under the brooding shadow of the raven" is particularly poignant as it joins contrasting images in close proximity (Eiseley, 1978, p. 34). Eiseley's resolution that the birds were "singers of life, and not of death" is a powerful example of transformative education based directly in an experience of the natural world as teacher, as his worldview is overturned upon witnessing the scene unfold in the glade.

The wisdom of the birds in this story points to an underlying will to life inherent in creation. This is evident in the dynamics of evolution, as the natural world seeks out innovations and collaborations in order for life to continue. Nature remembers these breakthrough experiences and passes them on to offspring. The will to live is fundamental to an understanding of ecological viability.
Eiseley's work continues in the tradition of the *agodzaahi* as he discerns place-based moral teachings that emerge from the land and its creatures. The following are excerpts from children's literature in which lessons of environmental awareness and stewardship are based in particular places and interactions with nature.

In *The Great Kapok Tree: A Tale of the Amazon Rain Forest* (for ages five to eight), written and illustrated by Lynne Cherry (1990), a community of animals in the rain forest talks to a logger as he sleeps under Kapok Tree, axe in hand. As he is sleeping, various creatures speak to the man of their relationship with the Kapok tree and their interdependence with the life forms of the rain forest. The bee, for example, tells the man of its hive in the Kapok tree and of its task of pollination. A troupe of monkeys scamper down from the tree's canopy and speak of what they have seen occur when other trees have been cut: "The roots of these great trees will wither and die, and there will be nothing left to hold the earth in place. When the heavy rains come, the soil will be washed away and the forest will become a desert" (Cherry, 1990, n. p.). The man is visited by a toucan, a macaw and cock-of-the-rock, a tree frog, a jaguar, four tree porcupines, several anteaters, a three-toed sloth, and a child from the Yanomamo tribe who murmurs in his ear, "Senhor, when you awake, please look upon us all with new eyes" (n. p.). And he does. Upon awakening, the man now sees the animals as wondrous and rare, and the forest as bejeweled with glowing light. He hesitates, drops the axe, and walks away.

Cherry's story is a magnificently illustrated science lesson. The text is supported by bright, colorful, detailed drawings of plant and animal life of the Amazon Rain Forest. Three levels of the rainforest--emergents, canopy, and understory--and the various flora
and fauna that inhabit them, provide a lesson in ecology. The subjectivity of each life form is apparent, as is their need for one another.

The natural world has voice in this tale, but it is a human voice. While providing scientifically accurate information about their lives and needs, Cherry ascribes to the animals human thoughts, feelings, and language, enabling the young reader to more easily conceptualize them as sentient subjects. In this, there is a tradeoff. While this story may cultivate empathy for the natural world, and thus, increased stewardship, it may also impede the attainment of accurate scientific understandings characteristic of mature nature writing.

The tradeoff, in my estimation, is worth it. For, in giving the animals human speech, Cherry provides a bridge that brings the young reader into an encounter with the natural world as teacher. The rain forest child who speaks at the end of the story further bridges the gap between the human and natural world when he asks the man to look upon "all of us" afresh. In this scene, the child is visually depicted as surrounded by and enmeshed in the animal and plant life of the rain forest, further supporting the bridging of human and other life forms.

The Giverny Award books also represent an effective balance and collaboration of imagination and scientific integrity in children’s literature. The Giverny Award refers to the famous setting in which Claude Monet created a series of Impressionist paintings that visually capture and explain an aesthetic experience of that region’s flora, making explicit an implicit connection between art and science. It is awarded annually to the author and illustrator of children’s science picture books that teach the young reader at
least one scientific principle or encourage the reader toward specific science-related inquiry.

*Sam Plants a Sunflower* (for ages 4-8), written by Kate Petty and illustrated by Axel Scheffler (1997), is the 1999 Giverny Award winning book in which Sam the Cat and his friends plant sunflower seeds. This hand-sized children’s botany book includes a packet of seeds so that the readers may plant their own sunflowers. Sam’s observations as he raises his first plants enable the reader to accurately visualize plant growth, and a worm’s view provides the underground story of seed germination and growth. This work also provides information on heliotropism, the ability of sunflowers to track the sun across the sky, and other botanical principles.

An excellent tool for cultivating Earth literacy, it is flawed in terms of scientific accuracy in that Sam, the story's protagonist who plants and observes the sunflowers, is a cat. Anthropomorphism, in this instance, weakens rather than strengthens the work because it does not provide information that helps the reader to better understand cats and their behavior. Still, the cat draws the child into a story that has great value in terms of engendering scientific understandings of plants and notions of care for creation.

The examples of literature presented here, in which the natural world is conceptualized as oracle, teacher, or parable, raise questions as to how to balance scientific rigor with artistic license. At what point do such liberties such as giving nature human attributes colonize rather than enhance understandings of the natural world? Is anthropomorphism a necessary literary device in order to bridge us back to our identity as part of nature? Poet Robert Frost appears to take a stand on this issue in his poem, "Take
Something Like a Star," which will be explored in the context of the conceptualization of natural world as healer.

The Natural World as Healer

In "Take Something Like a Star," by Robert Frost, the reader looks through the poet's eyes at the capacity of the natural world to bring one back to a sense of inner stability and calm.

Oh star, the fairest one in sight
We grant your loftiness the right
To some obscurity of cloud.
It will not do to say of night,
Since dark is what brings out your light.
Some mystery becomes the proud.
But to be wholly taciturn
In your reserve is not allowed.
Say something to us we can learn
By heart and when alone repeat.
Say something! And it says, "I burn."
But say with what degree of heat.
Talk Fahrenheit, talk Centigrade.
Use language we can comprehend.
Tell us what elements you blend.
It gives us strangely little aid,
But does tell something in the end.
And steadfast as Keats' Eremite,
Not even stooping from its sphere,
It asks a little of us here.
It asks of us a certain height,
So when at times the mob is swayed
To carry praise or blame too far,
We may take something like a star
To stay our minds on and be staid. (In Lathom, 1969, p. 403)

Frost's poem functions on more than one level. At face value, it provides an eloquent conceptualization of the natural world as healer; we may become staid in the presence of the star. On another level, it functions as parable. The star, in Frost's depiction, refuses to be colonized or quantified by its observers, but instead simply
maintains the integrity of its identity by the simple statement, "I burn." Our expectations are overturned. The star as object now becomes star as subject.

There is a reversal of roles when, rather than yield to the request for disclosure on human terms, the star "asks a little of us here." The human interrogator is now the one of whom something is asked; "it asks of us a certain height." We are asked to rise--to become more. Unmoved by the human requests, the star holds its own in the heavens. The human, then, must change. Whereas the natural world has, at times, been considered less than the human in value, here for human use, it is now the human who comes up "short."

The natural world as parable overturns the modern, scientific worldview of nature as an object of our interest and domination and teaches the human a lesson about the power of holding oneself in integrity. In this, there is perhaps the possibility for healing on a deeper level than first suggested by a surface reading of the poem. For, it offers the suggestion that, like the star, we are, at any given moment, enough.

The concept of the natural world as healer is validated in *This Land is Your Land: Turning to Nature in Times of Crisis*, a series of short essays in *Audubon Magazine*, in which people recall turning to the solace of nature following the terrorist attacks of September 11, 2001 on the U.S. In the wake of September 11, Carl Sifini (2002) reflects

I am drawn to the wild not because it is wild but because it is sensible, logical, ordered, stable, resilient. Wild nature is everything we're struggling to regain in the grief, rage, fear, and deep sadness following the attacks. In the shock of calamity, the ordinariness of nature is what proves most resolutely comforting . . . (Sifini, 2002, p. 42)
The natural world offers signs of hope, renewal, and beauty amidst death and destruction for Sally Tisdale (2002), who draws upon the image of an erupting volcano as she reflects upon the significance of September 11:

The lava is only barren for a while. Close one eye and you see death; places, houses, whole lives buried. Close the other eye and life appears: mosses, ferns, lichens and algae, filling the cracks . . . Life, as it has on this planet for hundreds of millions of years, finds a way. (Tisdale, 2002, p. 43)

These writers reflect what nature writer Annie Dillard discovered years earlier at Tinker Creek, as she reflects on its healing and transformative power:

Live water heals memories. I look up the creek and here it comes, the future, being borne aloft as on a winding succession of laden trays . . . The creek is the mediator, benevolent, impartial, subsuming my shabbiest evils and dissolving them, transforming them into lives, moles, and shiners, and sycamore leaves. (Dillard, 1974, p. 100-101)

Whereas there is a wealth of adult literature on this theme, finding children's literature that conceptualizes the natural world as healer has proven more difficult. Perhaps this is due to a perception that children, at least in the western world, have not yet been sufficiently wounded so as to need solace and recovery. Or, perhaps it might also reflect the notion that children are comforted by adults, but adults must look beyond themselves for healing.

Literary conceptualizations of the natural world as revelatory, by contrast, are bountiful, surfacing richly in poetry, nature writing, fiction, prose, and literature for children, as represented by the following selections.

The Natural World as Revelatory

According to Burton-Christie (1994), nature writing and spirituality share an intrigue with mystery. In these writings the divine is revealed in nature as matter and
Dillard (1974) ruminates, "Our life is a faint tracing on the surface of mystery, like the idle curved tunnels of leaf miners on the face of a leaf" (In Finch & Elder, 1990, p. 821). In another passage she writes, "We wake, if we ever wake at all, to mystery . . ." (In Finch & Elder, 1990, p. 817) In our unfolding journey we encounter things, often by chance, that stir and awaken us because of their beauty, grace, or revelation. Dillard reflects, ". . . I think . . . that beauty and grace are performed whether or not we will or sense them. The least we can do is try to be there" (In Finch & Elder, 1990, p. 821).

Thomas Berry writes that "the way to the world of the sacred is through the place of our dwelling" (1994, n.p.) Poet Mary Oliver contends, “To pay attention, this is our endless and proper work” (Oliver, 1994, p. 8). Cultivating a "sense of place" requires a devotion to learning the art of attention. It requires wakefulness; that we “pause and dwell within this particular moment—as if there will never be another . . .” (Burton-Christie, 2000, p. 114). For, as Burton-Christie contemplates, “. . . if I fail to pay attention, I may never come to see the light shining forth from the depths of my own being, from the lives of others, from the living world” (Burton-Christie, 2000, p. 113).

The nature writers have cultivated the art of attention. Burton-Christie (1994) finds in nature writing, "endless possibilities for genuine encounter with the natural world, for entering into relationships of mystery" (Burton-Christie, 1994, p. 12). He refers to "narratives of conversion" as those which convey the place and way in which an author is "beckoned, even seized" by a sense of mystery in nature (Burton-Christie, 1994,
These narratives suggest "both the revelatory power of natural epiphanies and their capacity to transform those who experience them" (Burton-Christie, 1994, p. 12).

In *God's Grandeur* by Gerard Manley Hopkins (2003), one may sense the author being "seized" by the beauty and divine presence in the natural world, amidst the drudgeries and hardships of life, and awed by the tenacity of this great transformative power. The divine, represented by the Holy Ghost in the form of a dove, overshadows and redeems the human imprint upon the world:

The world is charged with the grandeur of God.  
It will flame out, like shining from shook foil;  
It gathers to a greatness, like the ooze of oil  
Crushed. Why do men then now not reck his rod?  
Generations have trod, have trod, have trod;  
And all is seared with trade; bleared, smeared with toil;  
And wears man's smudge [&] shares man's smell: the soil  
Is bare now, nor can foot feel, being shod.

And for all this, nature is never spent;  
There lives the dearest freshness deep down things;  
And though the last lights off the black West went  
Oh, morning, at the brown brink eastward, springs—  
Because the Holy Ghost over the bent  
World broods with warm breast & with ah! bright wings. (Hopkins, 1993, p. 27)

In less explicitly religious language, Eiseley portrays the natural world as revelatory as he describes the work of the nature writer who puts down his reflections "in the hope that they will come to the eye of those who have retained a true taste for the marvelous, and who are capable of discerning in the flow or ordinary events the point at which the mundane world gives way to quite another dimension" (In Finch & Elder, 1990, p. 526). He advises that the time must be right; "one has to be, by chance or intention, upon the border of two worlds. And sometimes these two borders may shift or interpenetrate and one sees the miraculous" (In Finch & Elder, 1990, p. 527). For, as he
realizes at the conclusion of *The Star Thrower*, ". . . there looms, inexplicably, in nature something above the role men give her" (In Finch & Elder, 1990, p. 547).

Burton-Christie (1994) explains that, because of our ability to see and describe the natural world on many levels simultaneously, including those inexplicable and miraculous realms noted by Eiseley, nature writing is particularly significant for spirituality. He proposes that, because nature writing penetrates the depth of this relationship and opens itself to questions that have long occupied writers and thinkers in the field of spirituality, it is a valuable resource and conversation partner for contemporary spirituality.

In a piece entitled *Words Beneath the Water*, Burton-Christie (2000) dwells upon the concept of "logos" as one that possesses a wealth of meaning and gives expression to "a constellation of Christian mysteries, all grounded in the sense that God comes to us as a kind of utterance" (Burton-Christie, 2000, p. 318). He elaborates

. . . like the cottonwood tree deep in the desert canyon that draws into its branches wrens, juncos, hawks, and ravens and pulses with their movement and color, so the Word has attracted to itself diverse symbols and metaphors, many drawn from the natural world, that have deepened and enriched the Word's expressive power. (Burton-Christie, 2000, p. 318-319)

In *Hymn to Matter*, by French paleontologist, priest, and philosopher Teilhard de Chardin (1919), the natural world itself is a divine utterance. De Chardin blesses matter, which, in both its violence and benevolence, reveals the sacred. He moves the reader into an incarnational theology in which the divine is not only manifested in the human, but in all of creation. In this, he reconciles a Cartesian rift between the spirit and flesh of the world.

. . . Blessed be you, perilous matter, violent sea, untamable passion: you who unless we fetter you will devour us . . .
. . . Blessed be you, universal matter, immeasurable time, boundless ether, triple abyss of stars and atoms and generations: you who by overflowing and dissolving our narrow standards of measurement reveal to us the dimensions of God . . .

. . . Without you, without your onslaughts, without your uprootings of us, we should remain all our lives inert, stagnant, puerile, ignorant both of ourselves and of God. You who batter us and then dress our wounds, you who resist us and yield to us, you who wreck and build, you who shackle and liberate, the sap of our souls, the hand of God, the flesh of Christ: it is you, matter, that I bless . . .

. . . I acclaim you as the divine milieu, charged with creative power, as the ocean stirred by the Spirit, as the clay moulded and infused with life by the incarnate Word.

