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Promoting ecological consciousness in the classroom: A search for spiritual union

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PROMOTING ECOLOGICAL CONSCIOUSNESS IN THE CLASSROOM:

A SEARCH FOR SPIRITUAL UNION

by

Richard Byron Thomas

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The necessity of promoting an ecologically based curriculum is examined from both an educational and spiritual perspective. Beginning with a reflection upon the people, events, and experiences that have shaped my acceptance of Catholicism, my interest in the study of nature, and my decision to chose teaching as a career, this dissertation attempts to seek within the Catholic spiritual tradition a valid position from which I can address, as an educator, questions concerning humanity's ethical treatment of nature.

Chapter One provides an historical perspective on the moral and ethical position Western societies have adopted towards the natural world. I suggest that because of an anthropocentric interpretation of Christian theology and the rise of modern science during the Enlightenment, Western societies have distanced themselves from moral and ethical questions concerning humanity's relationship with nature.

Chapter Two focuses on an examination of the historical importance and influence of mysticism within the Catholic faith. The central feature of this chapter is an in-depth examination and interpretation of Nature Mysticism and the promise it holds for my own search for spiritual union.

Chapter Three develops the position that science education in the United States has contributed to bringing the world to the brink of ecological disaster as a result of its failure to promote wide-spread ecological consciousness. In response, the essential characteristics of a curriculum that promotes environmental awareness and the adoption of an ethical code of conduct concerning humanity's relationship with nature is examined.

In Chapter Four the refusal of Western societies to include nature within the boundaries of ethical consideration is envisioned as a fundamentally moral concern. I discuss my spiritual obligation to address the cultural context within which this tendency has developed and continues to be promoted. I conclude that although I have a spiritual responsibility to promote the acceptance of a curriculum that promotes ecological consciousness, I have come to accept that my ability to teach the essential components of ecological literacy to the fullest extent of my spiritual calling is limited given my position as a teacher in a secular setting.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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I would like to thank my sons Allen and Jason and my daughters Jennifer and Katie for the sacrifices they have made during the past four years. Although they may find it difficult at this point in their lives to understand what I have written upon these pages, I do hope that someday this dissertation may help them to understand the central importance of my faith in my life, my love of God, and my love for each of them.

Finally, my deepest and most heartfelt thanks are reserved for my wife Donna. Her love for life is the most pure and the most genuine of anyone I have ever known. Her simple, unwavering faith in all which is good represents the most beautiful expression of what it means to live the Christian life that I have ever witnessed. Like no other, she has tended the garden of my spiritual growth with patience and love.

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PREFACE

A. Childhood Memories

Memories of my interest in the natural world go back deep into my childhood. As a small boy I fondly remember lying on the bed in my parent's bedroom flipping through pages of a book I had checked out from our school library. Although the years have erased the details I do remember the book describing the life in and around a marsh or swamp. Throughout the book, reproductions of pen and ink drawings brought to life the animals and plants described in the text. The imagery of those moments has remained strong throughout the years. It has only been recently that I have been able to put into words the sense of timelessness that I have always associated with those and similar memories.

Throughout my life I have often experienced deep emotional responses as a result of experiences with the natural world. On occasion, simply contemplating something I have read or been told has been enough to trigger these emotional experiences. More often, however, they have been the result of overwhelming sensory stimuli (watching a sunset, running along a beach at night, holding a child, etc.). Eventually I came to realize that although each experience was triggered by a unique set of circumstances, and that it was never possible to predict under exactly what circumstances they would occur, each evoked a similar emotional state of mind. Furthermore, through conversation I came to understand

that other people had undergone similar experiences. Only recently have I come to appreciate how important these moments have been in defining my relationship with, and understanding of, nature.

Growing up in South Florida my brothers and sister and I were allowed a great deal of independence in our daily activities. I suppose that there were few places within a 30 square mile area of our home that we hadn't visited on foot or by bike. We lived in a two story house located about two miles to the south and west of where the Miami River emptied into Biscayne Bay. Despite living in an area that was quite literally a short walk from downtown Miami the opportunities to experience the natural world were many. From our house it was just a short bike ride across the bridges that connected the mainland to the wonders of several barrier islands. These islands offered miles of beaches that provided excellent swimming or skin diving and we often spent hours fishing beneath the bridges that spanned the water between them. The largest island, Key Biscayne, had a relatively large zoo (with free admission!) that also proved to be an irresistible lure. Closer to home several small parks attempted to maintain the unique native flora of sub-tropical Florida in pristine condition. Simpson Park was the closest of these and its hardwood forest was the inspiration for endless hours of adventure and

story-telling. A nearby science museum always provided interesting diversions with its displays depicting local wildlife, geology, marine biology and the early human inhabitants of the Miami area.

One of our favorite haunts was Bayfront Park located a few hundred yards north of the Miami River. The three mile journey was reward enough if one was patient and willing to put in a little extra effort. At the time manatees could still be seen cruising the Miami River and the draw bridges that crossed the river closest to the bay always seemed to offer the best opportunity to catch a glimpse of them. Other bridges, although somewhat out of the way, led past local bait shops and their saltwater tanks of live shrimp and minnows. Bayfront Park itself was a open expanse of grass studded with large palm trees and shady banyan trees. Situated between busy Brickell Avenue and the Miami skyline on its western boundary and shimmering Biscayne Bay to the east, it provided the eye and mind a moment of cool refreshment. Pier 5, locally billed as the home of "The World's Finest Fishing Fleet" stretched out into the bay from the park's eastern edge and provided a wealth of curiosities from the sea for anyone willing to stroll the length of its boardwalk.

The southern end of the park was dominated by the Miami Public Library, a massive structure of white marble. Here, within the four walls

of the Children's library, I discovered an immense storehouse of words and images that flooded my mind with the beauty and wonder of the natural world. One of my favorite books contained paintings of the world as it must have looked millions of years ago crowded with exotic plants, insects and of course the dinosaurs with their house-like dimensions. Other books offered cryptic diagrams which attempted to illustrate the mysteries of genetics and ecology. Drawings of microscopic creatures, first made visible by crude microscopes, seemed to come alive on the pages as I spent hours trying to comprehend their magic. Within these walls of marble, a stones throw from the concrete canyons of downtown Miami, seeds of interest and love for the natural world were nurtured into what became a life sustaining passion.

B. Professional Background

To a large extent I believe my interest in pursuing the study of biology was influenced by these early experiences. In high school I choose Advanced Biology as my science elective. Later I obtained an Associates of Arts degree in pre-forestry at the local community college and eventually I left south Florida to attend college in rural Wisconsin and pursue an undergraduate degree in biology.

Although I had lived most of my life in densely populated urban areas I immediately feel in love with the wide-open farmland that surrounded the small campus town of Platteville. During the school year I worked part-time unearthing samples for the Geology department's fossil collection and tending the Biology department's greenhouse and live animal collections. Each summer I worked mending fences, getting in hay, and learning about the pleasures of living simply on a small farm owned by my sister's father-in-law.

In school I pursued a double major in Biology and General Science. I enjoyed my college courses in science and continued to read extensively on all subjects related to natural science in my free time. Several field trips, outdoor projects, and lab work for my Astronomy class continued to provide the kind of sensual experiences with nature that had such a profound effect on me as a child and given birth to my love for nature.

It was during the three years I spent in Wisconsin that I decided to enroll in the School of Education and to pursue a career as a teacher. Previous to this time I had never seriously considered becoming a teacher. Throughout high school I was painfully shy and the thought of standing in front of a group terrified me. Furthermore, I cannot remember a single teacher whose teaching style had served as the inspiration for my decision.

This was especially true of my science teachers. Although I liked several of them on a personal level they lacked what I believe are the essentials of excellent teaching: professional experience and a love of subject matter.

In fact I seem to remember very little about what factors eventually influenced my decision to become a teacher. The opportunity to work with young people was both exciting and daunting. Throughout high school my contacts with children much younger than myself had been limited and controlled by adults. While I was an undergraduate at Platteville several opportunities to be involved with children presented themselves. I volunteered as a cub scout leader in the small town in which I lived and was considered "the adult most likely to come out and play" by the young children in the neighborhood. These experiences, and others like them, probably had a positive influence on my decision to become a teacher.

I also remember considering that as a teacher of biology I would be able to continue to pursue my interests in that and other areas of science. Early course work had convinced me of how limited my understanding was of the fundamental concepts of biology. As a teacher I hoped to broaden my own understanding of science while modeling my deep feelings for the subject to my students.

Probably the most influential factor however was the confidence expressed in my ability to be a successful teacher by close friends and family members. During periods of self doubt several individuals listened to my concerns and attempted to offer insights to the internal struggle I faced. Each of them attempted to help me appreciate the potential positive impact I could have on the lives of young people.