Your realm comprises those serene heights where saints think to avoid you—but where your flesh is so transparent and so agile as to be no longer distinguishable from spirit. (de Chardin, 1919, chap. 3)

In this work, de Chardin clearly goes beyond the notion of a mechanistic universe toward an understanding of an organic universe that grows out of an emerging theory of evolution. This evolutionary universe, for de Chardin, was one of divine presence and utterances, mediating the sacred.

In *Siddhartha* (for young or older adults) by Herman Hesse (1922), the river utters the sound of the holy. After years of eventful physical and spiritual wanderings that do not lead to the happiness that he seeks, Siddhartha comes to live with Vasudeva, the ferryman, and finds himself and, ultimately, God, in the river. From the earliest encounter onward, the river is depicted as animate subject; like the star in Frost's poem, the river invites Siddhartha into relationship:

The river gazed at him with a thousand eyes, with green, with white, with crystalline, with sky blue eyes . . . In his heart he heard the voice speaking, the newly awakened voice, and it said to him: "Love this water! Stay with it! Learn from it!" (Hesse, 1922, p. 89)

Hesse uses the river as a rich and fecund metaphor that communicates on many levels, speaks in many voices, and leads the reader to the underlying oneness of life:
And once again, when the river swelled in the rainy season and was roaring mightily, Siddhartha said: "Is it not true, O friend, that the river has many voices, very many voices. Does it not have the voice of a king, and of a warrior, and of a bull, and of a night bird, and of a woman giving birth, and of a sighing man, and a thousand other voices?"

"It is so," nodded Vasudeva, "the voices of all creatures are in its voice." (Hesse, 1922, p. 95)

Passing through the seasons of the year, and of the heart, the river is sometimes heard as laughing, at other times lamenting with a sorrowful voice. In reflecting upon the cycles of the water, from vapor to rain to source to brook to river, Siddhartha comes to terms with his own life cycles in a sacred journey toward the Divine.

He could no longer distinguish the many voices . . . everything was one, everything was entwined and entwisted, was interwoven a thousandfold. And all of it together, all voices, all goals, all yearnings, all sufferings, all pleasures, all good and evil—the world was everything together . . . he did not bind his soul to any one voice and did not enter them with his ego, but listened to all of them, heard the wholeness, the oneness—then the great song of the thousand voices consisted of a single word which was "om": perfection. (Hesse, 1922, p. 119)

Siddhartha's ego flowed into the oneness. The river, as mediator of the sacred, leads Siddhartha through a transformative journey to a deeper understanding of life, of himself, the unity of all of creation and, ultimately to the Divine.

The themes of wakefulness and attention emerge most strongly in association with spiritual conceptualizations of the natural world. In the works presented here, a cultivation of attention leads one to the inner essence or spiritual dimension of creation. In these narratives the subjectivity of the natural world is particularly pronounced as it seizes, beckons, and converts the human participant. Nature is vibrantly alive as it reveals the divine directly, or at times more discretely, as shifting borders reveal hidden worlds of meaning.
Re-envisioning Nature; Re-envisioning Education

Through the eyes and senses of ecologists, educators, writers and literary critics this chapter has explored the conceptualization of the natural world as subject, offering an alternative to the mechanistic universe of objects envisioned by modern science. Reenvisioning the natural world as subject requires new ways of seeing, knowing, and remembering who we are that have important implications for the way we do education. Laura Sewall (2001), in *The Skill of Ecological Perception*, suggests that the Earth continually "calls" us with beauty that is sometimes breathtaking, other times heart-wrenching, but always provocative and visceral. She continues

> We are embedded in a multidimensional web of beauty. It is where we are, now. We are also at the interface between an objectified world and postmodern relativism, between a kind of cultural arrogance and unified traditions. (Sewall, 2001, p. 215)

The literary works presented in this study provide a way to push beyond this juncture. The authors included here indicate that literature may cultivate in the reader a sense of place, taking one to new locations wherein one might come to know new life forms, landscapes, and seascapes, and compelling one to see the places she or he inhabits in new ways. It may also bring one into a new relationship with the natural world as subject, self, teacher, healer, and mediator of divine mystery. This body of literature calls the reader to be present, to listen, to observe, to pay attention to detail, and to see how life works in the natural world. The language of nature, as perceived by these writers, is the language of “here” and “now,” of immediacy, of being present, and of being in the right place at the right time to catch sight of the shooting star, the crossing of the borderlands, the insight, the revelation.
These narratives offer an understanding of Earth as subject that moves away from anthropocentrism toward biocentrism; away from views of humans as conquerors toward a systemic worldview wherein humans are part of a total, interconnected, and interdependent life community. These writings, along with an emerging, biocentric genre of revisionist history, provide a way to re-envision the human story as an interactive dynamic between the natural world and the human world, wherein all members of an Earth community reciprocally influence the other.

The work of these writers suggests that education which leads to ecological consciousness might actively cultivate the art of attention, contemplation, and a sense of place, placing the natural world at the heart of the curriculum. Literary works that present the natural world as subject might serve as a cornerstone of this curriculum.

While having much to offer to education that addresses ecological concerns, the concept of the natural world as subject also has limitations. So long as nature is perceived through human bodies, and meaning constructed with human minds, human conceptualizations of the natural world will always be, to some extent, anthropocentric. There is an ever-present possibility that one may construct the world in one's own image and fail to move beyond these self-projections to encounter the world on its own terms. Although the natural world is sentient and communicates in many languages, its utterances are mediated by the human and thus are subject to inaccurate interpretation. Because humans construct the world in ways that fulfill their personal needs for meaning, there is always a danger of romanticizing or colonizing what is perceived. The categories of the natural world as self, teacher, healer, and shaman presented here might represent
such an occurrence. They are, nonetheless, a starting point for considering nature as subject.

In presenting ecofeminist reflections on the *Ecojustice Principles*, Heather Eaton (2002) further illuminates this danger. *The Principle of Voice* holds that "the Earth is a subject capable of raising its voice in celebration and against injustice" (Eaton, 2002, p. 66). While affirming the Earth as a 'speaking' subject, Eaton inquires, "Who will speak for the Earth? With what power and for whom do they speak? How can humans speak for the Earth? With what knowledge and looking through which lens" (p. 66)?

According to the *Principle of Resistance*, "the Earth and its components not only suffer injustices at the hands of humans, but actively resist them in the struggle for justice" (p. 69). Eaton expresses concern about constructing the Earth as either victim or active agent of resistance. She questions, "Who will interpret the actions of the Earth, with what tools and through what lens/world view" (p. 69)? Eaton's concerns are well-taken.

There is a rich body of literature that suggests that humans may overcome our anthropocentrism, at least to some degree, and encounter the natural world in its own subjectivity by entering into an empathic or intersubjective relationship with it. The next chapter examines some of this literature and the theory behind it in the interest of exploring what it might offer an ecological curriculum theory. It does so with an awareness that these authors are speaking to us through their own knowledge, experience, and passions. The question then becomes what these particular writers/lenses offer to education that leads to greater ecological consciousness and concern.
End Notes

1 Ursula LeGuin was born in 1929 to prominent anthropologist, Alfred Kroeber, and author Theodora.

2 The core members of the team of writers in the first two volumes of the Earth Bible series are Vicky Balabanski, Charles Biggs, Norman Habel, Duncan Reid, Michael Trainor, Marie Turner and Shirley Wurst, with contributions from several others. Habel is the editor of the first volume, from which I draw here.

3 Leopold’s use of the word “worthless” here is noteworthy in light of his underlying premise that everything has intrinsic value. It appears that, in this excerpt, Leopold is looking through the eyes of the pioneer rather than expressing his own deepest beliefs.

4 The role given to the grasses of this valley as a force in shaping history is affirmed by Michael Pollan who, in The Botany of Desire (2001), asserts that “it makes just as much sense to think of agriculture as something the grasses did to people as a way to conquer the trees” (p. xxi).

5 Co-evolution, of course, precedes human existence, as a cooperative, symbiotic dynamic between non-human life forms.

6 Carson’s most influential book, Silent Spring (1962), documented the harmful effects of pesticides on the health of the environment, triggering a federal investigation under President Kennedy that resulted in tighter controls on the use of D.D.T. and other toxic products.

7 Although Charles Darwin's theory of evolution was widely known during the latter part of Montessori's lifetime, the idea of an expanding and emergent universe as expressed in the "Big Bang" theory, would not be developed until the early 1960s, with the invention of the Hubble Telescope, which was able to support the theory with empirical evidence. Thus, Montessori's reflections on the universe do not consider it in this light. One can only imagine what awe it might have inspired in her if this were then known.

8 The Giverny Award represents the views of the 15 Degree Laboratory’s Award Selection Committee, under the direction of Dr. James Wandersee of Louisiana State University.
CHAPTER FOUR:
"IF YOU WILL, YOU CAN BECOME ALL FLAME": INTERSUBJECTIVITY WITH THE NATURAL WORLD

Introduction

The previous chapter examined the conceptualization of the natural world as subject. This chapter explores human intersubjectivity with nature as well as intersubjectivity within the natural world itself and considers what these relationships might offer to the field of curriculum theory on behalf of ecological concerns. The chapter unfolds in three main sections, moving again from theory to literary excerpts that support it.

The first section examines "intersubjectivity" (Abram 1996) as a theoretical notion, taking various forms including "participatory consciousness" (Berman, 1981, Abram, 1996), "empathic fusion" (Goizueta, 1995), and "bodymind" (Hocking, Haskell, & Linds, 1999) or embodied knowing. In doing so, it draws upon the work of twentieth century philosophers and educators who seek to redress a scientifically outdated, Cartesian epistemology and engender a more holistic worldview that reflects new understandings of the universe and how it functions. In the case of Hocking, Haskell, and Linds, these efforts are directly tied to ecological concerns. This section also explores the ways in which some writers bring together the concepts of body, mind, spirit and Earth, in the context of agriculture (Berry, 1977) and pedagogy (Orr, 1992). Chapter three considered the natural world as a source of language and meaning-making. This chapter takes this notion a step further by considering language and the construction of meaning as expressions of an intersubjective and embodied relationship with nature—a reciprocal exchange with an animate world (Abram, 1996).
The second section of this chapter contextualizes the discussion of intersubjectivity in literature about nature, drawing upon a rich palette of literary works of twentieth century nature writers and those who theorize about these works. Because the nature writers are rooted in science, yet actively interact with the subject about which they are writing, they provide a new way to look at and experience both science and nature. These writings explore, in particular, the in-between, marginal spaces wherein seemingly disparate worlds come together and cross-fertilize each other. Mystery and transformation emerge as prominent themes of the literature of these marginal spaces of encounter as body and mind, Spirit and Earth are rewoven.

The third section narrows in focus to the garden as a particular context for intersubjectivity of the human with the natural world. This focus grows out of a desire, at this point in the study, to provide less breadth and more depth in order to discern specific metaphors and their potential for cultivating ecological consciousness. This focus is also an expression the researcher's interest in gardening and commitment to agricultural issues as environmental issues. The section moves from nature writing to children's literature, to revisiting the Garden of Eden, viewing the latter through a revisionist lens that offers a different interpretation than that suggested by Carolyn Merchant in the second chapter. Finally, drawing upon scientific writings, it looks at intersubjective relationships within the garden that do not directly include the human, mining the Earth for metaphors that facilitate deeper ecological understandings.

**Intersubjectivity**

Edmund Husserl (1859-1938), who initiated the philosophical movement of phenomenology in the early 1900s, sought to rejuvenate the world of sensorial experience
and to ignite the recognition of Earth as the forgotten foundation of human awareness (Abram 1996). Husserl describes phenomenology as a knowledge that grows out of lived experience. Maurice Merleau-Ponty (1907-1961), who built upon Husserl's ideas concerning the embodied nature of experience, proposes that

…if we want to subject science itself to rigorous scrutiny and arrive at a precise assessment of its meaning and scope, we must begin by reawakening the basic experience of the world, of which science is the second-order expression….To return to things themselves is to return to that world which precedes knowledge… (In Abram, 1996, p. 36)

Husserl and Merleau-Ponty sought to return to a forgotten world of experience as it is immediately lived. This kind of pure experience, they assert, is that which precedes thoughts about it. Through this quality of experience they believe that a person returns to Earth as the primal source of awareness. Husserl uses the term "intersubjectivity" to describe the relational quality of experience that would form the basis of knowledge about the world. In the writings of these philosophers, intersubjectivity emerges as a middle ground between constructivism, which leans toward a potentially dangerous anthropocentrism, and scientific positivism, which separates and isolates in order to produce knowledge.

Husserl proposed that there are two intersubjective regions of the experiential or phenomenal field: "…one of phenomena that unfold…on this side of my body--and another region of phenomena that are, evidently, responded to and experienced by other embodied subjects as well as by myself" (In Abram, 1996, p. 38). In an intersubjective relationship, then, both the human and the other-than-human are considered as subjects.

David Abram (1996)¹, who interprets the work of Husserl and Merleau-Ponty, explains the notion of intersubjectivity when he describes the phenomenon of
encountering an oak tree as subject. The perceived presence of a tree exists before the human comes to look at it, and the tree does not disappear when one turns away. The tree remains a discrete experience for humans and for other sentient organisms, as it quietly drinks sunlight through its leaves. Thus, the relative solidity and stability of the world is established.

An intersubjective experience is an embodied one. Abram continues, "It is as visible, animate bodies that other selves or subjects make themselves evident in my subjective experience, and it is only as a body that I am visible and sensible to others. The body is precisely my insertion in the common, or intersubjective, field of experience" (Abram 1996, p. 45). The living, sensing body has open and indeterminate, membrane-like boundaries that define a surface of metamorphosis and exchange. An active and open form, the body is "continually improvising its relations to things and to the world" (p. 49).

It seems appropriate, then, that knowing be represented by bodily functions. Abram describes the phenomenon of embodied knowing in terms of respiration:

The breathing, sensing body draws its sustenance and its very substance from the soils, plants, and elements that surround it; it continually contributes itself, in turn, to the air, to the composting earth, to the nourishment of insects and oak trees and squirrels, ceaselessly spreading out of itself as well as breathing the world into itself, so that it is very difficult to discern, at any moment, precisely where this living body begins and where it ends. (Abram 1996, p. 46)

Like breathing, perception may also be thought of as a communion whereby the animate, sensible world actively expresses itself directly to one's senses. Merleau-Ponty reflects, "As I contemplate the blue of the sky…I abandon myself to it and plunge into this mystery, it 'thinks itself within me,' I am the sky itself as it is drawn together and unified, and as it begins to exist for itself; my consciousness is saturated with this
limitless blue…” (In Abram 1996, p. 54). In this passage, the color blue seems to be as much a state of being as a visual perception.