Despite these positive influences my confidence in the correctness of my decision constantly wavered. My own concerns about my abilities and negative public perceptions concerning teachers and teacher training caused me to postpone my Education course work and student teaching assignment on several occasions. Eventually, as a result of unrelated personal problems, I left school without completing the requirements for a teaching certificate although I had received my Bachelor's degree in biology.

* * *

After graduation I accepted a position as a high school Life Science/Biology teacher at the Catholic high school I had graduated from in Miami. Almost immediately I feel in love with teaching despite almost daily frustrations. Beside having the opportunity to make a difference in the lives of people I cared about, I found the confidence the administration

displayed in my teaching abilities both rewarding and fulfilling. Although I lacked the experience to be what I would consider an excellent teacher, I tried to bring to my students a deep love for the subject. Field trips to local parks and beaches became part of the curriculum in my advanced science courses. In addition, week long canoeing trips along rivers in upstate Florida were offered to small groups during our school's mini-mester each January. Each of these opportunities offered students a chance to experience, in a lasting and meaningful way, some of what they had been exposed to in the classroom.

With time the influence I had with my students began to extend beyond the classroom. I volunteered to be the faculty advisor for both the Science and Chess Clubs while at the same time coaching two varsity level sports. In addition, I made a point of attending at least one game or match of each of the team sports offered at the school. Being involved in the after school life of my students helped me to gain their trust while opening doors to their personal lives that might otherwise have remained closed. As a result of this access I believe I was able to have a positive influence at a critical time in lives of many of them.

After three years in the classroom I made plans to return to school and seek a Master's degree in biology. Although I enjoyed my work,

teaching in a Catholic school required me to make long term financial sacrifices I did not believe I could afford. I realized I would eventually have to find a position that would provide me both the means to support a family and security in my retirement. Advanced degree work would allow me to continue to teach at a college or university level while providing some of the financial security I sought.

In the Autumn of 1983 I began graduate work in biology at Wake Forest University in Winston-Salem, North Carolina. It wasn't long, however, before I became disillusioned with the nature of the degree program. It seemed to me that the scientific journals I read and lectures I sat through detailed only tiny threads of what I believed to be a rich tapestry. I came to realize that the methodical study of the subject alone seldom, if ever, produced the kind of emotional response I longed to experience. As a result, despite the efforts of skilled and dedicated faculty, the three years I spent at Wake Forest were the most frustrating years of my life.

After completing my thesis work I decided that I was no longer interested in pursuing a doctoral degree in biology. Without it I was unable to obtain a teaching position at a university and accepted the first of several teaching positions in the public school system. Within a year I was

married and the strain of attempting to support a family on a teacher's salary required me to work a second job at a local community college in the evening.

The next several years proved to be very difficult professionally. The birth of our first daughter added to the financial strain and my goal of teaching at a university remained out of reach. I was working at a middle school and as a result was no longer directly involved with teaching biology. Several times I attempted to seek employment outside of public education but each attempt proved unsuccessful.

For the first time in my life I began to write seriously. With my writing I sought to explore the boundaries of the mystery, wonder, and simple beauty I experienced when in communion with the natural world. Writing became a way of re-connecting to the emotions that had been buried under the "science" of my Master's thesis. It provided me the opportunity to interpret the world in a deeply personal and, I later realized, spiritual manner.

In the summer of 1990 I entered the doctoral program in Curriculum and Teaching at the University of North Carolina at Greensboro. Although I was working two jobs at the time I felt my only chance to progress professionally required me to obtain a doctorate. At that time I was

particularly interested in studying the methods and techniques used in the training of science teachers. In part I was concerned that teacher training in the area of science overly emphasized the acquisition of information. As a result student teachers were provided few opportunities to experience science in a personal and meaningful way. I was also interested in gaining insights into my own style of teaching.

Not long after beginning my doctoral program I became interested in exploring and developing methods of instruction that would allow me to share with my students, in a more intimate way, the beauty I witnessed in the natural world. As a result I found it necessary to examine and define the boundaries of my own concept of nature. Although I find myself continually modifying these boundaries, the process has proved useful in identifying areas of further study while allowing me to examine my goals as an educator.

At the present time my concept of nature includes not only the material world but also the processes, interactions, connections, and forces that make up the universe. Human beings are an essential part of this order and deeply connected to it whether we recognize this fact or not. I'm deeply concerned that this point of view seems to occupy a peripheral position in modern scientific thinking which continues to be

dominated by reductionistic thinking. To some degree I believe my own disappointment with my graduate program at Wake Forest reflects my unwillingness to image the natural world through a reductionist lens. Instead I find myself attracted to concepts that attempt to unify instead of separate; integrate instead of segregate; promote harmony rather than conflict. I also have concerns when nature is characterized in human terms. Qualities like right and wrong, good and evil, gender (maternalistic vs. paternalistic), and/or purposefulness, I believe are mis-applied when used to describe aspects of nature instead of our relationship to it. I believe that nature itself exists free of these descriptions.

During the process of selecting a graduate committee I had the opportunity, on several occasions, to talk with Dr. David Purpel from the Department of Curriculum and Educational Foundations. With his encouragement I began to examine my interests in science and education from a spiritual viewpoint. I came to the understanding that the tension I felt concerning some of my inadequacies as a teacher resulted from an artificial separation that existed between my science and my faith. At this point I began to search for a way to end the spiritual alienation that I realized permeated my life.

C. The Spiritual Dimension

For as long as I can remember both of my parents have been practicing Catholics. Their faith has meant more to them, however, than simply going to church on Sunday. Catholicism was a way of life; a way of relating to the world. Growing up I did not learn what it meant to be a Catholic out of a book; instead my parents provided this knowledge for me by way of example.

Sacrifices were made by my parents in order that my brothers and sister and I could attend Catholic schools. Their willingness to endure personal hardship so that their children would have both an academic and spiritual education has become for me an enduring lesson in parental love. In many ways Catholic schools insulate their students from the realities of the world. Although I believe this to be true I do not consider it to be a criticism. Catholic schools provided a safe and caring environment in which I could develop socially, emotionally, and spiritually. The memories I have of my Catholic education are not those of separation and insulation but rather of warmth and security. I believe these experiences, along with the example of my parents, made the Catholic faith more to me than just words.

At various times in my life I have examined Catholicism and its relevance to my world. I have also attempted to examine the teachings and history of Catholicism in relationship to other Christian denominations. It was during high school that I first recognized the difficulties I would experience in attempting to reconcile my interests in science with my faith as a Roman Catholic. Initially my struggle was focused around questions of cosmic origins and species evolution. I was stunned when I read about the experiments concerning the origin of life conducted by Stanley Miller in the 1950's. Miller had demonstrated that the fundamental organic molecules necessary for life could be generated spontaneously under environmental conditions similar to those which existed on the primitive earth. I began to question if the existence of a God was necessary to explain the origin of the Universe. Attempts to find answers through the examination of scripture served only to confuse the issue further. I found it increasingly difficult to reconcile, intellectually, what I read in the Genesis account of creation with my growing scientific literacy. I became convinced that much of the Old Testament did not make sense if viewed as a literal account of the history of humankind. Modern translations of the New Testament, however, fostered within me a new understanding of what it meant to live as a Christian. I began to examine

scripture for personal relevance and insights into my own role in God's plan.

It was during my early twenties that I came to accept that my religious beliefs and my scientific beliefs must remain separate. One was simply a matter of empirical truth; the other of faith. Within a few years my ability to defend this position, however, became untenable as I became interested in examining questions associated with the moral and ethical responsibilities of science. In addition I found myself concerned with the position humanity occupies in regard to the rest of the natural world. These issues transcended the artificial boundaries I had established between religion and science and I again found myself immersed within a spiritual dilemma.

It has only been recently that I have become aware that my personal struggle in some ways reflects the historical separation of modern science and the Christian faith that has existed in Western civilization since the Enlightenment. This awareness, along with the knowledge that others have struggled along the same path I find myself traveling, has helped to validify the personal nature of the journey. Although I do not believe I was actively discouraged in my search for personal relevance by members of the Catholic community I am somewhat mystified by the lack

of encouragement I received. In particular I believe my ignorance of the rich history of Catholic mysticism impeded my own spiritual development.

Despite long periods of doubt and soul searching my questioning has helped me develop a greater understanding of my faith and served to strengthened my belief. As a result I consider myself to be Catholic not because of an accident of birth but as a result of thoughtful choice. It is, therefore, of great importance to me that I am able to find within the tradition of the Catholic faith answers that "resonate" with my understanding of the natural world and my goals as an educator. To completely describe what I understand to represent the "tradition" of the Catholic faith would be impossible to do at this point. I do, however, believe the following are central to its teachings: It is Christian and therefore recognizes Jesus as the savior of the world; it is grounded in the written scripture, and yet; it is a living faith which honors the community of believers both past and present; it is a community which supports a worldview in which being "in" the world is the proper arena for religious activity (Cunningham, 1987).