Abrams uses the word "synaesthesia" to describe the fusion of the senses in primordial, preconceptual experience. The convergence of the senses -- of color, sight, sound, and feeling - with the world at large ensures that one is destined for relationship, while at the same time experiencing one's own unity and coherence. Abram explains, "…my body is a sort of open circuit that completes itself only in things, in others, in the encompassing earth…the world is perceiving itself through us" (Abram, 1996, p. 62, 68).

Intersubjectivity may then be understood as a reciprocity between the human and the other-than-human in which one's own rhythms are attuned or synchronized with the rhythms, tones, and textures of the world in "a ceaseless dance between the carnal subject and its world …" (Abram, 1996, p. 54). This reciprocity exists within the biosystems of the animate earth itself. Merleau-Ponty explains, "I am breathing deeply and slowly in order to summon sleep, and suddenly it is as if my mouth were connected to some great lung outside myself which alternately calls forth and forces back my breath…” (In Abram, 1996, p. 55).

In oral, indigenous cultures, Abram explains, nature not only dances, but speaks, and the human voice is always a participant with the voices of wolves, wind, and wave; with the encompassing discourse of the animate earth. No element of the landscape, no movement or gesture, is void of expressive resonance, power, or meaning. The land is thus "the sensible site or matrix wherein meaning occurs and proliferates" (Abram, 1996, p. 140).
Participatory Consciousness

Thomas Berry (1988, 1999) finds that many humans in western culture have become autistic in their relationship with the natural world. They do not live in the universe, or on the land, but in cities, disconnected from nature. The kind of intersubjective meaning-making of which Abram writes, however, can only occur when one overcomes this autism and experiences knowing that is embodied and engaged with the world that we inhabit. Morris Berman (1981) and David Abram (1996) refer to this as "participatory consciousness," in which one merges and identifies with one's surroundings. The world is therefore experienced in its felt immediacy.

Participatory knowledge is sensual. Berman (1981) maintains that, "reality that is not 'tasted' does not remain real to us. In order to make a thing real, we must go out to it with our bodies and absorb it with our bodies" (Berman, 1981, p. 181). Berman, in The Reenchantment of the World (1981), depicts the Western worldview prior to the Scientific Revolution as one of participation, connection, enchantment and belonging wherein all members participate directly in its unfolding drama. Participating consciousness in the cosmos meant that one merged and identified with one's surroundings, creating a psychic wholeness (Berman, 1981, p. 16). He explains that in the Middle Ages the universe was thought to be geocentric, with the earth in the center of a series of concentric, crystalline spheres. It was a closed universe, with Man at the center and God, the Unmoved Mover, as the outermost sphere. Causality was teleological; everything but God was in process of Becoming. Everything moved according to divine purpose. Matter was continuous, containing no vacua, and time was
cyclical. Nature was concrete, alive, and organic (Berman, 1981, p. 50). And humans were an integral part of a cohesive whole.

Abram (1996) maintains that thought and language grow directly out of this rich, participatory experience of the world. Merleau-Ponty saw human language as profoundly carnal, rooted in sensorial experience; "meaning sprouts in the very depths of the sensory world…" (In Abram, 1996, p. 75). Language is learned bodily rather than mentally. Through "gestural genesis" communicative meaning is first embodied in the gestures by which we physically express feelings and respond to our affective environment. Human languages are informed by the structures of the human body and the human community as well as by the evocative features of the more-than-human landscape. They are thus the expression of the animate earth (Abram 1996, p. 74).

While European philosophy has focused on the issue of human specialness, setting humans apart from and above the rest of creation, the phenomenologists submit that language is an ongoing exchange "between our own flesh and the flesh of the world," belonging to the animate landscape as well as the human community (Abram 1996, p. 89, 82). Ferdinand de Saussure (1857-1913) takes an ecological view of language, depicting it as an organic, living system of internally related parts; "…a thoroughly interdependent matrix, a webwork wherein each term has meaning only by virtue of its relation to other terms within the system" (In Abram 1996, p. 82). Abram maintains that by making language a code to be understood on a secondary level rather than immediately experienced in relation to the world, humans created an abstraction, setting themselves apart from the animal world. The ecological analogy thus runs even deeper. He writes,

As technological civilization diminishes the biotic diversity of the earth, language itself is diminished… As the splashing speech of the rivers is silenced by more
and more dams, as we drive more and more of the land's wild voices into the oblivion of extinction, our own languages become increasingly impoverished and weightless, progressively emptied of their earthly resonance. (Abram 1996, p. 86)

When a culture shifts its participation from the outer world to the printed text, "the stones fall silent" (Abram 1996, p. 131). It follows, then, that literature which grows directly from a participatory experience of the natural world might enable the stones to speak once again.

Empathic Fusion

The notion of "participatory consciousness" finds resonance in the writings of Jose Vasconcelos (1882-1959), who moves the discussion into the realm of beauty and, ultimately, love. In 1918 Vasconcelos proposed an aesthetic philosophy in which what he calls "empathetic fusion" between subject and object occurs. In this experience, the person or subject loses him or herself in the experience of connection (Goizueta, 1995, p. 91). In exploring Vasconcelos' aesthetic philosophy, Roberto Goizueta explains, "Rational, logical thinking separates and dissects in order to manipulate the external world; aesthetic judgment becomes one with the external world in order to enjoy and celebrate it" (p. 91-92).

For Vasconcelos the compenetration through love contradicts reason, which analyses and creates barriers. Love, in this framework, is intersubjective in that it involves an intimate exchange between subjects that mutually give of themselves and receive of the other. In the Christian tradition, marriage is viewed from a scriptural basis as two people becoming one. Boundaries between self and other are redefined. By setting rationalism and logic in opposition to love and real life, however, Vasconcelos appears to be creating an overstated, if not false, dichotomy, thus succumbing to the same
temptations as ecofeminists who risk replacing old dualities with new ones rather than liberating them.

Intersubjectivity, by its nature, overcomes dualities and generates holistic experiences of the world. Empathic fusion implies a sensate way of knowing that goes beyond vision. Abram (1996), argues that seeing is a way of knowing that separates the knower from the known and proposes a move toward an oral-audial orientation to the world which he finds to be characteristic of indigenous peoples. By employing other ways of knowing, empathic fusion dissolves boundaries between self and other, knower and known--boundaries of language and communication between humans and the natural world.

Bodymind

The move away from the dualities of subject/object, head/heart, mind/body is referred to by some recent thinkers as "bodymind," which was the theme of a curriculum theory conference entitled "Bodymind: Holistic Explorations of Cognition, Action, and Interaction in Education." Held in May 1999 in Vancouver the conference gathered scholars who had been influenced by phenomenology, Buddhism, ecological theory and the holistic biology of Humberto Maturanna and Francisco Varela, representing the leading edge of holistic education theorizing (Miller, 2001). In the Preface to a published collection of papers presented at the conference, Ron Miller (2001) explains that the authors invite the reader to an experience of bodymind as "knowing-through-action" (Miller, 2001, p. xiv). The theory of bodymind is concerned with the dynamic relationships between knower and known, teacher and learner, that lies at the heart of the educational endeavor. The authors explore how we might "educate the soul of the human
being…” (p. xiv). Co-editors Brent Hocking, Johnna Haskell, and Warren Linds suggest that the distinction between embodied knowing as content and engaged knowing as process will disappear as one becomes familiar with the notion of bodymind.

In "Experiencing Unknown Landscapes: Unfolding a Path of Embodied Respect," Haskell (2001) contends that embodied ways of knowing, connected to the land and one another, are vital for both education and stewardship of the Earth. These embodied ways of knowing, she argues, embrace the inseparability of body and mind. Haskell proposes a pedagogy based upon bodymind activities in education. Toward this end, she seeks to find theories that recognize and honor human experience as fluid and ecological. These, she believes, will lead to "embodied respect" within educational communities. Like Haskell, Brent Hocking (2001), in "Touched by Gentle Breezes in Spring: An Ecological View of Renewal in Teaching," presents the need for ecological perspectives that honor the complex, embodied nature of cognition. Hocking explores this view through personal experience and reflections upon their significance for classroom pedagogy.

In "All Knowledge is Carnal Knowledge: A Correspondence³," a published Email conversation with David Jardine, David Abram (2001) sheds further light on the concept of bodymind as it relates to literacy. Advocating that we make room in our collective language for the various non-human voices, he asks that our words be awake to other styles of expression, other bodies, and "other shapes of sentience and sensitivity" (Abram, 2001, p. 316). This entails "that I speak more as a body than as a mind--that I identify more with this breathing flesh (this skin and these hands and this ache in the gut) than my culture generally allows, and that I let my words and my thoughts blossom out of my limbs" (p. 316).
Abram's description of carnal knowledge graphically portrays the sense of connectedness and integration characteristic of intersubjective experience. In *The Unsettling of America, Culture & Agriculture*, Wendell Berry (1977) also makes a strong connection between body, mind and Earth. Berry describes this connection both in terms of religion and agriculture. He contends that we are part of the mystery of Creation. And, although many of us live in urban settings, our bodies live by farming; "we live agriculture as we live in flesh" (Berry, 1977, p. 97). Agriculture, according to this depiction, creates an intersubjective relationship between Earth and humans. The human body is inextricably joined to the soil and to the bodies of other living creatures. He argues that since our bodies share with the bodies of plants and animals in "the cycles of feeding and the intricate companionships of ecological systems and of the spirit," our fragmentation cannot be our cure, for it is our disease (p. 103). To be healed, Berry maintains, we must come with all creatures to "the feast of Creation" (p. 104).

Berry finds a profound resemblance between the way humans treat their bodies and the way they treat the Earth. He submits that contempt for the body invariably manifests itself in contempt for other bodies--"the bodies of slaves, laborers, women, animals, plants, the earth itself…" (Berry, 1977, p. 105). Extending his grievance to social structures, Berry likens the separation of the soul from the body and from the world to "a fracture that runs through the mentality of institutionalized religion like a geologic fault…a flaw in the mind that runs inevitably into the earth" (p. 108-109). He concludes with the hopeful vision of a world that is a "great meeting place" where soul and body, spirit and flesh, word and world, "pass into each other" (p. 109).
David Orr's (1992) reading of Henry David Thoreau's *Walden Pond* (1854) affirms this intersubjective phenomenon of body, spirit and world. According to Orr, Thoreau did not 'research' Walden pond, but rather, he went to live it. Although he did not produce usable data, Thoreau lived his subject by carefully observing it and himself. In the process of doing so, "he revealed something of the potential lying untapped in the commonplace, in our own places, in ourselves, and the relation between all three" (Orr, 1992, p. 125). Orr thus views *Walden Pond* as modeling "the possible unity between personhood, pedagogy, and place" (p. 126). Thoreau's reflection on a small lake vividly illustrates Orr's point: "A lake is the landscape's most beautiful and expressive feature. It is the earth's eye; looking into which the beholder measures the depth of his own nature. The fluviate trees next to the shore are the slender eye-lashes which fringe it, and the wooded hills and cliffs around it are its overhanging brows" (In Shanley, 1994, p. 186).

This work has looked at the notion of intersubjectivity, taking expression in various forms. From these writings one may conclude that an intersubjective experience of the natural world is embodied and sensorial, involving interpenetration and exchange through permeable boundaries. Extending these understandings to agriculture and pedagogy, this study finds still more connections between the human body and Earth.

According to Abram and de Saussure these connections generate language and meaning. It would follow, then, that when one's intimate connection with the natural world is severed, human meaning-making is impaired. By the same token, encounters with the natural world might bring one into a fuller experience of what it means to be human. The following is an exploration of language and imagery drawn from literature that illuminates the experience of intersubjectivity.


**Intersubjective Spaces**

Philip Sheldrake (2001), in "Human Identity and the Particularity of Place," draws upon the work of Arnold Berleant (1992) when he describes "place" as "a complex network of relationships, connections and continuities…" (Sheldrake, 2001, p. 3). Sheldrake also cites Walter Brueggemann (1977), explaining that place has historical meanings and memories that provide continuity and identity across generations. The physical landscape, then, becomes an active partner in the conversation between physical geographies and "geographies of the mind and spirit" (p. 5). Sheldrake contends that these physical places, which invite our participation, serve as rich and vital sources of metaphor by which we socially construct and define our perceptions of reality.

In the works of the nature writers, marginal spaces of shifting or ambiguous boundaries generate particularly rich metaphors for places of intersubjective encounter or conversation. In *Walden Pond* Thoreau describes the surface of a pond as a meeting place of two realms: "Walden is blue at one time and green at another even from the same point of view. Lying between the earth and the heavens, it reflects the color of the sky…" (p. 176). In this description lies the subtle stirrings of language and metaphors to depict the blurring of boundaries between Earth and heaven, the material and the spiritual, as Cartesian dualities collapse into holism.

Rachel Carson (1955), in *The Edge of the Sea*, also writes of borderline, marginal spaces as places of meeting, interpenetration, and mystery: "Looking out over the cove I felt a strong sense of the interchangeability of land and sea in this marginal world of the shore, and of the links between the life of the two (In Finch & Elder, 1990, p. 523). One
may see in this passage a blurring of boundaries between land and sea. This marginal space is an intersubjective space. Carson continues

Underlying the beauty of the spectacle there is meaning and significance. It is the elusiveness of that meaning that haunts us, that sends us again and again into the natural world where the key to the riddle is hidden. It sends us back to the edge of the sea, where the drama of life played its first scene on earth. . . . (p. 524)

Literature itself might be viewed as a rich and fruitful intersubjective space between the author and the readers which both describes and gives birth to other intersubjective spaces wherein mind, body, spirit and Earth meet and cross-fertilize one another. Burton-Christie writes, "It inhabits and searches out those charged borderlands, those places of encounter where longing gives way to relationship, communion, intimacy" (Burton-Christie, 1999, p. 65). This "simple, radical relationality" lies at the heart of nature writing. Burton-Christie elaborates:

Here, in this liminal space, it becomes possible to imagine the apparently impermeable boundaries that separate one place from another, spirit from matter, ourselves from other living species, ourselves from God, as permeable. It becomes possible to imagine ourselves as no longer standing aloof and distant from the world, but as caught up into, transformed by the intimate presence of the living world within and around us…” (p. 65)

Burton-Christie (1994) underscores the importance of emotional engagement with the subject matter as an integral part of this transformative process. The nature writer must address the subjective and personal. In the words of scientist E. O. Wilson, "You start by loving a subject" (Burton-Christie, 1994, p. 10). Reminiscent of the aesthetic philosophy of Vasconcelos, Edward Abby explains that the nature writer needs "…a sympathy for the object under study, and more than sympathy, love. A love based on prolonged contact and interaction. Intercourse if possible…” (Burton-Christie, 1994, p. 11).
Nature writer Loren Eiseley (1907-1977) provides a striking depiction of interspecies 'intercourse' in his fictional short story "The Dance of the Frogs" (1978). In this piece, a young scientist comes across an esteemed elder scientist, Albert Dreyer, in a tavern. The usually private and sedate Dreyer proceeds to tell him of his experience of being caught up in the spring rite of the frogs returning to the water for mating and egg laying. Dreyer explains, "...there is a time to skip. On country roads in the spring...You will skip because something within you knows the time - frog time. Then you will skip" (Eiseley, 1978, p. 111). For, "The water was pulling them - not water as we know it, but the mother, the ancient life force, the thing that made us in the days of creation, and that lurks around us still, unnoticed in our sterile cities" (p. 112). It was pulling Dreyer too.