This dissertation represents my attempt to seek within the Catholic spiritual tradition a position from which I can address, as an educator, questions concerning humanity's ethical treatment of the natural world.

D. And a Child Shall Lead Them

I would like to learn, or remember, how to live.
Annie Dillard (1982)

Many children seem to possess the innate ability to perceive, at a deeply emotional level, the wonder and mystery of the universe. Too often this talent is abandoned somewhere during an eager pursuit of a more "mature" understanding of reality. Fortunately there will always be children whose eyes and hearts have not yet been deceived. It was through the eyes of such a child that I came to remember what it was I had lost and was able to begin to learn again how to live.

* * *

Undergraduate biology majors at the University of Wisconsin-Platteville were required to split course work as evenly as possible between topics in botany and zoology. At the time I had little interest in anything even resembling a plant and did my best to find alternatives to the standard botany courses. Mycology and Plant Pathology offered some promise in this pursuit. The purpose of the course was to introduce students to some of the more common plant diseases, their causes and prevention. This sounded much more interesting to me than a survey of various plant groups and their anatomy.

As I was to learn, although there exists a multitude of afflictions that may assault the health of plant tissue, a good portion of these are caused by infection by various fungi. As a result, much of Plant Pathology served to introduce students to the natural history of these fascinating organisms. Living and preserved examples of various fungi were used initially to help us recognize common species. Each class period seemed to provided a new and more bizarre mushroom or mold to whet our interest. As the course progressed I noticed I became more aware of the common fungi that had always been a part of my world but had remained unnoticed and unappreciated. Soon I found myself seeking out rotting trees for the fungal bounty they might hold. I noticed for the first time the peculiar growth pattern known as "fairy rings" exhibited by some mushroom species. My heart raced when I discovered a tiny specimen of "bird's nest fungi" on an uprooted tree stump.

Typically the course ended each spring with a short hike into the woods and fields surrounding the campus for the purpose of collecting interesting specimens. When the day finally arrived morning broke sunny and clear with a slight chill and a crispness in the air one could almost taste. Enthusiasm seemed almost infectious and it wasn't long before several of us had discovered exceptional examples of fungi and related

lichen.

I, too, found several nice specimens but the day proved to be especially memorable for another reason. While walking along a narrow path through one of the several fields we criss-crossed that morning, I noticed an old tree stump rising above the surrounding grass. I approached hoping that the wood had decayed to the point that bracket fungi would be spouting from it remains. As I drew closer I noticed a medium sized garter snake stretched across the top of the stump sunning itself. As a young boy I had developed a fascination for snakes and had been hoping for several years to catch one to keep as a pet. With a little patience and luck I was able to capture what proved to be a fine female animal. During the next few minutes several of us took the opportunity to allow her to climb along our arms and hands as we watched in fascination.

Several years later when I reflected on this experience I found it ironic that I had found the snake only because of my interest in a previously obscure species of fungi. I was struck by the realization that often in the pursuit of a narrowly defined goal I had allowed much of the meaning and true wonder of the life around me to be missed.

When I began my degree work in biology at Wake Forest University several years later it was this type of experience I had hoped my course of

study would foster. One of the reasons I had decided to attend Wake Forest was because of its proximity to the Appalachian mountains. Having spent most of my life in relatively flat south Florida I looked forward to exploring the wonders of this magnificent natural area. Several other new graduate students shared a similar interest and during the next few months several long-lasting friendships began in the mountains of western North Carolina.

It wasn't long before I noticed however that my thoughts were increasingly dominated by concerns of course work, research projects, and responsibilities related to my teaching assistantship. It became increasingly difficult to escape, even for a few hours, the academic pressure associated with obtaining the degree. There was an endless number of research journals to browse, papers to read, and new concepts to understand. Attending weekly seminars became an exercise in humility as I seldom understood the information being presented or the purpose of the research. I soon realized how unprepared I was to conduct an independent research project and began to question my desire to continue. For the first time in my life the study of biology became a chore. I became convinced that to be a good biologist required a degree of dedication to intellectual pursuits I was unwilling to make. The love for biology which

had once burned in my heart and mind was being smothered in pursuit of an academic degree.

Despite my inability to completely leave the rigors of graduate work behind, there were opportunities to escape for short periods of time. Several other graduate students were conducting research projects that involved field work. In addition, extended field trips and camping and hiking trips to the mountains or coast continued to provide some degree of intimacy with nature.

Near the end of our first year another graduate student invited me to the mountains to help him locate study sites for his research project. Tim had received a grant to investigate salamander ecology in the mountains of southwestern North Carolina. During a memorable weekend the two of us took the opportunity to explore several trails and mountain streams near the small mountain town of Highlands.

Eventually a camping trip to Highlands became an annual event for many of the graduate students in the biology department at Wake Forest. After several years the number of participants had grown to close to two dozen with many graduates returning to the area each summer for the sole purpose of attending this outing. I continued to attend the annual trip to Highlands even after graduation. The opportunity to listen to other biology

majors discuss their research projects over a blazing fire proved interesting but personally uninspiring. At the time I had become convinced that any future I might have in biology was tied to my willingness to do research which emphasized quantitative aspects of nature. I knew from my own experiences however that the answers I sought did not lie in that direction. I felt deeply discouraged that the type of understanding of nature I sought seemed to hold so little value within the established scientific community. Year after year I sat around that campfire while my childhood dreams of intimacy with nature seemed to drift away like so many wisps of smoke.

By the summer of 1992 my daughter Jennifer had become a veteran of several trips to Highlands. Previously, she had been satisfied to ride on the hip or back of an adult during any of the several long hikes the group took to local waterfalls. I noticed that as a four year old, however, she was becoming stronger and more independent and would often explore the edges of trails we happened to be hiking. Like most children Jennifer possessed a boundless curiosity about the world around her. When hiking my wife and I often found ourselves answering an endless stream of questions concerning whatever happened to capture her fancy at the present moment.

On one occasion several of us had decided to hike to an old amethyst mine located several miles from camp. Tim, who knew the location of the mine best, had been unable to attend the trip that year since he had accepted a teaching position in his native Canada. As a result the responsibility of leading the group fell to me.

The first part of the hike followed a well defined road bed up the side of a thickly forested mountain. Because I was unwilling to discourage Jennifer's explorations the two of us quickly fell behind the main group. At each fork in the trail my friends would wait for me to arrive to provide further direction before embarking; leaving Jennifer and me to once again bring up the rear.

Once, along one particularly straight stretch of trail, I remember standing with my daughter as she tugged earnestly at my shirt sleeve. Ahead on the trail the main group continued to distance themselves from where we stood. For an instant in time I felt as if I was caught between two worlds. At my feet, Jennifer awaited anxiously to share with me her most recently discovered wonder. Ahead my future seemed to be moving away as I watched, along a trail I had once imagined myself traveling, toward a goal I was now realizing I would never reach. I turned away.

I found Jennifer crouched over a small yellow and white form

protruding from the mountain soil. In an instant of recognition my mind raced back to that crisp spring morning that now seemed several lifetimes ago. Although I could not recognize the species, much of what I had learned about mushrooms years before I began to share with my enthusiastic pupil. As we slowly worked our way along the trail my daughter's curiosity re-opened a door to a world I had forgotten existed. Years of frustration began to slip away as together we examined each new curiosity. Hand-in-hand she led me back, one tiny miracle at a time, to the world of child-like wonder I had left behind. By the time the two of us had again caught up to the main group my conviction concerning the validity of my own sense of the value of nature had been renewed.

What my daughter taught me that day has remained for me a most beautiful lesson. Although she lacked the book learning I had spent several years obtaining she hadn't lost her child-like wonder and keen eye for simple beauty. With her help I once again realized that in the pursuit of a goal I had allowed others to define, I had allowed myself to miss so much of the real beauty in nature; the discovery of which had always been so meaningful to me as a child. Through her eyes I was able to take the first step towards regaining access to a world I had almost lost somewhere along the way. For this gift alone I will forever be in her debt.

CHAPTER 1

THE INFLUENCE OF CHRISTIANITY AND MODERN SCIENCE ON WESTERN MAN'S ALIENATION FROM NATURE

With the rise of modern science, as one of its most central results, the age of unquestioned faith was lost to Western man.
Richard S. Westfall (1986)

It has been argued that the root causes of the current world-wide environmental crisis can be found in assumptions concerning humanity's role in the natural world found within the dominant traditions of Western thought; Christianity and modern science (Berry, 1978; Deloria, 1983; Ellul, 1964; Ehrlich and Ehrlich, 1981; Hughes, 1975; Merchant, 1980; White, 1967). Undoubtedly, modern science has provided the technology, but has Christianity fostered a cultural climate that has allowed technology to be utilized in such an environmentally destructive manner? During the past century this question has received intense scrutiny (Benz, 1966; Ellul, 1964; Glacken, 1967; Van Leeuwen, 1964; Suzuki, 1955; White, 1967; Whitehead, 1925).

To provide a detailed, in-depth assessment of the arguments on both sides of this issue is beyond the scope of this project. Instead my goal is the more humble one of providing a roughly historical sketch, from within

both a Christian and scientific context, on the ethical and moral position Western societies have adopted toward the natural world. I will explore and focus on the suggestion that as a result of an anthropocentric interpretation of Christian theology that promotes dualism between man and nature, and the rise of modern science during the Enlightenment, Western societies have distanced themselves from moral and ethical questions concerning our relationship with nature. Although this limited approach risks dangerously oversimplify complex issues, the alternative is to become intellectually overwhelmed by the sheer volume of competing research. In this way I hope to understand the historical roots of the alienation I have experienced between my religious beliefs and scientific interests on this issue.

A. The Influence of Christianity

> *Our failure as Christians to protect the earth from the destructive influences that are desolating the planet is a profound indication that we have lost the integrity of our human as well as our spiritual traditions.*
>
> Thomas Berry (1988)

The wide spread acceptance of Christianity has received a great deal of the blame for the development of nature-denying attitudes within Western societies (White, 1967; Hughes, 1975). Many of the central teachings of

Christianity bare directly on humanity's relationship with nature and interpretations of scripture have been used to define the moral and ethical boundaries of this relationship. Historically, the overwhelming majority of these interpretations have served to distance humanity from the rest of creation by defining the relationship as one of dominion and mastery. Within this context, other forms of life exist to serve humanity in a hierarchy of creation at the apex of which stands man (Nash, 1989; White, 1967) and are denied moral or ethical consideration. As a result Christianity has been referred to as the most anthropocentric religion in this history of the world (Kaufman, 1972; White, 1967).

H. Paul Santmire (1985) has identified two fundamental ways of thinking in Western theology. The first is a "spiritual" motif in which the human spirit strives to rise above nature to communion with God. The second, an "ecological" motif, envisions the human spirit rooted in the world of nature. "Ecological" in this context pertains to a system of interrelationships between God, humanity and nature. In many ways the "spiritual" motif is similar to the more familiar fall/redemption spiritual tradition while the "ecological" motif is more closely attuned with a creation-centered interpretation of scripture.

Theological motifs result when a cluster of root metaphors shape a tradition of theological reflection, or a single root metaphor exercises a formative influence on a tradition over many years. Santmire suggests that an understanding of the root metaphors of ascent, fecundity, and migration to a good land is important in order to fully appreciate the formation of the "spiritual" and "ecological" motifs in Western theology. As a result, it may prove instructive at this point to briefly examine the influence each metaphor has had in defining the God-human-nature relationship.

The metaphors of ascent and fecundity appear to be dependent upon the almost universal experience in human history of the overwhelming mountain. Although derived from the same experience the metaphors exist in a state of tension with each other. If I ascend with my eyes fixed on the summit, then the mountain becomes a means of transcending nature (ascent). The further I climb the more removed I become from the natural world. If instead I climb with my eyes fixed below, then my purpose in climbing is to gain a better vantage point from which I can view the natural world in all its beauty and mystery. This allows me to better appreciate the diversity of living things and material forms (fecundity).

The third metaphor, that of a promising journey, has found its chief expression in the history of the Hebrew peoples and the story of Exodus.

> *Therefore I have come down to rescue them from the hands of the Egyptians and lead them out of that land into a good and spacious land, a land flowing will milk and honey . . .*
>
> (Exodus 3: 8)

Within theologies shaped by this metaphor nature is envisioned as overflowing with the blessedness of the Creator. The most intense spiritual experiences are always located within the midst of nature and to be removed from the land means a loss of spiritual identity.

In Western theology the metaphor of ascent has consistently become the "spiritual motif" and has served to deny the role of nature in the redemptive process. The metaphors of fecundity and the promising journey typically cluster and become the "ecological" motif and consistently reaffirm the role of nature in God's cosmic plan.

In this chapter, I will attempt to investigate the influence of the "spiritual" motif in Western Christian thought regarding humanity's ethical relationship with nature. This will be accomplished by examining those historically important individuals, theological concepts, and Christian teachings which have been significantly influenced by this motif. A

similar treatment of the "ecological" motif is reserved for Chapter Two of this dissertation.

Fundamental Teachings

There are at least three fundamental Christian teachings that have been influential in defining man's relationship with God and nature within the "spiritual" motif; the portrayal of wilderness as a cursed land, the desire to achieve otherworldliness, and the necessity of maintaining a spiritual dichotomy between man and nature. Throughout the history of Christianity individuals have emphasized various aspects of these teachings to promote nature-denying interpretations of scripture. Typically, several of these themes are woven into a single theological position or philosophy.

The Desire for Otherworldliness

The desire to achieve otherworldliness, to transcend the earthly existence, is one of the most influential themes in many religious philosophies. In Christianity, humans are typically considered unique due to their possession of a soul and expectation of salvation. As a result, Christian aspirations are clearly fixed on Heaven, the supposed place of their origin and hopefully their final resting place (White, 1967 Hughes, 1975; Nash, 1989). Nature is not conceived of as man's proper home and

source of being and therefore has little or no value for the Christian who thinks only of the salvation of his soul.

Within this framework, the natural world is considered to be of a fundamentally different order than man because it exists outside the realm of final salvation (Santimire, 1985). The earth serves merely as a testing ground for the faithful; redemption is reserved for humanity. Clearly this theme in Christianity is dominated by the metaphor of ascent. To achieve salvation requires leaving the material world behind. Humanity's existence on Earth is seen as merely transitory as is the earth itself (Hughes, 1975; Nash, 1989). We ignore the destruction of the physical world because we are absorbed with our own spiritual salvation (Berry, 1990).

One of the earliest interpreters of scripture who made use of the "otherworldliness" theme was the teacher Origen who served in the catechitical school in Alexandria. Central to his philosophy was the metaphysical concept of the great chain of being in which the universe is structured in a hierarchy which ascends from material to spiritual forms. Origen believed that those creatures closest to the One (apex) are more perfect than those creatures that occupy the lower positions in the hierarchy. Origen's thought is dependent upon a vision of an unchanging God dwelling in eternity surrounded by a world of rational beings. Although

each was created to live in communion with God, some turn from God toward non-being. This act of spiritual rebellion establishes the conditions for God's creation of the world to stop the fall of rational beings toward ultimate non-being.

Origen believed the material world was created to be a place of punishment. Although evil does not reside in nature, matter was created for the sole purpose of educating humanity, through trials and tribulations for an eventual return to a spiritual destiny. As a result the world is portrayed as an inherently inhospitable refuge more than a life-sustaining home (cursed land). The ultimate goal of divine providence, therefore, will be the return of all rational creatures to their original state of communion with the One for eternity (metaphor of ascent).

The concept of a hierarchy of physical and spiritual forms was fundamental to the thought of several prominent Christian philosophers during the Middle Ages. John the Scot (ca. 810-77) believed that God had not intended for his creative power to descend down the hierarchy as far as corruptible matter. He envisioned final redemption as entailing the final abolition of corruptible matter altogether. Alan of Lille (ca. 1128-1202) describes the universe in terms of a human city. Residing within the citadel of the city is the everlasting ruler; God the King. The middle of the

city is occupied by a heavenly body of angels which extend its guard over humanity which occupies the suburbs of the universe. Finally, furthest from the citadel, Alan describes a beautiful material universe created by God which serves as nature's domain. Although the goodness of God extended to all things, salvation was intended only for rational creatures.

The Franciscan theologian St. Bonaventure also professed a religious philosophy shaped by hierarchy. Although Bonaventure believed that each being was equally close to God, each was not equally capable of responding to this divine relationship. As a result, only those creatures that existed within the spiritual realm, humanity and the angels, could find fulfillment in salvation. Irrational creatures participated in creation, and found fulfillment, only through their relationship with humanity (Hayes, 1981). In the end the biophysical world is left behind as humanity ascends to perfect spiritual communion with God (Santimire, 1985).