No, you do not pause. You look neither to left nor right, for fear of what you might see there. Instead, you dance on madly, hopelessly...You do not look - you cannot look - because to do so is to destroy the universe in which we move and exist and have our transient being. (p. 113)

To do so would be to destroy the universe of participatory consciousness; to depart from the present moment. Intersubjectivity, in this situation, requires a kind of temporary abandonment of logic or reason in order to gain another kind of knowledge. Dreyer seeks to maintain the bodily connection with the 'other.'

You dare not look, because, beside the shadows, there now comes to your ears the loose-limbed slap of giant batrachian feet, not loud, not loud at all but there, definitely there, behind you at your shoulder, plunging with the utter madness of spring, their rhythm entering your bones until you too are hurtling upward in some gigantic ecstasy that is not given to mere flesh and blood to long endure...I was part of it, part of some mad dance of the elementals behind the show of things. (p. 113)

Dreyer now physically embodies the rhythm of the ritual dance of the frogs and is changed by the experience of intersubjectivity.
Even as I leaped, I was changing. It was this, I think, that stirred the last remnants of human fear and human caution that I still possessed. My will was in abeyance; I could not stop. Furthermore, certain sensations, hypnotic or otherwise, suggested to me that my own physical shape was modifying, or about to change. I was leaping with a growing ease. I was -

It was just then that the wharf lights began to show. We were approaching the end of the road, and the road, as I have said, ended in the river. It was this, I suppose, that startled me back into some semblance of human terror. Man is a land animal. He does not willingly plunge off wharfs at midnight in the monstrous company of amphibious shadows.

Nevertheless their power held me. We pounded madly toward the wharf, and under the light that hung above it, and the beam that made a cross. Part of me struggled to stop, and part of me hurtled on. But in that final frenzy of terror before the water below engulfed me I shrieked, Help! In the name of God, help me! In the name of Jesus, stop! (p. 114)

Dreyer is forever changed, both psychically and physically, through his participation in the dance of the frogs. Reflecting on his research with frogs, he admits, "I have never been able to handle them for research since. My work is in the past" (Eiseley, 1978, p. 115). Early on in the story we learn that part of Dreyer's mystique as a retired scientist involves a black glove that he wears on one hand. The mystery of the glove is now revealed.

He paused and drank, and then, seeing perhaps some lingering doubt and confusion in my eyes, held up his black-gloved hand and deliberately pinched off the glove.

A man should not do that to another man without warning, but I suppose he felt I demanded some proof. I turned my eyes away. One does not like a webbed batrachian hand on a human being. (p. 115)

In "The Dance of the Frogs" the reader encounters a person caught up in a primal intersubjectivity of human life, animal instinct, water, which serves here as a metaphor for the life-giving womb of creation, and the powerful reproductive drive inherent in all of nature. The drive toward interspecies connectedness is also a moving force behind Wil's journey in "The Island" (Paulsen, 1988). The island, as a microcosm of the universe, pulled Wil to itself and shaped him; "He was what the island had made him and
continued to make him” (1988, p. 132). Returning to Gary Paulsen's story for young adults, we revisit Wil as he explores the world of the loon as an extension of his own interior being:

You had to be a loon, he thought, to make this sound. You had to understand all that a loon understood, be all that a loon could be, go all the places a loon could go – you had to be a loon. And so, he thought, dozing, maybe it’s that way with all things. Perhaps you cannot learn, truly learn of something unless you become what you’re trying to understand... But how then, he thought, how to write of or paint anything except yourself? (1988, p. 173)

As Wil merged sensually and spiritually with the life forms of the island, he came to know himself and the world profoundly, gaining a broader perspective and capacity to understand, to love, to forgive, and to laugh at life. When urged to leave the island by his friends and family, Wil responded, “…I know that if I leave here, if I go back without learning more, I will somehow lose what I am, and I don't want to do that. I don't ever want to do that” (1988, p. 116). The identity of the loon has become integral to Wil's identity.

Paulsen's story clearly illustrates the notion of intersubjectivity, but here it is on both a physical and metaphysical level. While Wil sees and physically draws the loon, he also feels or intuits the various gestures of the bird within his own body. This suggests that the notion of intersubjectivity proposed by Husserl and Merleau-Ponty might be extended to embrace experience that is vicariously internalized as embodied knowing. Expanding intersubjectivity into the realm of the metaphysical creates a larger space for the sacred.

Reweaving Spirit and Earth

Wil's inner journey takes on the appearance of a spiritual quest. According to Burton-Christie (1996), this quest, exemplified in the Christian monastic tradition, is
rooted in a complex, rhythmic pattern of withdrawal and engagement. The movement between these two impulses is like the pulse of the ebb and flow of the tides. In "Fire and Silence" Burton-Christie tells the story of Anthony, a fourth-century monk, who emerges from the wild with special healing powers after twenty years of solitary prayer, fasting, meditating on sacred texts, and wrestling with demons. The purpose of monastic life in the wilderness is "the awakening to a simple vision of oneself as part of a world that is whole, innocent" (Burton-Christie, 1996, p. 66). Spiritual transformation, in this tradition, does not occur apart from the natural world, but in intersubjectivity with it; "deepening one's capacity to respond to the world,...learning to see and celebrate...the traces of spirit arising from the palpable world" (p. 67). Burton-Christie continues:

It means learning that the pores of the soul can be opened, that we can drink deeply from the verdure of the world, and pour ourselves back with unstinting generosity. It means entering the great dance of the spirit in the world. (p. 67)

Experiencing this transformation, one of the early desert monks, Abba Joseph of Panephysis, declared, "If you will, you can become all flame" (In Burton-Christie, 1996, p. 67).

In "The Star Thrower," by Loren Eiseley (1978), the inner fires of the main character are rekindled through an intersubjective encounter with the natural world. In this piece a nameless narrator describes himself bleakly as "the skull...the inhumanely stripped skeleton without voice, without shape, wandering alone upon the shores of the world. I was devoid of pity, because pity implies hope" (Eiseley, 1978, p. 169). He is clearly in need of transformation.

The narrator comes upon another man wandering the coasts and throwing the many starfish on the beach back into the sea. He converses with him and learns that the
star thrower wishes to save the starfish from death on the dry beaches. After a conversation with the star thrower, he vacillates between his inner darkness and a newfound sense of hope born of a fleeting glimpse of the holy.

I turned as I neared a bend in the coast and saw him toss another star, skimming it skillfully far out over the ravening and tumultuous water. For a moment, in the changing light, the sower appeared magnified, as though casting larger stars upon some greater sea. He had, at any rate, the posture of a god.

But again the eye, the cold world-shriveling eye, began its inevitable circling in my skull. He is a man, I considered sharply, bringing my thought to rest. The star thrower is a man, and death is running more fleet than he along every seabeach in the world. (Eiseley, 1978, p. 172-173)

After passages of autobiographical recollection, the narrator remembers the Biblical injunction, "Love not the world." He responds in a whisper:

"But I do love the world…I love its small ones, the things beaten in the strangling surf, the bird, singing, which flies and falls and is not seen again." I choked and said, with the torn eye still upon me, "I love the lost ones, the failures of the world." It was like the renunciation of my scientific heritage. The torn eye surveyed me sadly and was gone. I had come full upon one of the last great rifts in nature, and the merciless beam no longer was in traverse around my skull.

But no, it was not a rift but a joining: the expression of love projected beyond the species boundary by a creature born of Darwinian struggle, in the silent war under the tangled bank…I had seen the star thrower cross that rift and, in so doing, he had reasserted the human right to define his own frontier. He had moved to the utmost edge of natural being, if not across its boundaries. It was as though at some point the supernatural had touched hesitantly, for an instant, upon the natural. (p. 182)

In this interpenetration of the natural and supernatural, the main character is transformed. His reintegration with the natural world through love becomes his own self-integration. He too becomes a star thrower and experiences himself as part of something larger: "We were part of the rainbow--an unexplained projection into the natural" (p. 184) His spiritual transformation gives him the ability to act with hope against seemingly impossible odds. "It was like a sowing--the sowing of life on an infinitely gigantic
scale...I flung and flung again while all about us roared the insatiable waters of death" (p. 184).

The man embraces the world with love and follows the star thrower in imitation, thereby raising himself to a new level of being where despair gives way to hope and resistance to the sacred gives way to surrender.

I picked up a star whose tube feet ventured timidly among my fingers while, like a true star, it cried soundlessly for life. I saw it with an unaccustomed clarity and cast far out. With it, I flung myself as forfeit for the first time, into some unknown dimension of existence. (p. 185)

Like Wil in Paulsen's story, the main character in Eiseley's work experiences intersubjectivity on both physical and metaphysical levels. The man physically throws the starfish out into the sea and, with it, throws himself metaphorically into the realm of mystery. By joining himself to the starfish and to the sea into which it is thrown, the man becomes parable, reconciling dualities of life and death, hope and hopelessness. In his intersubjectivity with the natural world lies his personal redemption; he is able to affirm the life of other creatures and of himself despite adversity and fear of the unknown and, ultimately, to embrace the divine.

**The Garden as Intersubjective Space**

This dissertation has considered the notion of intersubjectivity as expressed in the works of various philosophers, theorists and writers. It has looked at the confluence of mind, body, spirit, and Earth, deconstructing Cartesian dualities that separate and isolate objects of study. This deconstruction is an important move toward a more holistic orientation toward experience, knowing and meaning-making. The value of learning a particular place has been noted, as one enters deeply into its inner life and that of its inhabitants. The language of these encounters, as articulated by the nature writers, is one
of love, intimacy, mystery and transformation, as self and other, heaven and Earth, are reconciled both within and outside of the human.

Returning to the overall ecological focus of this study, and noting the great impact of agriculture on the environment, the remainder of this chapter will examine the particular place of a garden. In doing so, it will explore what the garden might yield in terms of conceptualizing the natural world as an intersubjective space, with an eye for unpacking, in the final chapter, the implications of this conceptualizing for curriculum theory.

John Dewey (1900) laid the groundwork for this type of thinking as early as 1900. In *The School and Society* Dewey charted the physical layout for a laboratory school based on the premise that the only way to unite the parts of the system is to unite each to life. In this chart, the school system itself occupies a center block. Below the center block are the garden, the park, and the country, representing the relation of schooling to the natural environment. Dewey proposes that from the garden children would be led on to surrounding fields, and then into the wider country (Dewey, 1900). He regrets the isolation of the school from life and urges that education be child-centered and experiential.

In *Earth in Mind* (1994) David Orr recalls that until recently people learned much of what they knew about the natural world from the experience of growing up on a farm or by visiting nearby farms. He postulates that the increasing gap between the broad support for environmental causes evident in public opinion polls and a growing ignorance of how ecosystems work, as well as the adverse effects of private consumption and economic growth upon them, is due to the decline of ecologically diverse farms and the
experience of the natural world they fostered. Whereas, traditionally, farms have served as a reality check on human possibilities in nature, the sharp decline in the number of farms, along with the shift toward industrial agriculture, has negatively impacted our collective ecological intelligence (Orr, 1994).

A garden provides a natural educational context in which this valuable body of knowledge and skill may be rekindled. The cultivated garden is a marginal, intersubjective space between the human and the earth in its natural state; a bridge between civilization and wildness, and a pathway to reconciliation and recovery. The following are three narratives of intersubjectivity set in the context of a garden, drawing from nature writing, children’s literature, and biblical criticism.

In *Noah's Garden*, nature writer Sara Stein (1993) tells the story of how she went from "illiterate gardener to possibly not a gardener at all" (Stein, 1993, p. 3). Her experience with gardening opens up for her vast new worlds of imagery, inquiry, and meaning and causes her to confront some fundamental issues within herself and in her relationship with the natural world and its creatures, both human and non-human. Her work on gardening encompasses a broad spectrum of topics including science, natural history, land ownership and land use, loss and recovery of biodiversity, large-scale inorganic substitutions for ecosystems, birds, bees, biological clocks, insects, amphibians and vanished woods, to mention a few.

In a chapter on "Unbecoming a Gardener," Stein looks at botany and horticulture as two differing orientations toward nature. Botanically, she wishes to learn how plants grow; horticulturally, she wishes to learn how gardeners grow them. In doing so, she discovers the basic disparity that plants grow where they can, while gardeners grow them
where they will. She explains that, by happenstance, the seeds of plants fall or their rhizomes wander into favorable conditions for survival. Gardening, however, strives "to defeat chance, or at least to rig the odds," therefore it requires human manipulation (Stein, 1993, p. 3). Further elucidating her dilemma, she writes, "Horticulture told me to cultivate the soil to control the weeds; botany told me the more the soil is disturbed, the more weeds grow" (p. 3).

One can see Stein's struggle with her relationship with the natural world, recognizing both her compulsion to control nature and her appreciation of the wild. Her dilemma illuminates the larger tension between conservationists and those who propose sustainable development. It also represents in microcosm the larger issues about which we have been concerned--conceptualizations of the natural world as object and as subject as expressed, respectively, in the impulse of modern science to control nature and in the sensitivity and attunement of the nature writers who seek not to dominate nature, but to enter into relationship with it.

In another passage, Stein contemplates the effect of a garden, as a manipulated environment, upon the human psyche. She submits that while grassland or forest dwarf the human, a garden provides a sense of "comforting importance, enclosure without impingements, freedom within boundaries, small charms and charming vistas, shifts of shade and sun, flickering changes of hue and texture within a permanent structure" (Stein, 1993, p. 5). Stein adds that a garden is made safe by the gardener's ability to keep wilderness at bay. Grappling with conflicting images, she reflects

…on the one hand the woodlands and meadows of my childhood, now brought into focus by my accumulating knowledge of the broadleaf forest biome of which they were a part, and on the other hand the reassuring transformation of these wild
exemplars into grassy paths, glades, and garden rooms in which one knows that the way inevitably leads home again. (p. 5)

To further complicate matters, Stein brings ecology into the conversation, finding it in contention with horticulture. Whereas, for gardeners, aphids are enemies, moles are nuisances, and snakes are something to be eliminated, ecology views all species as being connected in an interdependent web in which even an ant is precious. She eventually comes to question the concept of plants and animals as independent entities: "There's no such creature as a fig without its fig wasp, as I realize when, chewing more thoughtfully now, I eat the tiny pollinator the fruit has buried in its flesh" (Stein, 1993, p. 9). Consuming an intersubjective relationship surely gives embodied knowing a new flavor.