In the modern era, the French Jesuit priest Teilhard de Chardin attempted to develop a doctrine of cosmic evolution that relied heavily on humanity's ability to eventually transcend the physical world. Essentially Teilhard believed that humanity came into being along a single, evolutionary axis that consistently and purposefully led to increasing complexity and consciousness. Through conscious effort humanity would

transcend physical evolution and achieve spiritual union with the Creator (Santimire, 1985; King, 1988). Although Chardin identified several intermediate stages of the evolutionary process including cosmogenesis, biogenesis, and noogenesis (the development of self-consciousness), all evolution was ultimately a process of Christogenesis; the growth and fulfillment of the living Christ. To Chardin the biological order existed merely to provide a stage upon which a final unified world of pure spirit would be achieved (Santimire, 1985).

A Cursed Land

Portrayals of wilderness as a cursed land occur throughout scripture and most of the history of Christianity. The pervasiveness of this attitude is evident in the historically consistent response within the Judeo-Christian tradition to conquer and subjugate wild country. Land is consistently considered wilderness unless cultivated while many animals are portrayed as wild beasts or deemed loathsome (Leviticus 11:1-43) unless domesticated. Portrayals of the desert as inhospitable contrast sharply with the overflowing bounty of the Garden of Eden or the Promised Land flowing with milk and honey. The inhabitants of wild country, both human and non-human, have also been targets of conquest. Repeatedly, large scale efforts aimed at converting the inhabitants of wild country to

Christianity have been, and continue to be, supported by the Church faithful. The histories of the native peoples of North and Central America testify to the sometimes devastating effects of these efforts on native culture (Deloria, 1973).

As a result of this portrayal of wilderness as the opposite of paradise, there has developed in Western societies a fundamental lack of respect for the inherent value of the land and its native inhabitants. Consequentially, land is ultimately viewed as a mere object to be exploited for human needs or pleasure; a possession. Animals are labeled pests to be exterminated (wolves, snakes, mosquitoes i.e.) and plants considered weeds when they do not fulfill a humanly conceived need, desire, purpose, or image of beauty. To imagine the land, its inhabitants, and the relationships that exist between the two as possessing inherent value worthy of protection within ethical boundaries is a strenuous task in a culture dominated by these assumptions.

The rise of Gnosticism during the first two centuries of the Christian era represents an extreme expression of the metaphor of ascent within the "otherworldliness" and "cursed land" themes. The Gnostic doctrine of an alien God that is removed and disconnected from the world has had a consistent influence on the development of Western attitudes to

the natural world. Within this philosophy nature is viewed as a self-contained realm of darkness and evil which was neither created or governed by God. Into this realm a segment of the divine has fallen and become entrapped within the human soul. Salvation will occur when a savior descends from the transcendent realm to supply the human soul with saving knowledge (gnosis). Thus equipped, the soul returns to a spiritual communion with God leaving behind the evil of the earth. Once the spiritual wholeness of God is restored, the final act of the Gnostic universal drama is the abolition of the cosmos (Santimire, 1985).

Gnosticism is perhaps the most extreme example in Western history of a world-view shaped by the metaphor of ascent. Salvation is based entirely upon rising above and beyond the world of nature. The material world is viewed as a vast defiled prison. The only appropriate response is a desire to escape, to rise to the highest levels of true being, far above the evils of nature (Bradley, 1992; Santimire, 1985).

Spiritual Dichotomy

Anthropocentric interpretations of scripture have been influential in maintaining a spiritual dichotomy between humanity and the natural world in Western societies. Within this context the Bible is viewed almost entirely as an historical account of God's relationship with humanity (Deer,

1973). Proponents of this viewpoint suggest Christian theology should focus primarily on the God-man relationship and should not have an ecological dimension (Santimire, 1985). As a result, orthodox Christian thought always imagines God and humanity apart from, or against, nature. Kaufman (1972) has suggested that merely examining Christian vocabulary provides evidence concerning the extent of the dichotomy between man and nature. Words such as sin, salvation, forgiveness, repentance, hope, faith, rightousness have to do primarily with human relationships with God or other humans. These words are rarely applied to the human-nature relationship

Historically, theologians who promote an anthropocentric interpretation have focused on the text found within Genesis 1:27-28.

> *God created man in his image; in the divine image he created him; male and female he created them. God blessed them saying: "Be fertile and multiply; fill the earth and subdue it. Have dominion over the fish of the sea, the birds of the air, and all the living things that live on the earth."*

Throughout the Old Testament the Hebrew words kabash (subdue) and radah (have dominion over) are repeatedly used to signify a violent or crushing assault. This has frequently been interpreted in the Christian tradition as a divine commandment to conquer and enslave every part of nature.

Mankind has the right to do with nature as he pleases because he alone of all the creatures of creation was made in the image of God. As a result, humans are seen as masters, not members, of the natural order and everything in the world exists only to serve man (Nash, 1989).

An anthropocentric interpretation of the man-nature relationship is evident in the complex thought of the great Anglican Doctor Thomas Aquinas. During the early part of the twelfth century the notion that the natural world was essentially evil was beginning to fade. More and more nature was imagined as having flowed from God and was therefore inherently good and blessed. Aquinas attempted to understand the nature of this creative process, as well as the conditions under which all of creation would return to God, in his monumental *Summa Theological.* Eventually Aquinas came to believe that although all material creatures were created in order to be assimilated into the divine goodness, those creatures lower on the hierarchy than "spiritual" humans were created to serve the needs of the more noble beings. Nature is seen as an object for human use which fills biological needs and provides spiritual knowledge of the Creator (Santimire, 1985). Like so many Christian theologians before and since, Aquinas believed that only humans were created in a state of grace and were therefore the only members of creation worthy of

redemption.

The consistent refusal to include the natural world and its processes within the spiritual realm has been one of the most influential contributions of the Judeo-Christian theology to Western culture. Although natural objects were created by God and showed evidence of his existence and wisdom, they themselves were not worthy of salvation or worship. In the Judeo-Christian tradition the distinction between the Creator and the created is unequivocal and there can never be any doubt concerning the inferiority of the natural order:

> *I, the Lord, am your God, who brought you out of the land of Egypt, that place of slavery. You shall not have other gods besides me. You shall not carve idols for yourselves in the shape of anything in the sky above or on the earth below or in the waters beneath the earth.*
> (Exodus 20: 1-4)

As a result Christianity has consistently rejected animism; the belief that all living and non-living parts of the environment possessed a consciousness or spirit. To do otherwise would elevate the pagan nature-Gods to a level equal to the Creator.

Christian opposition to animism put an end to human subservience to the cosmos, removed ancient inhibitions that had prevented the exploitation of nature for centuries, and promoted a utilitarian concept of

nature (Deer, 1975; Merchant, 1980). It has been suggested that the removal of animistic and organic assumptions about the natural order contributed to the death of nature by allowing its technological exploitation by mankind for his own gain (Merchant, 1983; White, 1967).

B. The Influence of Modern Science: A Search for Mathematical Objectivity

Assumptions concerning the validity of rationality over other forms of knowledge have also contributed to humanity's separation from the natural world (Bowers, 1992). Since the Enlightenment, the Western world-view has been largely shaped by the concepts, methods, and technology of its science. One of the central tenets of Western science is that it exists free of bias whether personal, cultural, or moral, and aims only to understand and explain. Western science during the past 500 years has been greatly influenced by the desire to develop methods of study dependent upon techniques that would insure this objectivity. The integration of mathematics into the study of science during the Scientific Revolution was the greatest expression of this desire.

The increasing reliance on mathematics to describe physical reality represented a defeat for the Aristotelian view of nature which had become prominent in the West since its rediscovery in the twelfth century. Aristotle believed that although numbers could capture certain aspects of

a material object, they could not be used to describe its complete and true nature. Instead, material objects possessed an internal organic quality that was the result of intellectual design. Organic objects were constantly evolving in form in order to more perfectly reflect the inherent qualities that defined them. These qualities eluded mathematical description and as a result Aristotelian descriptions of nature employed philosophical arguments rather than mathematical ones (Deason, 1986).

This approach contrasts sharply with the Platonic view of reality that began to reassert itself with the attempts of sixteenth century scientists to describe nature in mathematical terms. Plato believed that the highest reality was Intellectual Form which, although present in material objects, could be described most perfectly through the use of mathematics. Plato agreed with the Pythagoreans that all heavenly bodies were divine and noble beings whose motions were uniform and circular. As a result Plato attempted to describe all physical reality using numbers and "perfect" geometric shapes like circle and spheres. Like Aristotle, Plato believed the universe was the result of a rational design and all natural laws were subordinate to divine authority (Deason, 1986; Mason, 1962).

Modern Science: A brief historical perspective.

> *Every added protection against the natural world contributes its bit to the steady building illusion of independence from nature, so that in time the greatest illusion is erected, the omnipotence of man.*
>
> Fredrick Turner (1980)

The history of what has been called modern science began with the revolutionary heliocentric planetary system proposed by Nicholas Copernicus in 1543. Although led astray by Greek misconceptions concerning the importance of "perfect" geometric shapes to the design of the universe, Copernicus attempted to develop a simple explanation for the motion of heavenly bodies within a mathematical context. Over the course of the next two centuries the Platonic view of the universe was continually modified in an attempt to construct a mechanical view of the world in which matter lacked active, internal forces driving it towards some ultimate perfect form. Eventually nature was no longer viewed as an organic being and became increasingly described as a machine whose properties and behaviors could be predicted and controlled. Within this context God's role in the design of the universe was reduced to that of a Divine watchmaker; present at the origin of the universe but not actively involved in its day to day operation.

A Need for Accuracy: The Marriage of Pure and Applied Science

Initially, the inability to make accurate measurements hindered the advancement of a Mechanistic view of the nature. Previous to the sixteenth century, astronomers consistently failed to accurately predict the occurrence of celestial events. In 1564 the Danish nobleman Tycho Brahe witnessed an unexpected conjugation of the planets Jupiter and Saturn. This event inspired him to begin construction of an observatory which eventually allowed him to make detailed and accurate measurements of celestial objects and their motions. Using these measurements Tycho was able to accurately track the path of a comet *through* the supposedly solid celestial spheres of Plato and Pythagoras (Ronan, 1982).

Tycho was driven by the need to minimize errors of measurement that had hindered the work of previous astronomers. He continually strove to increase the precision of the measuring devices he employed thus establishing a fundamental link between theoretical and applied science (Mason, 1962: Ronan, 1982). In addition, he was probably one of the first scientists to recognize the limitations inherent in any measuring device and attempted to compensate by comparing measurements obtained from different instruments (Ronan, 1982).

The measurements taken by Tycho remained the most accurate in the world for over one hundred years and proved to be instrumental to the theories of planetary motion proposed by his student Johann Kepler. A deeply religious man, Kepler believed that there existed a Divine Plan for the cosmos that could be understood through methodical scientific study. The study of nature was, for him, as much a revelation of God as was the Bible (Ronan, 1982; Westfall, 1986).

In 1609 Kepler published *The New Astronomy* in which he demonstrated mathematically that the orbit of Mars followed an elliptical, not circular, path around the Sun. This suggested that the orbital speed of Mars was not uniform but rather dependent upon its location in its orbit. This finding helped to further enlarge the rift developing between modern science and ancient Greek philosophy concerning the nature of the universe. Eventually Kepler was able to derive a mathematical relationship between a planet's period of revolution and its distance from the Sun. This triumph was due as much to Tycho's accurate measurements as it was to Kepler's theoretical insights and further solidified the growing field of quantitative science.

Quantifying Nature

As a result of its ability to function as a neutral tool in the investigation of natural phenomena, mathematics quickly established itself as a logical part of science by the seventeenth century. One of the first individuals to emphasize the quantitative nature of science was the Italian Galileo Galilei. Galileo believed that any problem could be investigated if all the important variables could be observed, measured and subjected to mathematical analysis (Mason, 1962). Galileo became one of the first scientists to design controlled experiments by attempting to isolate and investigate the effects of individual variables. This allowed him to analyze complex natural systems by reducing them into their component parts. Using these techniques, Galileo was able to make predictions concerning phenomena that could not be witnessed with the naked eye including the acceleration of falling objects.

Although Galileo did not invent the telescope he did use it extensively to support his beliefs in a Copernican view of the universe. Observations of the cratered and mountainous surface of the moon and dark spots on the surface of the sun hinted that celestial objects were not perfectly formed. In addition, his discovery of four large moons orbiting Jupiter and his observations concerning the phases of Venus demonstrated

that not all objects were preordained to orbit the Earth. Finally, when Galileo turned his telescope in the direction of the Milky Way he discovered that it was composed of thousands of individual stars (Ronan, 1982). These observations suggested that the nature of the universe was fundamentally different, and existed on a far greater scale, than previously imagined.

As a result of its predictive power, the mathematical-experimental method of science came into maturity during the sixteenth and seventeenth century. Leonardo da Vinci used this approach to investigate problems associated with the design and construction of buildings while Nicola Tartaglia and Galileo utilized it to investigate the motion of projectiles. Despite these successes, mathematics could not be easily applied to qualitative aspects of the natural world. Initially, non-measurable phenomena were ignored by scientists like Galileo. Eventually they were regarded as being unreal (Mason, 1962).

Francis Bacon was one of the first scientists to recognize the important role science could play in the betterment of society. Bacon believed that through the proper channeling of technology humanity would eventually be able to subdue and control nature. Unlike Galileo, Bacon believed the scientific method was essentially qualitative, and inductive.

Through a careful consideration of facts, Bacon attempted to develop hypothesis from which he could derive axioms and theories. Using this technique any properly trained individual could verify the truths of nature for themselves (Merchant, 1980). Although of limited use at the time, the qualitative-inductive method developed by Bacon would bear fruit when applied to problems of evolutionary geology and biology during the nineteenth century (Mason, 1962).

By the middle of the seventeenth century attempts to link the scientific method and mathematics into a mechanical picture of the processes of nature had, for the most part, been successful. To a large degree this resulted in the removal of matters of religious faith from the process of questioning. Rene Descartes, a leading proponent of the Mechanistic philosophy, proposed that questions of faith could be determined only by revelation and therefore represented a realm of knowledge separate from that investigated by science. Descartes believed that God revealed himself through the unchangeable laws he ordained and that all of nature was governed by these laws. Because a good God would not set out to deceive his creatures, Descartes believed that the laws of nature were comphrehendable through reason and properly employed mathematical analysis. Although the existence of God was essential to his

philosophy, Descartes believed that the day to day running of the Universe was governed by laws and not Divine intervention (Westfall, 1986). As a result he rejected the notion that humanity should stand in wonder at the mysteries of the cosmos and was repelled by the notion of miracles. Miracles suggested that flaws existed in God's design and that nature required periodic adjusting (Ashworth, 1986; Ronan, 1982).

Although he always deferred to the Church on matters of faith, Descartes went to great lengths to construct a philosophy that did not appear at odds with Church doctrine. The universe, he believed, was composed of two horizontal planes; one mechanical and one spiritual with only mankind occupying both planes. This fundamental dualism has continued to influence Western thought for the past three centuries (Ronan, 1982; Westfall, 1986).

The scientific accomplishments of the great English scientist Issac Newton in many ways demonstrate the degree to which the methods of science had come to depend upon the powers of mathamatical analysis during the Enlightenment. During the later half of the seventeenth century several prominant scientists, including Newton, were attempting to both describe, and derive a mathematical relationship that would account for the elliptical orbits of the planets around the sun described by Kepler.

One reason why the problem was so difficult was that as a planet travels an elliptical path its distance from the sun is constantly undergoing change. As a result the magnitude of the force that holds the planet in orbit must also undergo constant change if the planet is to remain in orbit. In order to study problems of this type Newton was forced to invent a new form of mathematics; calculus. Using calculus Newton demonstrated that the force holding the planets in elliptical orbits operated according to an inverse square law. Using Newton's mathematical analysis Edmund Halley was able to predict, with a degree of accuracy unimaginable to earlier astronomers, the return of the comet that bears his name in 1758. Without the analytical powers provided by calculus it would have been extremely difficult, if not impossible, to verify Kepler's theories concerning planetary motion.

Newton claimed that the force acting from the sun was gravitational and not magnetic as suggested by Kepler and Robert Hooke. Futhermore Newton suggested that the effects of gravity were universal thus uniting celestial and terrestrial laws of motion under one basic law (Ronan, 1982). An outgrowth of this philosophy was that it was no longer necessary to view the Earth as a special act of creation seperated from the rest of the cosmos by its own set of Divinely inspired laws.

By the end of the Enlightenment the break with Aristolean (organic) concepts of the universe was complete. Increasingly science had become rational, experimental, and mathematical while descriptions of nature became more and more mechanical. Repeatedly scientists attempted to reduce nature into its components parts in order to manipulate, control, and predict the behavior of individual variables. These developments encouraged the development of more precise and accurate measuring devices along with an increasing dependence upon technology. Only those aspects of nature that could be measured were considered to be real while qualitative assessments were either rejected or ignored. Eventually Western societies came to rely on science and technology to lead the way to a better society through the manipulation and control of nature.