As Stein's gardening adventure continues, she grows in her disturbing awareness of its ecological consequences. She recalls that when she and her husband first bought their land, it was in a stage of regrowth from pasture to forest that is among the most productive ecosystems on earth. After clearing brush, pulling vines, hauling rocks, breaking ground, and digging beds, the couple had created an expanse of landscaped ground and gardens that seemed to them like Eden. Stein recollects, "Then it hit. I realized in an instant the full extent of what we had done: we had banished the animals from this paradise of ours" (Stein, 1993, p. 9).

After much soul-searching, Stein resolves that America's "clean, spare" tradition of landscaping and gardening has proven to be devastating to rural ecology. "The relentless spread of suburbia's neat yards and gardens" has resulted in local extinctions of foxes, dangerously reduced the habitat of many kinds of birds, and threatened to extinction fragile species such as orchids that rely on a single pollinator, butterflies that require a specific host plant, and turtles whose passage to breeding sites are obstructed by
roads or drainage projects (Stein, 1993, p. 10). She and her husband resolve to turn a portion of their land back to prairie, which turns out to be a slower process than they anticipated.

Sarah Stein brings the reader into an awareness of how a garden might generate a multidisciplinary curriculum, touching upon pertinent themes of ecological education as well as shedding light on the moral and ethical issues involved in human-Earth relations. In wrestling with botany and horticulture she demonstrates, in a personal space, how differing conceptualizations of the natural world might result in differing behaviors toward it. In the end, this leads an attempt to live in a more intersubjective rather than separated manner with the indigenous life forms of her bioregion. While Stein's work deals with a private space, in Seedfolks, written by Paul Fleishman (1997) for young adults, the author looks at a community garden in a poor section of Cleveland, Ohio, as a public space of intersubjectivity with the natural world, including its many and diverse human members. Told through the separate but overlapping stories of its multicultural residents, Fleishman's charming and insightful work illustrates how the garden is internalized by a community at large and by its individual members.

The community garden is initiated with the planting of four bean seeds in a vacant lot by Kim, a young Vietnamese girl whose father died before she was born. Kim plants the seeds so that her father, who was a gardener, might recognize her as his daughter. Ana, a Romanian woman and unofficial neighborhood historian/snoop who has lived in the area since 1919, becomes suspicious of Kim's comings and goings in the vacant lot. Suspecting her of hiding drugs, money, or a gun, Ana digs in the small patch of garden only to find rooted bean seeds. Days later, Ana persuades Wendell, a janitor from
Kentucky, to help her save the withering bean plants that have apparently been planted too early in the season. Wendell's growing involvement in the garden brings him to a new sense of empowerment. He reflects, "There's plenty about my life I can't change. Can't bring the dead back to life on this earth. Can't make the world loving and kind. Can't change myself into a millionaire. But a patch of ground in this trashy lot--I can change that. Can change it big" (Fleishman, 1997, p. 12).

Gonzalo, from Guatemala, tells the story of how the garden brings his childlike and withdrawn, non-English speaking grandfather back to a sense of vitality and adulthood, while Leona, a fiesty black woman, gets city officials to clean up the trash pile adjacent to the garden after bringing a pungent sample of it to City Hall. Sam, a retired activist, notices the ever-expanding garden taking on the characteristics of the neighborhood, with blacks on one side, whites on the other, and Central Americans and Asians toward the back, each group speaking its own language and growing its own special crops. Fences and signs appear. Sam realizes, "God, who made Eden, also wrecked the Tower of Babel, by dividing people. From Paradise, the garden was turning back into Cleveland" (Fleischman, 1997, p. 28). He resolves to break down barriers by encouraging people to interact more with each other.

A colorful ethnic array of characters continues to appear, each with her or his own story, including Curtis, who tries to win back Lateesha's heart with a patch of tomatoes bearing her name, and Virgil's dad, a cab driver who tries to get rich by raising lettuce. Nora, a British nurse, is pushing Mr. Myles, a despondent stroke victim, in his wheelchair when he signals her to stop. They discover the garden. She pushes him onward, only to be stopped again: "I turned the wheelchair and headed back. I could see his nostrils
taking in the smell of the soil. We reached the lot. His arm commanded me to enter.

Over the narrow, bumpy path we went, his nose and eyes working. Some remembered scent was pulling him. He was a salmon traveling upstream through his past" (Fleischman, 1997, p. 47). Nora finds a way to enable Mr. Myles to participate in the garden, changing them both.

What a marvelous sight it was to behold Mr. Myles' furrowed black face inspecting his smooth-skinned young, just arrived in the world he'd shortly leave. His eyes gained back some of their life...A fact bobbed up from my memory, that the ancient Egyptians prescribed walking through a garden as a cure for the mad. It was a mind-altering drug we took daily. (p. 49)

The story of Maricela, an angry Mexican teenager pregnant with an unwanted child, is one of the most poignant vignettes of Fleishman's collection. Forced to work in the garden as part of a program for pregnant teens, Maricela, after much resistance, has a breakthrough experience when she comes to realize that her body is part of nature. "I was related to bears, to dinosaurs, to plants, to things that were a million years old" (Fleischman, 1997, p. 56). She realizes that it is not a disgrace, but an honor to be part of nature. "And for just that minute I stopped wishing my baby would die" (p. 57).

In time, a community grows around the garden, with pantomime used to overcome language barriers. Both literally and figuratively, the garden provides common ground for interacting with the Earth and with each other. Nora reflects, "...we were all subject to the same weather and pests, the same neighborhood, and the same parental emotions to our plants...We, like our seeds, were now planted in the garden" (Fleischman, 1997, p. 50). The experience of connection and sense of place grounded the community.
The community residents experience a certain sadness when winter comes and the garden is dormant. But, in the spring, Florence, a black woman descended from "seedfolks," the first black family in the country, spots Kim going to the garden with a trowel and a plastic bag of lima beans. She recalls, "I felt happy inside as if I'd seen the first swallow of spring" (Fleischman, 1997, p. 69).

From Fleishman's tale of a community and its relationship to a garden emerge themes of identity, hope, empowerment, activism, recovery, interconnectedness, cyclic renewal, and communities of memory--themes that are important to curriculum theory. Reaching back into the collective memory of a culture rooted in the Judeo-Christian tradition, one may find another, archetypal, garden that has contributed to the shaping of present-day notions of oneself, one's relationship to Earth, and to each other. Chapter two looked through the eyes of Carolyn Merchant as she explored the connection between the personification of Eve in the biblical story of the Garden of Eden, and the ecological problems that resulted from a particular reading of this creation myth. Reconsidering the natural world as subject rather than object and explore the curricular implications of an intersubjective relationship with it, this chapter turns again to this story, looking at it through another interpretive lens.

The Garden of Eden Revisited

Fran Ferder and John Heagle (1989), in *The Promise of Partnership, Women and Men in Ministry*, tell the Yahwist account of the Adam and Eve story of Genesis 2 as one of partnership. In doing so, they surface language that further supports the notions of intersubjectivity and holism characteristic of an ecological worldview. Researching the Hebrew text in its original language, they explain that in this creation story "common soil
and holy breath are united. Divinity and humanity mingle. Creation begins in partnership and flourishes in mutuality” (Ferder & Heagle, 1989, p. 37). In an attempt to redress a patriarchal perspective that they contend results from mistranslation and misinterpretation of this ancient text, Ferder and Heagle assert that the ancient author describes the creation of "ha-adam," which appears to be a single creature.

The authors begin their revisionist exegesis by transliterating the italicized words from Genesis 2:7 into their original language.

Then Yahweh God formed ha-'adam of dust from ha-adama and breathed into its nostrils the breath of life, and ha-'adam became a living nephesh.” (Ferder & Heagle, 1989, p. 39)

They explain that adama means "earth" while adam means "earth creature", and ha is the definite article meaning "the." According to Ferder and Heagle, the words adama and adam, then, represent a pun, playfully exchanging images. They retranslate the biblical passage as follows:

Then Yahweh God formed the earth creature of dust from the earth and breathed into its nostrils the breath of life and the earth creature became a living nephesh. (p. 39)

Nephesh, which connotes total selfhood, has no exact English equivalent. Its usage here suggests a gradual unfolding of selfhood that is in process, continuing to take shape throughout the story; "Dusty earth is joined by holy breath and mystery unfolds. God's life mingles with the soil and evokes a creature that is at once earthly and divine" (p. 40). Initially, the sexually undifferentiated creature is simply a combination of dust and breath, not yet capable of initiating action on its own, but only of receiving breath.
Ha-'adam moves from a passive creature to an active worker and decision maker in a garden (Gn. 2:17), becoming responsible for its care as it 'bd (tills) and smr (keeps) it, using its energy and breath on behalf of the Earth. It is not life-sustaining, however to be existentially alone, but rather it is destructive and keeps the earth creature from attaining its full selfhood.

And Yahweh God said,

It is not good for ha-adam to be alone.
I will make for it an ezer k negdo. (cf. Gn. 2:18-19)

Ezer means "companion" and k negdo means "corresponding to it," implying full equality, mutuality and identity. After a period of trial and error in search of this companion, God causes a tardemah, a deep sleep, to fall upon ha-'adam, during which an awesome transformation beyond understanding or explanation occurs. The tardemah experience transforms the neuter earth creature and it emerges as ish and ishash, male and female of the one flesh of the earth creature--"flesh of each other's flesh, companions whose identity is shared by a common humanity, yet made distinctive and unique by separate sexualization" (Ferder & Heagle, 1989, p. 45). "This is at last bone from my bones and flesh of my flesh" (Gn. 2: 23); for the first time, humanity has the ability to speak. Ferder and Heagle submit that in the context of full partnership comes the potential for full self-expression; "humanity's first words express its destiny--a destiny directed toward relationship…" (p. 45).

The authors note that the tardemah experience in this story is initiated by God. During this sacred encounter, the earth creature is changed in such a way that it is able to individuate while also becoming more capable of mutuality and, as a result, to come into full selfhood. The human origin myth, as depicted by the author of Genesis 2, is one of
intersubjectivity and primal holism in which soil and breath, human and God, male and female, are joined. In the reconciliation of these dualistic notions comes the fullness of human expression. This has implications for curriculum theory.

This chapter has looked at the garden as a context for intersubjectivity with the natural world. Moving to an even more particularized place, it now turns its attention to the soil as an intersubjective space. Due to a lack of literary works concerning soil, the following section will draw upon scientific narratives only.

Soil as Intersubjective Space

The definition of soil clearly indicates its intersubjective nature. The United States Department of Agriculture's Natural Resources Conservation Service (NRCS) defines soil as:

(ii) The unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and shows effects of genetic and environmental factors of: climate…and macro- and microorganisms, conditioned by relief, acting on parent material over a period of time. (NRCS, Soils, para. 1)

In *Silent Spring* (1962) Rachel Carson informs us that our existence and that of every animal of the land is controlled by a thin layer of soil that covers the continents. Our agriculture-based life depends on the soil and its health. The very origins and maintenance of its true nature are, in turn, intimately related to living plants and animals in ongoing cycles of connectivity (Carson, 1962).

Telling the story of the soil's natural history in rich, descriptive language, Carson explains that soil is part of the creation of life, "born of a marvelous interaction of life and nonlife long eons ago" (Carson, 1962, p. 53). Volcanoes poured their parent materials out in fiery streams, while waters running over the bare continental rocks wore away the hardest granite, and "chisels of frost and ice" split and shattered them. "Then
living things began to work their creative magic and little by little these inert materials became soil" (p. 53). Life formed the soil and other living things of incredible diversity and abundance that now exist within it. The myriad organisms of the soil, by their presence and activity, make it capable of supporting the Earth's mantle of green (Carson, 1962).

Existing in a state of constant change, the soil takes part in endless cycles. As rocks disintegrate, organic matter decays, and nitrogen and other gases are brought to the earth in rain, new materials are constantly being contributed to the soil. Meanwhile, other materials are borrowed for temporary use by living creatures. Important chemical changes are constantly in progress, converting elements derived from air and water into forms that are usable by plants. Living organisms are active agents in all these changes. (Carson, 1962).

Carson (1962) describes soil as a vast cyclic community of living things. Some organisms form carbon dioxide, which, as carbonic acid, aids in dissolving rock. Other microbes perform oxidations and reductions, making minerals such as iron, manganese, and sulfur available to plants. Microscopic mites and springtails are also present, joining earthworms and other small creatures in the task of slowly converting the forest floor to soil. Carson concludes, "This soil community, then, consists of a web of interwoven lives, each in some way related to the others--the living creatures depending on the soil, but the soil in turn a vital element of the earth only so long as this community within it flourishes" (Carson, 1962, p. 56). Joe Smillie and Grace Gershuny (1999), in The Soul of Soil, similarly describe soil as "a complex living system," adding that we humans are a part of the soil ecosystem (Smillie & Gershuny, 1999, p. 7). This ecosystem, they
maintain, extends to the farm and to society of which it is a part, as they mutually support one another. Whether or not we realize it, humans are all in an intersubjective relationship with soil.

Soil fertility is evaluated by its capacity to nurture healthy plants. This regenerative capacity depends on the health, vitality and diversity of the organisms that carry out their life cycles in the soil. Soil microbes can number in the billions per every gram of healthy topsoil, providing the raw materials that plants need for regeneration. Among these microbes are mycorrhizae, which may serve as yet another example of intersubjectivity.

Mycorrhizae are "Symbiotic relationships between fungi and plant roots" -- "mutualistic relationships in which the fungus obtains at least some of its sugars from the plant, while the plant benefits from the efficient uptake of mineral nutrients (or water) by the fungal hypae" (University of Edinburgh, The Microbial World, Mycorrhizas, para. 1 & 2). An estimated 80% or more of plants have symbiotic relationships with fungal mycorrhizae (Smillie & Gershuny, 1999). More than 2500 different fungi may form from mycorrhizal relationships with trees. There are often several different fungi associated with an individual tree (Forestry Extension, Tree Roots, para. 8).

As the portion of a plant or tree above the ground grows and expands, so too must its root system. A seedling may have two to six feet of root length, while the root system of a mature oak may extend hundreds of miles. And trees may share root systems with one another (Forestry Extension, Tree Roots, para 6 & 9). The area of a single plant's root system, then, can be quite extensive, thus the interface between a plant and the soil can be expansive, increasing points of uptake, absorption and transfer, to 100x,
thus greatly improving the plant's ability to utilize soil resources (Amuranthus, 2003). This allows for vast webs of mycorrhizae to form, capturing and assimilating nutrients.\(^8\)

Biologist Ted St. John explains that the interconnected plants form a community, sharing a system of nutrient uptake and contributing jointly to its energetic support. The networks in a natural ecosystem, consisting of between one and two dozen fungal species, each with its own network, interconnect a number of plant species (Mycorrhizae & the Plant Community, para. 2 & 3). Mycorrhizae, then, link plant and soil as well as plant and plant. And, in yet another cooperative relationship, soil and plant form an erosion-resistant rhizosphere as soil containing plant life conserves both the soil and the plants growing in it. Most important biological transformations take place in the rhizosphere, particularly nitrogen fixation and mycorrhizal connections. The mucigel, an outer coating of the growing root tip, is a substance produced by both the root and the microcommunity around it (Smillie & Gershuny, 1999). At this level, one finds a liquid intersubjectivity.