CHAPTER 2

THE MYSTICAL TRADITION IN CATHOLICISM: A VALIDATION OF THE ECOLOGICAL MOTIF

> *The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed. To know that what is impenetrable to us really exists, manifesting itself as the highest wisdom and most radiant beauty which all our dull faculties can comprehend only in their most primitive forms- this knowledge, this feeling, is at the center of true religiousness. In this sense, and in this sense only, I belong to the ranks of devoutly religious men.*
>
> Albert Einstein

Despite a long and rich history, interpretations of the God-human-nature relationship that have emphasized the ecological motif have remained on the periphery of Catholic teachings. Recently many Catholic philosophers have called for a return to the Creation-centered theology practiced by the early Church (Berry, 1982; Bradley, 1992; Carmody, 1983; Clifford, 1988; Fox, 1988; Mertens, 1987). Creation-centered theologies emphasize the creative nature of God on a cosmic scale while down playing anthropocentric notions of salvation. Within these theologies the God-human-nature relationship is envisioned as one of inter-relationship and mutual presence (ecological motif).

In this chapter I will examine aspects of the Western mystical tradition and interpretations of Catholic teachings which promote humanity's relationship with nature within an ecological context. This

search has helped me to validate, within the Catholic spiritual tradition, a personal understanding of the God-human-nature relationship which had not been encouraged within either my scientific or religious education. As a consequence of this new understanding I have been able to pursue a spiritual reunion between my religious beliefs, my scientific interests in the natural world, and my desire to integrate environmental ethics into an educational setting.

A. Defining the Western Mystical Experience

The mystical journey represents an attempt to perceive the presence of the living God within one's life. Consistently Western mystics have claimed that it is possible to achieve direct and conscious contact of soul with the living God; a state of intellectual intuition of the Absolute. During these momentary periods of spiritual union the soul is transformed in order to attain perfect harmony with God while at the same time experiencing a momentary foretaste of the bliss of heaven promised to all. (Butler, 1966; Steer, 1953.) During this period of transcendental union the soul retains its individuality and full personality despite its transformation and absorption into God (Butler, 1966).

The mystical experience is frequently described as an interior pilgrimage initiated by deep contemplation and frequently culminates in a

state of trance or rapture. There is a strong tendency in the Western mystical tradition to root the mystical experience in a life of prayer and fasting; both of which are seen as representative of a inner spiritual hunger for God. Although both acts are essential to achieving the proper yearning of the heart for spiritual harmony, the experience itself is conferred only by Grace (Butler, 1966; Capps and Wright, 1978; Steer, 1953).

For the mystic, the proper goal of the contemplative life is the attainment of perfect and perpetual union with God achieved after a period of spiritual purification and illumination (Capps and Wright, 1978). The state of spiritual union is characterized by an attitude that de-emphasizes institutionalized religious doctrine, dogma, and sacraments (Butler, 1966). Often the experience is described in terms of darkness and obscurity, a kind of knowing through ignorance, which cannot be described in terms of sensory or mental images (Smart, 1977). Drawn by a hunger of love and a thirst for spiritual knowledge, the mystic is drawn deeper and deeper into their own inner existence.

The mystical experience often encourages the development of a holistic attitude towards the natural world. Living things, although unique in their creation, bear a resemblance to, and are connected with, all other

living things. The world is not envisioned as a finished product, fixed and immutable, but rather as a dynamic organism whose life is always new. Within this context a large portion of reality is determined to be unknowable and mysterious but trustworthy. As a result the mystic does not approach the world as a problem to be solved but attempts rather to penetrate its depths and richness. To the mystic, life itself is the ultimate gift for which the most appropriate response is to give thanks (Capps and Wright, 1978).

B. Western Mysticism: A Brief Historical Perspective

Early Influences

Those aspects of Western Christian mysticism that emphasize the interior process as the proper path to spiritual union with God can trace their biblical roots through both Old and New Testament literature. Portions of the Wisdom literature, kingship materials, and prophetic material as well as the New Testament Gospel of John and letters of Paul, encourage the discovery of God within self.

> *Those who trust in him shall understand truth, and the faithful shall abide with him in love.*
>
> Wisdom 3: 9

Remain in me, as I remain in you. Just as the branch cannot bear fruit on its own unless it remains on the vine, so neither can you unless you remain in me.

John 15: 4

I made known to them your name and I will make it known, that the love with which you loved me may be in them and I in them.

John 17: 26

The mystery hidden from ages and generations past. But now it has been manifested to his holy ones, to whom God chose to make known the riches of the glory of this mystery among the Gentiles; it is Christ in you.

Col. 1: 26-27

In many ways the Judaic tradition created a nurturing environment in which Christian mysticism could flourish. It can be argued that the Christian religion is an example of Judaism in mystical form (Capps and Wright, 1978).

Christian mysticism was also greatly influenced by Platonic philosophy and its contention that various components of reality are graded; not the same in terms of quality, kind, or status. Like other early Greek philosophers Plato discerned two orders of reality, one permanent the other transitory. Plato attempted to provide a place for being (permanence) while allowing for a place of becoming (transition) to be properly acknowledged. Plato used this philosophy to examine questions concerning the structure of society and education, how values operate, and how knowledge occurs (Capps and Wright, 1978).

Although Plato intended his ideas concerning the nature of reality to be purely philosophical they were quickly extended into realms of religious thought. The dualism between being and becoming was modified to define the relationship between supernatural and natural, creator and created, God and the world. Within the Platonic tradition philosophy and religion were fused and provided the language, concepts, and intellectual framework by which mystical aspirations could be examined and defined. God was recognized as the highest form of being, knowledge construed as knowledge of God, and knowledge of Good interpreted as union with the Absolute (Capps and Wright, 1978).

Augustine (354-430), who is frequently referred to as the father of Christian mysticism, accepted that union with the divine was possible through a process of self-emptying, a declaration of dependence upon the divine, and a longing for God's love and acceptance. Augustine believed that sin had marred humanity's likeness to God and created an overwhelming gulf between God and the human soul. This gulf could be overcome only through the transforming power of divine grace which was perceived through a process of contemplated in-dwelling (Capps and Wright, 1978).

Although initially influenced by the philosophy of the Gnostic prophet Mani, Augustine's thought eventually shifted toward a theology emphasizing the ecological motif. For Augustine the whole of creation was brought into being and sustained by God as a realm of blessing and divine glory. Augustine believed that all things in nature had their own intrinsic value, integrity, and place in the greater history of the created order (Santimire 1985).

Desert Fathers and the Monastic Life

Throughout the centuries of Christianity individuals seeking contemplative lives were drawn to places that fostered interior awareness (Armstrong, 1973; Cook, 1989; Dreyer, 1991; Merton, 1960; Sorrell, 1988). Several desert hermitages were founded during the early centuries of Christianity as were communal monasteries. The climate within these settings was markedly ascetic and required participants to adjust priorities while severing material and emotional attachments to the outside world. The Desert Fathers were a group of men who abandoned the cities of the pagan world during the fourth century to seek solitude in the barren lands of the Middle East. Through prayer, the very heart of the inner life, each hoped to achieve an intuitive grasp of their own inner reality anchored in Christ.

The Desert Fathers believed that the society they sought refuge from fostered a political climate in which men sought to impose their will on other men. To passively accept the values and tenets of such a society led to spiritual disaster. To these men there was no such thing as a "Christian state" and doubted if Christianity and politics could be combined to form a Christian society. They sought instead to construct a spiritual society in which men had no desire to be ruled by, or rule over, other men and each was created equal in each others eyes.

Although the desert hermits sought solitude, they believed the very essence of the Christian message was unity in Christ and each other through charity. To seek a spiritual union with God that required complete separation in spirit as well as body from the rest of humanity was an absurdity. To be a prisoner of one's own selfhood was, is fact, to be in hell. Therefore the Desert Fathers did not seek to place themselves above the rest of society. Instead they felt a spiritual obligation to remain connected with the physical world even when seeking transcendental union with God. In this way they hoped to save not only themselves but to pull the whole world to safety after them (Merton, 1960).

Medieval Monasticism

Western mysticism owes much of its essence to the nurturing conditions provided by monasticism. The monastic life style in the West was characterized by daily absorption of the Hebrew bible, the Christian New Testament, and the writings of the Church Fathers. It was hoped that as a result of intimate familiarity with the life and passion of Christ and the saints, as well as frequent participation in liturgical worship would help to enrich and transform the lives of the individual. Many monastic communities became highly formalized following specific guiding principles. Early Benedictine orders, for example, practiced a simple life that emphasized manual labor, the communal ownership of goods, the communal practice of prayer, silence and a vow of poverty, chastity, and obedience (Capps and Wright, 1978).