Mycorrhizae also benefit the plant by attacking and suppressing disease and pathogens and guard the roots against the invasion of root diseases by forming a barrier of dense filaments. They improve soil structure by providing humic compounds and organic "glues" (extracellular polysaccharides) that bind the soil into aggregates whiles also improving porosity which, in turn, influence plant growth (Amuranthus, 2003).

Scientist Lynn Margulis and her son, Dorion Sagan (1998), in Symbiotic Planet, provide insight into the notion of intersubjectivity when they advance a new model of evolution based primarily on symbiosis--the living together of very different kinds of organisms in order to survive. This theory represents a departure from the Darwinian
model of competition and survival of the fittest that has dominated evolutionary science for over a century. In symbiosis, the authors explain, long-term cohabitation may result in symbiogenesis, the appearance of new bodies, new organs, and new species, citing as an example the emergence of the green algal cell from four once entirely separate ancestors. They assert that most evolutionary novelty arose and still arises directly from symbiosis. The concept of symbiosis presents us with new social metaphors of mutuality, cooperation, community, and interdependence, which serve as important values for teaching our children to live together peacefully and to create a viable future (Margulis & Sagan, 1998).

Thomas Berry (1995) describes the Universe as "an interacting and genetically related community of beings, bound together in an inseparable relationship in space and time" in which "each being of the planet is profoundly implicated in the existence and functioning of every other being" (Thomas Berry, 1995, para. 2). Although one may speak of individual, separate organisms in nature, they are rare. And, without the connections between the various entities in nature, life cannot survive. These intersubjective connections, although sometimes outside of the scope of our immediate vistas, animate creation. This has implications for the way that one may think about life and education.

**Conclusion**

This chapter has investigated the notion of intersubjectivity theoretically and as illustrated in nature writing, fiction, myth and science. The garden, the desert, the lake, the edge of the sea, bodymind, body-Earth, matter-spirit, science-art, head-heart, self-other; these are marginal spaces of encounter. As shifting borders give way to new
realms of intersubjective experience, spirit and world are rewoven. The nature writers provide a language and imagery of intimacy with the nature. They take the readers into the physic borderlands wherein they may become one with a starfish that is thrown back into life-giving seas. These writers suggest that by consciously entering into an intersubjective relationship with Earth humans might awaken to themselves as part of the world, part of the star-filled heavens, and become all flame.

The mythic story of the Garden of Eden depicts the human as a creature of the soil and provides a vision of a primal unity wherein life comes from and is integral with Earth. Literary and scientific narratives indicate that a garden is a fertile space for re-grounding oneself in the natural world. Probing beneath the garden one finds living networks of intersubjectivity. The following chapter explores how the many themes that emerge from these writings may enrich curriculum theory on behalf of ecological concerns.

End Notes

1 Because of its emphasis on experience and relationship, Abram refers to phenomenology as "philosophy on the way to ecology" (Abram, 1996, p. 1).

2 The conference was conceived and executed by Brent Hocking, Johnna Haskell, and Warren Linds, who were then graduate students at the University of British Columbia. Together they edited and published the conference essays under the title Unfolding Bodymind, Exploring Possibility Through Education (2001).

3 This piece serves as the Afterword to Unfolding Bodymind.

4 According to widely-accepted biblical scholarship, Genesis 1, the first of two accounts of creation in the Hebrew scriptures, comes from a Priestly source, while Genesis 2, the second account, comes from the Yahwist source.

5 The plural of "mycorrhiza" differs from one source to another. For consistency, I will use "mycorrizae" as the plural, rather than "mycorrhizas."
According to the scientific literature, there are seven kinds of mycorrhiza, the most being arbuscular, named for internal structures called arbuscules, or vesicular-arbuscular, which consist of arbuscules and another structure called vesicles.

The relative relationship of the root to the shoot is calculated as the ration of the weight of the root to the weight of the top. This ration is usually from one fifth to one sixth. This means that the top is five to six times as heavy as the roots (Forestry Extension, Tree Roots, para 6).

The *Armillaria ostoyae*, for example, discovered in the Malheur National Forest in eastern Oregon, stretches 3.5 miles, mostly underground, making it the largest living thing in the world (The Biggest Living Thing on Earth, para. 1 & 2).
CHAPTER FIVE:
SOILS OF REGENERATION

Research Summary

This dissertation has explored conceptualizations of the natural as a context for imagining an ecologically-sensitive curriculum theory. The study was premised on the underlying assumptions that we are in the midst of a global ecological crisis, that this crisis is one of knowledge and education, and that all education is ecological education (Orr, 1994). With these assumptions in mind, the dissertation has looked at the relationship between the ecological crisis and education by examining the role of language in shaping perceptions of the natural world. It has analyzed narratives of science, literature and other disciplines that conceptualize the natural world as object and as subject, and the relationships that result from these conceptualizations. It has evaluated how particular metaphors used in reference to the natural world enhance or impede ecological understanding and the cultivation of responsibility and stewardship.

In doing so, this work has looked at the notion of intersubjectivity (Husserl/Abram, 1996) as expressed in philosophical and theoretical writings on participatory consciousness (Berman, 1981, Abram, 1996), empathic fusion (Goizueta, 1995), bodymind or embodied knowing (Hocking, Haskell, & Linds, 1999), and the intimate connections between body, mind, spirit & Earth (Berry, 1977, Orr, 1992). These concepts have been explored in narratives of nature writing, children's literature, and scientific writings. Marginal or in-between spaces have emerged from these narratives as important and potentially transformative sites of interconnection and meaning making wherein dualities are reconciled and physical and metaphysical realms merge. The implications of these particular findings form the core of this final chapter.
The goal of this chapter is to consider ways in which conceptualizations of the natural world based on intersubjective relationships might be used as a basis for new curriculum theorizing and how this theorizing might underpin a curriculum for ecological viability. Toward this end, it will historically situate the findings of this study within the larger field of curriculum theory, placing them in conversation with theorists and philosophers. Returning to the central theme of language, it will suggest new Earth-based metaphors that provide fresh, regenerative ways of representing curriculum. It will propose that the work of the nature writers embodies a kind of Earth-based metaphorical language that is conducive to cultivating ecological understandings. Finally, it will highlight the original contributions of this study to the field of curriculum theory.

Situating Ecological Education

During the twentieth century curriculum theory was largely governed by the Tyler Rationale, which has historically been seen as a form of control. William F. Pinar (1995, 1996) views Ralph Tyler (1949) and his writings as representing "the quintessential articulation of the curriculum development paradigm" (Pinar, Reynolds, Slattery, Taubman, 1995, 1996, p. 15). In Pinar's view, the Tyler Rationale, which outlined a methodology for determining objectives, learning experiences, organization, and evaluation, is a prime example of the traditional field's interest in procedure and social engineering. He contents that the Tyler Rationale has now come to be seen as "a rational for narrow, behavioristic conceptions which reduced curriculum to objectives and outcomes" (p. 177).

In Understanding Curriculum: An Introduction to the Study of Historical and Contemporary Curriculum Discourses Pinar describes the Reconceptualization
movement in curriculum theory as a shift away from exclusive attention to curriculum
development and toward representations of basic categories of the field and
understandings of these categories. This entails "a shift in definition from curriculum as
exclusively school materials to curriculum as symbolic representation" (Pinar, et. al.,
1995, 1996, p. 16). Whereas Tyler's curriculum development is institutional or
bureaucratic in conception, contemporary curriculum, reconceptualized as symbolic
representation, has come to refer to institutional and discursive practices, structures,
images and experiences that may be analyzed in terms of political, racial,
autobiographical, phenomenological, theological, international, gendered or
deconstructed texts (p. 16). Reconceptualization also involves a conscious move away
from the atheoretical and ahistorical nature of the Tyler Rationale and toward a
profoundly historical and situated orientation toward curriculum.

This dissertation resonates with the abiding concerns of the Reconceptualization
movement in that it entails a shift away from an objectifying scientific rationalism that
has come to be represented by the Tyler Rationale and affirms the values of subjective,
historical, situated, non-linear, and experiential curricula. It shares with Reconceptualists
a concern for spirituality and language as important forces in shaping human learning and
action.

Dwayne Huebner (1993) illustrates the Reconceptualist attunement to spirituality
when he asserts that spirituality is not a stage of cognitive development, but rather a
quality that permeates every facet of education. Gabriel Moran (1981) also sees
spirituality as implicit and pervasive in education. His critical reflections on religion and
ethics include an awareness of and sensitivity to Earth and ecology. Moran proposes, "If
education truly encounters religion (as opposed to tucking it into the school curriculum), education would take on a diversity of forms with qualities I have called rooted and reverent. Education would have roots in the earth, the body, and the family…” (In Pinar, et. al., 1995, 1996, p. 629).

Reconceptualizing curriculum as Earth-centered, embodied, and reverent necessitates a rigorous interrogation of the language of the field. Huebner and David Smith emerge as important voices in this linguistic discussion, the themes of their writings resonating with those of contemporary ecologists.

According to Pinar, Huebner saw the language of curriculum as constrained by the myths of learning and purpose embedded within it; learning was aligned with educational psychology and the empirical-analytic tradition and was thus a term suggesting control. He proposed that the language of learning and purpose be cast aside and that new questions be asked instead (Pinar, et. al., 1995, 1996, p. 417). In challenging the atheoretical and ahistorical tradition that came to be represented by the Tyler Rationale, Huebner urged a critique of conventional curricular language that would be phenomenological in nature.

David Smith reframed Huebner's phenomenological argument in terms of the notion of language as "home." Pinar explains that the task of teachers, in Smith's view, was to recover "those forms of life, and specifically those language forms, which enable him or her to be with children in a more livable way" in "the house of being, which is language itself" (Pinar, et. al., 1995, 1996, p. 421). Here Smith draws on Heidegger who asserted that to reflect on language is to dwell in it as an abode for humanity. Speaking, then, becomes a middle way between moral humans and logos, the voice of language itself.
According to Pinar, Smith attempts to redress the alienation of educators' language from lived experience and to recover the art of hearing; to speak phenomenologically, one must learn to "allow the voice of language itself to speak through us." Pinar continues, "To speak authentically represents a returning home to the abode where we educators may truly live again. Living in language, in the power of language itself to shape us and mold us, is for Smith the only authentic living" (Pinar, et. al., 1995, 1996, p. 422). This way of living, Pinar contends, not only changes us, it changes the world.

**Coming "Home" to Earth: Regenerative Metaphors for Curriculum Theory**

We have seen that, for David Abram (1996) and Douglas Burton-Christie (2000), logos is located in the land as well as in the human community. When the notion of living in language is extended to non-human utterances, it becomes yet more comprehensive, powerful and regenerative. The voices of the natural world, as mediated by the nature writers and other authors of this study, suggest that Earth-based metaphors may shape curricula in such a way as to honor one's embodiment in and interrelationship with nature, place, and spirit as fertile contexts for an ecologically-oriented curriculum theory. These writings bring the reader deep into the dynamics of Earth itself. Coming "home" to the linguistic ground of our being, I offer soil, roots, and mycorrhizae as potentially rich and transformative metaphors for curriculum theorizing.

The metaphor of soil may be seen as representing the creative life context of interrelationship and possibility in which education takes place, while roots might depict the grounding of knowledge in sense of place. Mycorrhizae may symbolize the discursive relationships that occur in the spaces between roots and soil, between the local and the global, between the individual and the whole, between all living entities. The
thematic triad of soil, roots and mycorrhizae holds the potential to generate new ways of thinking about education that reconcile the dualities of object/subject, human/nature, self/other, head/heart, and matter/spirit, which, according to narratives of ecofeminism and Deep Ecology, lie at the heart of the ecological crisis. Relating this triad to the Christian notion of the Trinity, one might also view soil as the creative and life-giving energy of the Father, roots as the particularized expression of the divine in the historical person of Jesus of Nazareth, and the mycorrhizal relationship as the movement of the Spirit, which relates Father and Son, and animates and bonds all of creation into a sacred whole. In the following sections, these metaphors will be explored in conversation with the field of curriculum theory.

Soil: A Creative Life Context of Interrelationship

Rachel Carson (1962) reminds us that soil has a story and it is our story. According to both evolutionary science and various creation myths throughout the world, we come from soil, we are nourished by soil, and we return to soil. Might education do the same?

According to a recent scientific study, life may have indeed come from clay. Jack Szostak, Martin Hanczyc, and Shelly Fujikawa (2003), a research team at the Howard Hughes Medical Institute and Massachusetts General Hospital in Boston, report that a clay mixture called montmorillonite is key to some of the initial processes in the formation of life. The clay mixture helps form little bags of fat and liquid and it helps cells to use the genetic material of RNA, which is an essential life process. This new discovery builds upon previous research in which these scientists discovered that clays can catalyze the chemical reactions needed to create RNA from nucleotides. They
contend that "the formation, growth and division of the earliest cells may have occurred in response to similar interactions with mineral particles and inputs of materials and energy" (www.cnn.com/2003/TECH/science/10/25/clay.life.recap, para. 6). The findings of this research support the beliefs of many religious faiths that life comes from clay or soil.

In a Tahitian myth from the Society Islands (French Polynesia) Ta-aroal breaks out of his egg shaped shell to create the god, Tu. Together they fashion Ti-I, the first man, and Hina (half goddess and half mortal), the first woman, from clay. In a Russian Altaic creation story, the god Ulgen sees mud, having the shape of a human face, floating upon the waters. Ulgen gives the shape a spirit and calls this first man Erlik. In an origin myth from the Maidu people of California, Earth Starter takes red earth and mixes it with water to create a man and a woman. According to Greek mythology, the brothers Epimetheus and Prometheus, who were Titans or Elder gods, create humans from a mixture of earth and water which are poured into molded images of the gods (Hamilton, 1988). And, in the origin myth of the Yoruba of what is now Nigeria, the god Orshilana creates humans out of the earth and gets the god Olurun to blow life into them (www.fandm.edu/departments/Anthropology/bastian/ANT269/cosmo.html, para. 10).

The Australian Aborigines worldview underscores the notion of Earth's life-giving power. According to this worldview, there is a seed power, also referred to as jiva or guruwari, which is deposited in Earth. All meaningful activities, events, or life processes leave behind a vibrational residue in Earth at places at which they occur. The landforms of Earth and their vibrations echo the events of their creation and thus the natural world is seen as a symbolic footprint of the metaphysical beings who brought about creation. The "dreaming" of a place, in which the potency of a particular place is
married to the memory of its origin, consecrates the land in holiness and, through extraordinary states of consciousness, one can become attuned to the inner dreaming of Earth (Lawlor, 1991).

The Spider Woman story is a type of creation myth common among Native American tribes which conceptualizes Earth as a womb from which humans are gradually birthed, and emerge through progressive stages of knowledge and ability (Leeming, 1992). Similarly, according to the Blackfoot American native people, Old Man creates a mother and her child out of clay. The human images evolve over the course of four days until they are able to walk and to ask questions about their existence (Hamilton, 1988).

Like these Native American myths, the second account of creation in the Hebrew scriptures depicts the human as emerging from soil and continuing through various stages of consciousness to evolve into fuller being.

Then Yahweh God formed the earth creature of dust from the earth and breathed into its nostrils the breath of life and the earth creature became a living nephesh. (Ferder & Heagle, 1989, p. 39)

This creation myth may be especially pertinent to this discussion of soil as an educational metaphor, as the Judeo-Christian religious tradition underlies the Western Enlightenment scientific thought critiqued by this dissertation. Rethinking this myth might offer new ways to envision curriculum as creative, holistic, and relational.

As Ferder and Heagle explain, within the word "adama" or "earth" is contained the word "adam," the creature born of soil and divine breath. According to their interpretation of this myth, "adama" reconciles dichotomies of human and nature, heaven and Earth, divinity and humanity, female and male (Ferder & Heagle, 1989). If duality lies at the center of the ecological crisis, then "adama" or soil is a fertile metaphor for
curriculum theory that seeks to reconcile those dualities that have proven to be counterproductive to an ecological ethic. Drawing upon insights offered by narratives of science, literature, and other disciplines, this radically relational metaphor might represent a move from dualism to holism; from human disconnection from the natural world to interrelationship with it; from factual or certain knowledge to the interconnected spaces of unknowing, mystery, and meaning-making between the facts. According to Ferder and Heagle, the reconciliation of these dualities creates the potential for total selfhood and for the fullness and generativity of its expression.

In *Teachers in Nomadic Spaces, Deleuze and Curriculum*, Kaustuv Roy (2003) explores this kind of creative thinking when he seeks to open up pedagogical boundaries "as these arise out of the modes of being and thinking of the actors, in order to get beyond images that have become congealed in thought through habit." For, he contends, "To get beyond these signifiers is to free the imagination" (Roy, 2003, p. 15). Roy draws upon Deleuzian pragmatics as a means of rethinking education and releasing one from oppressive reified categories. He asserts that "such release brings with it a certain transformative energy, and a creative potential of difference, that has the possibility of releasing new powers of being and acting" (p. 15).

Gershanny, Smillie (1999) and Carson (1962) inform us that we are part of the ecosystem of Earth. Soil, as a network of interwoven lives, might be thought of as a context in which creative relationships are forged. This particular understanding of soil may provide a new, regenerative metaphor to help us to rethink curriculum and reframe an epistemology of interrelatedness. Representing an ecological worldview of life as complex and interconnected, this metaphor locates human being in a larger metanarrative
of relationality and provides a viable conceptual framework for a discursive approach to creating knowledge--themes that this chapter will further explore. In doing so, it offers fertile ground for the cultivation of an ecologically-sensitive curriculum theory.

Roots: Grounding Knowing in a Sense of Place

Usually underground, roots absorb nutrients and water from the soil to feed the plant while also establishing it in a particular location, thus situating the plant. Roots thus provide a way to visualize the idea of being grounded in Earth both physically and epistemologically. In this way, roots might serve as an effective metaphor for sense of place or belonging--notions that are important to both cognitive science and ecological education.

Cognitive scientists and psychologists have identified sense of place as a root metaphor for human language and meaning-making. They assert that, along with the metaphor of causality, sense of place underlies language construction, generating all other metaphors (Pinker, 1997). Abram affirms these findings when he submits that the land is "the sensible site or matrix wherein meaning occurs..." (Abram, 1996, p. 140). The literature of Deep Ecology suggests that a sense of place is essential for establishing a bond between the human and the natural world, both individually and collectively, as communities of memory are tied to particular places (Fromherz, 1999). Children in Western culture often fail to connect food, clothing, medicines, material goods, and the energy that fuels vehicles, homes and institutions to the natural world as the source of their existence, thus often failing to realize that their lives depend on the health and vitality of the land. Cultivating a sense of place is thus fundamentally important to human knowledge construction and ecological thinking.
Nature writing and children's literature, as presented in this study, affirm the value of situated knowledge as foundational to an ecologically-sensitive curriculum theory. Potek (1993) skillfully brings this idea home when, in *The Tree of Here*, he explores the significance of a dogwood tree in a young boy's life, while Wil grounds his identity in the life forms of an island (Paulson, 1988). In Fleishman's *Seedfolks* (1997), a small neighborhood community discovers their collective identity by collaborating in the cultivation of a garden. These literary works suggest that we know through place. Sense of place, then, may be thought of as a form of knowing. The knowledge created within this space is personal and uncolonized. It is a deep kind of knowing that is felt and embodied.

Literature might thus be seen as a curricular resource for becoming rooted. Grounded in scientific understandings, the writers explored in this work provide a poetic language of intimacy with the natural world. They model a way of being in nature that is attentive and engaged, bringing the reader into a world of communion and belonging. Intermediaries with the natural world, they lead one into the marginal borderlands; into places of permeable boundaries, of transformative encounters of crossing over into the other and finding oneself there. Through the language of careful attention and an eye for nuance and detail, they provide a wealth of empirical information as well as metaphorical images for conceptualizing the natural world and one's place within it.

Cosmological education provides a larger context and starting point for engendering a sense of place. Thomas Berry (1988, 1999), Maria Montessori (1948), Rachel Carson (1957), and Aline Wolf (1996) propose that a sense of place begins with a sense of wonder. Presenting the universe to children provides an ultimate context for
education. Gazing at the stars above, children begin to understand their place in the universe as inhabitants of a small planet in a solar system on the spiral arm of one of billions of galaxies. From here, they may locate themselves on Earth, the North American Continent, and their local bioregion, learning its flora and fauna.

Moving still closer to home, a garden might serve as an educational site for cultivating a sense of place. The garden provides a localized, particularized entry point into the natural world out of which a multi-disciplinary curricular conversation may grow. Garden-based education holds the capacity for cultivating the knowledge, skills, critical awareness and vision for ecological viability because it models the ecosystem on a small, understandable scale. The garden may cultivate in students an understanding of how their actions affect the larger system of which they are a part and provide a greater knowledge of and appreciation for their local bioregion and city or town, generating a sense of ownership and responsibility (DeMoor, 2000).

To be rooted in the natural world is to have a sense of place and a local context for curriculum. According to the science of botany, rootedness is proportionally related to growth. As a portion of a plant grows above the ground, so too must its root system grow. Mycorrhizae enhance the effectiveness of roots on both concrete and metaphorical levels.

Mycorrhizae: Curricular Spaces of Interrelatedness

Soil, a cyclic community of interwoven lives, is a model of cooperative relationships. Within the soil live fungal mycorrhizae, which are symbiotic relationships that connect root to soil and plant to plant in extensive networks, stretching sometimes for miles, in ever-increasing expanses of uptake and exchange. The word "mycorrhiza,"
from the Latin roots for "fungus" and "root," names a relationship in nature in which all participants mutually contribute to the process of creating underground networks of connectivity. In a mycorrhizal relationship, one finds mucigel, which is mutually created by both roots and fungi. A liquid conductor of relatedness, it underscores the fluidity of vital connections within the soil.

The literary narratives of this study suggest relationship itself as a curricular space. Mycorrhizae, then, might serve as a fertile metaphor for representing the relational spaces in which learning and transformation occur. By proposing mycorrhizae as a metaphor for curriculum, this dissertation suggests a new rhetorical device for conceptualizing the notion of discursive knowledge and for probing more deeply into the dynamics of these relational spaces of knowledge construction. In this capacity, mycorrhizae might be seen as representing the following: (1) relational spaces of meaning-making; (2) non-linearity; (3) conversations across species boundaries; (4) spirituality as discursive space; (5) a dialog between soil and roots; (6) causality. This section will explore each of these possible applications of mycorrhizae as a metaphor for curriculum and contextualize them in the field of curriculum theory.

Relational Spaces of Meaning-making

The narratives of this study point to the notion of interrelatedness as a foundational premise for engendering ecological consciousness. The edge of the sea holds rich associations of meaning and drama for Rachel Carson (1955), while the psychic interface between Loren Eiseley and the starfish teaches him about abandoning oneself to hope (Eiseley, 1978). Knowing occurs in relationship. Knowledge is what results from these encounters. A curriculum based on mycorrhizal connectivity might
emphasize the creative connections that occur in the potentially transformative spaces between the facts. In a mechanistic worldview, facts are objects, frozen and inanimate. In an ecological view of curriculum, knowledge is fluid and the spaces between the facts are living spaces. They may be sites of silence or unknowing, which may be re-envisioned as alternate forms of knowing. Rather than ascribing a punitive value to unknowing, teachers might validate it as important, honoring it as a creative in-between space between knowing and knowing again. Mycorrhizae provide a fresh way to look at knowledge, not as a non-living commodity, but as a living community that is continually in process. This realization fosters a new view of curriculum.

Whereas modern science constructs knowledge through isolating objects of study from their context, an understanding of interrelatedness that grows out of the science of ecology suggests ways of knowing that are contextualized in the rich matrix of relationships of a particular place. Biological and ecological concepts inform the work of educational theorists Lincoln and Guba (1985), William Doll (1993), and others as they align postmodernism with living systems, quantum physics, and other scientific disciplines. This kind of thinking is necessary to ecological education. For, the findings of this study suggest, to live and do education out of paradigms that are not based on cogent understandings of the natural world and how it functions is to create dangerous and ultimately self-defeating abstractions.

Non-linearity

The metaphor of mycorrhizae offers a fresh way to imagine non-linear paths of conversation and connection such as occurs in Fleischman's story, Seedfolk, in which a
colorful cast of characters provide multiple entry points into a larger community experience of gardening.

Curriculum theorists William Doll (1993) and Roy (2003) make compelling cases for post-modern non-linearity. Drawing upon living systems theory and the open or process thought of Jerome Bruner, John Dewey, Jean Piaget, and Alfred North Whitehead, Doll (1993) counters the Tyler Rationale and takes a biological approach when he develops a postmodern curriculum theory that recognizes human beings as living systems and thus open systems. Toward this end, he proposes non-linearity, self-organization, and communication as essential characteristics of a post-modern educational paradigm that leads to transformation.

According to Doll, transformative curriculum most readily occurs within open systems. Whereas “closed systems transmit and transfer; open systems transform” (Doll, 1993, p. 57). “Thus, educational development would occur best when based on the type of system that characterizes being human” (p. 58). He explains that interaction is one of the essential characteristics of living systems in which parts are defined in terms of their relationship to each other and to the system as whole. This is ecological thinking and thus conducive to engendering ways of knowing and being that acknowledge the place of humans in relational balance with their environment.

Citing the work of Hans Reichenbach (1951), Doll endorses an experiential epistemology that is interactive and dialogic, emphasizing creation of rather than discovery of knowledge. This discourse entails a “back-and-forth interplay" between the knower and the known (Doll, 1993, p. 126). In a post-modern view, Doll asserts, gaps are spaces of untapped potentiality in which transformations may occur as interactions
expand, increase, and mature over time. If curriculum is to be transformative, Doll proposes, “…we will need to view curriculum as more than a series of contingent units—to see it as a mixed and multivariate integration of rich, open-ended experiences; as a complex mosaic ever shifting its center of attraction as we shift ours” (Doll, 1993, p. 38).

In a similar vein, Roy (2003) explores Gilles Deleuze's work on rhizomes as a metaphor for non-linear curriculum. He writes, "A contingent mass, the rhizome can be cut up on any way and still retains operational wholeness; therefore it is highly tenacious. The rhizome is also a tuber, and unlike ordinary roots, can sprout in any direction" (Roy, 2003, p. 88). Roy explains that Deleuze uses the word rhizomes as another name for operational multiplicities. While trees are vertically ordered, rhizomes are usually "nonhieratic, laterally connected multiplicities that do not feature linear development…” (Roy, 2003, p. 88). Roy likens them to knowledge in that they are messy. As an analytical tool and "a becoming," Roy suggests that rhizomes help to creating new pedagogical spaces.

Deleuze applies the metaphor of rhizomes to the brain as an instrument of knowing, as they extend the possibilities in its synaptic structures and change the brain's architecture (Roy, 2003). According to Roy, rhizomatic thinking thus frees us from "the false bondage of linear relationships…” and acknowledges the learning which occurs in "non-regulated spaces…” (p. 90-91). In doing so, it brings forth areas of exchange that are normally filtered out of mainstream educational discourses and connects the classroom with "lived realities of the social actors in the school" (p. 91). Roy elaborates, "The Deleuzian notions I introduce help us to reopen petrified borders, as well as to look
for the possibilities of gaps and fissures, and in-between spaces, where learning takes place in unusual and discontinuous ways" (Roy, 2003, p. 13).

The metaphor of mycorrhizae effectively represents the kind of non-linear or horizontal thinking espoused by Doll, Deleuze, and Roy, but also serves a different purpose than the rhizome as a metaphor for curriculum theory. Whereas the metaphor of a rhizome is helpful in that it emphasizes the intricacy of connections that extend the boundaries, increase the complexity of a single organism, and help it to reproduce asexually within a single plant species, the mycorrhizal metaphor emphasizes mutual interdependence and boundary functions that are performed at the interfaces of different organisms. One organism is a fungus while the other is a plant. That same fungus may also connect with other plants of the same species. The total number and types of connections in a mycorrhizal network far surpasses that in a rhizomal network, functioning across boundaries of difference to create new, intersubjective relationships.

Mycorrhizal intersubjectivity, as applied to human experience and learning, may be seen as what Berman (1981) and Abram (1996) have referred to as "participatory consciousness." This crossing of borders is illustrated in Eiseley's story "The Dance of the Frogs" (1978) in which the young scientist's webbed hand serves as a rhetorical device to depict how he has connected with the frogs in their spring mating ritual in such a way that they have become a permanent part of himself. His batrachian hand represents interface between the human and amphibian worlds. Wil, in Paulson's tale of The Island, speaks of this dynamic when he muses, "Perhaps you cannot learn, truly learn of something unless you become what you're trying to understand…” (Paulson, 1988, p.
Like Abba Joseph of Panephysis, the early desert monk who becomes "all flame," Wil awakens to a vision of himself as part of the world.

Conversations Across Species Boundaries

These literary narratives suggest that human knowledge may be created in conversation with nature. Or, at the very least, it might be tested and validated in the larger text or reality of the natural world. Thomas Berry writes, "The universe carries within it the norm of authenticity of every spiritual as well as physical activity within it" (Berry, 1999, p. 49). If human-constructed meaning is in contradiction to what the natural world reveals about itself, then perhaps we are creating dangerous abstractions that further entrench us in ecological crisis.

The findings of this dissertation affirm the value of discursive knowledge and contextualize the conversation in the larger natural world. The discourse between humans and the natural world might be framed as a relationship between knower and known--a theme that emerges in postmodern curriculum theory. This relationship lies at the heart of an ecologically-sensitive curriculum theory. In an ecological worldview, however, this dialogue or social relatedness includes non-human members; human community is never conceptualized apart from the total life community.

Roy advocates rhizomatic thinking in order to free us from "the false bondage of linear relationships…" and he acknowledges the learning which occurs in "non-regulated spaces…" (p. 90-91). He contends that this approach to education brings forth areas of exchange that are normally filtered out of mainstream educational discourses and connects the classroom with the "lived realities of the social actors in the school" (p. 91). While Roy's analysis is based on a biological metaphor, it is limited in its ability to
generate ecological consciousness when one applies it only to the human community. While affirming the values of relationship, connectivity, and non-linearity that emerge from Roy's exploration of rhizomes, this dissertation differs from Roy's work in that it situates discursive meaning-making in the complex matrix of relationships found in the natural world.

As with Roy's curriculum theorizing, Doll's work (1993) provides a solid argument for the construction of metaphors based on living systems. The findings of this study confirm the effectiveness of this approach to language and conceptualization in terms of engendering ecological understanding. The narratives of the nature writers suggest that we might embrace the notion of relationship within a larger worldview that includes the non-human; that we might locate ourselves not only within the individual, but that our sense of place and relatedness be connected to the larger biosphere. These writers eloquently model this more inclusive discourse. Their work suggests a curriculum theory that moves beyond anthropocentrism to a vision of education as a conversation with all of life. Pinar's (1995, 1996) assertion that "there is…nothing outside text" (Pinar, 1995, 1006, p. 49) might readily be applied to nature; the natural world may be considered a foundational text with which the student engages.

According to a modernist worldview, education is human-centered and the natural world exists to serve the human. An ecological view of curriculum suggests that the human and the natural world are not separate, but potential co-creators of worlds of meaning, thus their needs must be mutually considered. This notion requires a shift of thinking from anthropocentrism to biophilia. It also changes the role of the classroom teacher. The underpinnings of this shift are already underway. Lincoln and Guba (1985),
in presenting Smith and Olgivly's "new" paradigm (1979), posit the premise of heterarchy rather than hierarchy. In this model, the process of outcomes is facilitation rather than command. Applying this understanding to ecological education, a teacher-facilitator would make ample space in the curriculum for the natural world to 'speak', both within and outside of the conventional voices of science. And he or she would cultivate in the student attentiveness to the subtleties of nature and new ways to listen.

This orientation to the world is illustrated in "The Other Way to Listen," (for ages 6-9), by Byrd Baylor and Peter Parnell (1978), which tells the story of an elder who teaches a young girl to listen to the natural world--to the corn singing, wildflower seeds bursting open, a rock murmuring good things to a lizard--to "everything being right" (Baylor and Parnell, 1978, n.p.). The elder instructs the girl to get to know one thing as well as you can, starting with something small, and that you have to respect whatever you are with; do not be afraid to learn from bugs or sand. This, indeed, does take a long time, but eventually, while singing "hello, hello, hello…" to the hills and thinking, "here I am," she finally hears the hills singing.

Spirituality as Discursive Space

This dissertation has explored spirituality as another 'way to listen' to the voices of nature, creating rich, discursive spaces of sacred mystery. In these conversations between the human and the natural world one may discover a non-anthropocentric, incarnational theology.

The literature of the nature writers reveals a mystery, power and grandeur greater than the human and suggests that the interconnectedness of life functions on both physical and metaphysical levels. They demonstrate that mystery or unknowing may be a
portal to sacred spaces of revelation; spaces of courtship, intimacy, and at times, intercourse, from which one may emerge transformed. In these marginal spaces of encounter with the sacred lies the potential for reintegrating spirit and world, self and Other. A holistic or ecological curriculum honors the rhythms of knowing and unknowing, of engagement and disengagement, of going out into the desert and returning home aflame. Educationally, it offers the possibility of turning barren minds back into prairies by simply allowing the natural world to bear its imprint upon us.

The literary works presented in this dissertation suggest that spirituality may be thought of as a discursive, middle space wherein the divine within oneself finds resonance with the divine outside of oneself. Mycorrhizae provides a way to express in metaphor the activity of this connection, reweaving matter and spirit, and thereby joining particularized expressions of divinity with an incarnational world.

A Dialog Between Soil and Roots

Drawing from living Earth, this chapter has proposed soil, roots, and mycorrhizae as potentially regenerative metaphors for curriculum theory. Stepping back again and looking at these metaphors as they relate to each other might generate an even greater appreciation of the potential generativity of mycorrhizae as an expression of interrelatedness.

This work may be considered postmodern in that it localizes or contextualizes knowledge in a sense of place. While affirming the value of localized knowledge, postmodernism rejects the notion of metanarrative (Pinar, et. al., 1995, 1996). This study diverges from a postmodern worldview, however, by taking a both/and rather than either/or position in regard to the issue of metanarrative versus localized knowledge.
While soil may be seen as representing a shared metanarrative of human belonging to and embeddedness in the processes of Earth, roots locate the knower in the local story of a particular place. Mycorrhizae may be seen as a space of conversation between soil and roots.

The postmodern predisposition toward cosmology and living systems mitigates against its own resistance to the idea of metanarrative. The emerging field of cosmology, readily embraced by Berry (1994, 1999), Doll (1993), and others, indicates that all of creation shares a universal history - that of the unfolding of the universe. A shared human story grows from a shared context and condition of existence; humans are embodied beings on a physical planet upon whose life systems they depend. Human actions affect the whole, leaving a mark on creation. In view of what science has learned about ecosystems, it appears to be a myth that within this shared context one can function in isolation.

This dissertation takes the position that knowledge is both universal and particular, social and individual. It asserts that the natural world is a metanarrative within which one occupies local sites of meaning-making. Validation of knowledge, then, might be grounded both locally and universally, moving in conversation between the two. Mycorrhizae is a way to conceptualize this conversation between the universal and local; between soil and roots.

Causality

Mycorrhizae also helps us to think in fresh ways about causality. Mycorrhizal activity, which occurs in the rhizosphere, animates elements of Earth into a flourishing community of life. While roots anchor the plant and draw nourishment, mycorrhizae
provide agency as they extend its reach and join it to a larger matrix of connectedness. They increase the surface absorbing area of roots, increasing the plant's ability to utilize the resources of soil, and they improve soil structure. In this capacity, mycorrhizae may be related to the notion of causality as a root metaphor for language construction (Pinker, 1977). Joined with the metaphor of roots, or sense of place, these two metaphors are directly related to the findings of cognitive science regarding how humans make meaning.

In summary, mycorrhizae provides a living metaphor of symbiotic relationality that may result from multiple, non-linear, and ever-expanding paths of knowledge and meaning-making. Mycorrhizae suggest a model of relating which, when applied to curriculum, shifts the emphasis from facts to the relational spaces in between the facts, opening up new ways of knowing and new areas of knowledge. We know through relationship. We know through emotions, through our bodies, through consciousness and unconsciousness. Knowledge is embodied and internalized. It is integrated into the physical, intellectual, emotional, and spiritual fabric of the knower.

As a metaphor for curriculum theory, mycorrhizae might represent curricular spaces of interrelatedness in the human community and also the discourse between the human and the natural world. These spaces make room for sacred encounters as they reintegrate spirit and matter, divine and human, universal and particular incarnational expressions.

Conclusion

This chapter has looked at the metaphors of soil, roots, and mycorrhizae, gleaning them for their capacity to cultivate an ecologically-sensitive curriculum theory. It has
contextualized these metaphors in the larger field of curriculum theory, returning to questions of epistemology and suggesting radically relational ways of knowing which include the body and spirit as well as the mind. These ways of knowing engender new forms of knowledge.

David Orr (1994) considers "the art of living well in a place" to be a form of knowledge (Orr, 1994, p. 14). This art entails an understanding of growing food, building shelter, using solar energy, as well as knowledge of local soils, flora, fauna, and the local watershed. Orr asserts that one should also cultivate the capacity "to distinguish between health and disease, development and growth, sufficient and efficient, optimum and maximum, and 'should do' from 'can do'" (p. 14-15). He contends that knowledge should include basic scientific understandings, economic principles, environmental ethics, and the effects of one's actions upon the environment.

Orr's recommendations for Earth literacy comprise an educational vision that includes both traditional or Tylerian forms of curricula and non-traditional forms of curricula, as explored in this chapter. These ways of knowing encompass both linear and non-linear thinking. By drawing upon different forms of knowledge including science and literature, the narratives of this work suggest that both of these ways of thinking and knowing have value in cultivating ecological awareness. Different types of knowledge construction may be appropriate to different kinds of situations. Modern science, based primarily upon linear thinking, has brought us to the point at which we are today in terms of our knowledge of the universe, of physics, mathematics, biology, chemistry, ecology and other disciplines. Non-linear thinking, as illustrated in more artistic expressions, keeps the boundaries of knowledge construction open and fluid, making room for poetry,
creativity, and spirit. Each of these epistemologies provides an important piece of the needed solution to our ecological problems.

Both science and literature may present ways of thinking about the natural world that, when brought together in metaphorical language, are particularly effective in cultivating ecological understandings and sensitivities. This generative union of science and art is illustrated in the work of the nature writers and of carefully selected children's literature about nature. Direct experiences of nature and skillful works of literature that join science to art may then be considered core to an ecologically-sensitive curriculum.

The nature writers also present a new way of looking at science and scientists. Blurring the dividing lines between science and art, these writers deconstruct the myth of the scientist as cold and objective and present a vision of scientific knowing that is embodied and connected to rather than detached from that which it studies. In doing so, they offer an alternative to the modernist objectification of nature. By constructing knowledge and meaning through relationship with the natural world, these writers offer a new view of how we come to know. And, by identifying a mystical dimension to the natural world, they create a space for spirit in the curriculum.

While proposing that education embrace a broad, inclusive and relational view of knowledge, ways of knowing, and who can know, which might include non-human participants, this dissertation does not espouse that linear thinking be abandoned altogether, but rather that it be placed in constructive dialog with other forms of knowledge and knowing. In its concern for the future, ecological education implies Tylerian goal-setting, yet also asks that one be fully present to the communications and expressions of the life community as they occur in any given moment. The findings of
this work suggest that an extractive epistemology, as generated by modern science, may be valuable so long as that which is extracted for study is recontextualized in the larger whole; the local and universal reintegrated. This dissertation, then, advocates for a curricular vision that is broad enough to accommodate many ways of knowing, moving freely and imaginatively between meta-narrative and local knowledge, self and other, and linear and non-linear paths of knowledge construction.

This work embraces postmodern notions of local and discursive knowledge while also situating the human within a larger network of relatedness that includes the natural world. It takes the view that all of life is curriculum; everything belongs. Everything is in relationship with everything else and this needs to be considered as a basis for curriculum theory. In this creative tension between the local and the particular, self and other, difference does not disappear. Rather, revisiting the words of Evelyn Fox Keller (1985), "the recognition of difference provides a starting point for relatedness. . . . In this world of difference, division is relinquished without generating chaos. Self and other, mind and nature, survive not in mutual alienation, or in symbiotic fusion, but in structural integrity" (Keller, 1985, p. 164, 165).

Curricular Soils of Regeneration

While locating itself within Reconceptualization, the findings of this research do not fit neatly into any pre-established curriculum theory paradigm. William Pinar (personal communication, October 16, 2003) asserts that ecology is a discourse in itself--one that is still in the formative process. This dissertation makes an original contribution to this emerging dialog and to the larger field of curriculum theory in the following ways: It situates discursive knowledge in the larger context of the natural world, with nature as
text and conversation partner in the process of knowledge construction. In doing so, it
extends the notion of language to include non-human expressions. In dialog with the
natural world, it explores new curricular spaces of mystery and spirit. It suggests soil,
roots, and mycorrhizae as rich and regenerative metaphors for curriculum theorizing. It
highlights the work of the nature writers as a resource for engendering new
understandings of the natural world as having voice, identity, and agency, suggests this
body of literature as a curricular resource for cultivating ecological understandings, and
places this literature in conversation with the field of curriculum theory. Finally, it
argues for a both/and dialogic position regarding the notions of local knowledge and
metanarrative. In these ways, it seeks to philosophically fund a move away from an
ecologically disabling anthropocentrism and toward a greater intimacy with the natural
world.

The findings of this work suggest that a curriculum based on interrelationship
with Earth brings us into fuller ways of being human. This is rich and promising terrain
for any curriculum theory. For, in conversation with Earth we learn of nature's great
regenerative powers--powers that lie deep within the soil.

The lava is only barren for awhile. Close one eye and you see death; places,
houses, whole lives buried. Close the other eye and life appears: mosses, ferns,
lichens and algae, filling the cracks . . .Life, as it has on this planet for hundreds
of millions of years, finds a way (Tisdale, 2002, p. 43).

End Notes

1 A version of this myth is also found on Samoa.

2 Some roots also have a storage function.

3 This notion can be illustrated by the many definitions given for the word "root" itself.
These definitions quickly move from the concrete or physical to the abstract or
metaphysical realm, taking the form of both nouns and verbs. In addition to the concrete definition of root as the underground portion of a plant, the word "root" may also be used to describe "the condition of being settled and of belonging to a particular place or society." Or it may refer to a primary source or origin; we get close to the root of a problem. Linguistically, the root carries the main component of meaning in a word. Mathematically, it is used in terms of a square root, while musically it identifies the note upon which a chord is built. As a verb, root is the act of becoming established. To root is to put out roots and grow, to furnish a primary source in something, to dig in the soil, to rummage for a thing, or to give audible support or encouragement (www.dictionary.com). One can see from these examples how a single metaphor such as "place" might similarly serve as an underlying basis for generating a plethora of meanings and form a foundation for language.

4 The word "mycorrhiza" comes from the word "myco," meaning "fungus" and the word "rhiza" meaning "root." It thus embodies its meaning, which is the relationship between fungi and roots.
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VITA

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