It was during the Middle Ages that the Christian communal monasticism experience reached its peak in Europe although the movement experienced numerous changes aimed at redirecting the focus of the monastic lifestyle. Several established Benedictine communities were joined by Cistercians and Carthusians who sought a more austere religious existence. Other reform efforts were initiated by the Franciscans and Dominicans, whom emphasized inherent teachings, and the Jesuits which

founded a teaching order. It was also during this period that important contributions to the development of Western Mysticism were made for the first time by women mystics including Hildegarde of Bingen (1098-1179), Mechthild of Magdeburg (1212-1299), Julian of Norwich (1343-1413), Catherine of Sienna (1347-1380), and Teresa of Avila (1515-1582) (Brunn and Epiney-Burgard, 1989; Capps and Wright, 1978; Levasti, 1953; Szarmack, 1984)

The Medieval flowering of mysticism in Europe resulted in the development of several fundamentally different mystical pathways. Many of the women mystics, for example, described their experiences using a language rich in love in which Christ was envisioned as a Bridegroom and the human soul as the bride. Others emphasized an intellectual process in which the individual would come to know God through a knowledge of the Good (*via positive*). Several Rhineland mystics, including the German Meister Eckhart, emphasized the utter transcendence of God and sought to enter into union with the Godhead through a spiritual journey characterized by darkness or nothingness (*via negative*) (Capps and Wright, 1978; Davies, 1988).

The Rhineland emphasis on the majesty of God eventually led to the belief that natural ontological connections between God and man had been

severed thus eliminating the possibility of an natural knowledge of God. The Protestant reformers Martin Luther and John Calvin both expressed mistrust with the mystical experience as well as the monastic settings in which it was fostered. The personal nature of the mystical journey was seen as being fraught with dangerous deceptions concerning the nature of God. Consequently during much of the Reformation the mystical journey was no longer considered to be second nature to the deeply religious life and was subjected to intense criticism and extreme resistance whenever it was displayed (Capps and Wright, 1978).

During the post-reformation period Catholic mysticism became more reflective and self-critical in an attempt to regain its original contemplative base. Attempts were made to formalize the contemplative process; to establish rules or recognizable patterns that characterized the mystical journey. Examples include the writings of Ignatius of Loyola's *Spiritual Exercises*, Teresa of Avila's *Interior Castle*, and the commentary on *The Song of Songs* written by John of the Cross. The interior process was described as having three recognizable steps or stages. The first stage, purification, prepared the soul for the spiritual journey by removing all protective barriers. This was followed by a period of illumination during which an individual received insights into the divine reality. Finally

spiritual union, a state of communication between God and the soul, was achieved. These stages were identified in the spiritual manuals that were used in many monasteries and convents to lead individuals into a process of interior exploration (Butler, 1966; Capps and Wright, 1978).

The Modern Era

During the past three hundred years it has become more difficult to identify a single trajectory for the mystical path. Several factors including Church history, theological controversies, and profound cultural shifts have all served to fragment the mystical impulse in the West. Despite these divisive influences, mysticism has remained attractive to those who feel lost within the complexities of the modern era. Refusing the be excluded from the human heart the mystical impulse continues to establish its own nurturing conditions within the human soul. During periods of moral collapse and spiritual decay adherents to the mystical tradition continue to seek unity and wholeness against what is perceived to be an increasingly alienating world (Berry, 1982; Bruchel, 1987; Capps and Wright, 1978; Fox, 1988).

C. Nature Mysticism

> *For what can be known about God is evident to them, because God made it evident to them. Ever since the creation of the world, his invisible attributes of eternal power and divinity have been available to be understood in what he has made.*
>
> Romans 1:19-20

The belief that it is possible to discern insight into the nature of the Creator through contemplation of the physical world is the central tenet of Nature Mysticism. To the nature mystic, all of nature is seen as the language in which God has expressed his thought. Moments of intense contemplation provoke a deep sense of awe and wonder until, moved by the overwhelming subtleties of cosmic reality, a spiritual unity with God is achieved (Armstrong, 1973; Cook, 1989; Dreyer, 1991; Teasdale, 1991; Sorrel, 1988).

Nature mysticism is founded in a panentheistic spirituality in which all things are seen to exist in God and he in all things. It stands in sharp contrast to the ritualized, liturgical-based spirituality which dominates Western Catholicism and has been criticized for failing to meet the spiritual needs of the Church faithful seeking a more mature mystical awareness of their place in the Cosmos (Teasdale, 1991).

Although the compatibility of Nature Mysticism with Christianity has been questioned (Butler, 1968; Zaehner, 1957), individuals who have followed this spiritual pathway have had a significant influence on the development of the Western mystical tradition. Several of the New Testament authors write of the ability of mankind to witness the handiwork of the Creator within the created world. Jesus himself was a great lover of nature and frequently taught that nature should be a source of joy, sustenance, and both physical and spiritual cleansing. Jesus often used imagery founded in the natural world to portray truths about the human spiritual life:

> *Learn from the ways the wild flowers grow. They do not work or spin. But I tell you that not even Solomon in all his splendor was clothed like one of them.*
>
> Matthew 6: 28-29

> *Either declare the tree good and its fruit is good, or declare the tree rotten and its fruit is rotten, for a tree is known by its fruit.*
>
> Matthew 12: 33

Many of the most significant events in Jesus's life occurred in the wilderness and he frequently sought isolation in natural areas to achieve spiritual renewal through communion with his Father (Hughes, 1975).

Franciscan Mysticism

Although many of the great mystics of medieval Europe used images of nature to describe the mystical experience (Brunn and Epiny-Burgard, 1989) none has received as much attention as the Italian Francis of Assisi. Born into a wealthy family near the end of the twelfth century, Francis rejected the material comforts of the world to live, as faithfully as humanly possible, the Christ-like life. His unwavering efforts to place Christ at the center of his life were manifested through his complete love for God, a devotion to poverty, and his delight in nature (Armstrong, 1973).

Francis left very few written records concerning individuals and experiences that had influenced the direction his life took. Much of what is known about his life is a result of biographical material prepared by Thomas of Celano, information compiled by companions and disciples, and some questionable and sometimes confusing material composed by St. Bonaventura (Sorrel, 1988). Thirteenth century Europe was undergoing great economic, social, and political changes that must have influenced young Francis. The mercantile system was on the rise in Western Europe creating in its wake a class-consciousness that judged individual worth based upon the ownership of property. In addition, the Church, which monopolized education, art, and performed numerous legal functions in

medieval society, had increasingly become the target of organized reform efforts. In general it was believed that the Church, led by clerics living lives much different than Christ and his apostles, had drifted too far from its spiritual base (McDonagh, 1987; Cook, 1989).

Early in his spiritual transformation Francis made a symbolic rejection of materialism by stripping naked in public and returning his clothes to his father, a prominent member of the merchant class. During the next three years Francis sought a life of utter poverty begging for food and clothing, enduring ridicule from strangers and former friends, and spending large amounts of time attending to lepers. He came to realize that worldly things were not an obstacle to attaining the Christ-like life he sought but rather his attitude toward them. Therefore in poverty and physical weakness Francis found spiritual richness and strength (Cook, 1987).

Francis was quickly joined by other men from the areas surrounding Assisi and together they wandered the countryside joyfully living an ascetic lifestyle and calling for reconciliation with God. Fearing they would be labelled as heretics Francis sought and received an audience with Pope Innocent III. Francis wanted approval for a simple rule, based mostly on scripture, in which he and his brothers would live the life of Christ and

the apostles. Unable to deny to Francis a lifestyle to which all Christians claim to be following, and possibly seeking to quiet criticism of Rome, Innocent granted Francis permission to establish his Order (Cook, 1987).

Although the Order spread rapidly throughout Europe and the Holy Land, difficulties soon arose as a result of the inability of many brothers to match their leader's spiritual zeal. Increasingly Francis suffered physical and emotional strain as he continued to lead a strict ascetic life. His realization that his suffering was a reflection of Christ's passion brought him great joy in the final months of his life (Cook, 1987).

The nature mysticism practiced by Francis was founded upon the belief that God's presence pervaded the entire universe. His early education did not include the Neoplatonic attitude towards creation which emphasized a vertical, hierarchical structure of the natural world (Sorrel, 1988). Instead he developed a strong sense of horizontal connectedness between humanity and natural phenomena and extended the Christian call to love beyond the human realm to include all Creation (McDonagh, 1987; Dreyer, 1991). Francis realized that God's family included all of Creation and references to various brothers and sisters in his famous canticle were meant to be taken literally.

The Canticle of Brother Sun

Most high, all powerful, all good Lord.
All praise is Yours, all glory, all honor and blessing.
To you, alone, Most High do they belong.
No mortal lips are worthy
To pronounce your name.
All praise be Yours, my Lord, through all that you have made,
And first my Lord Brother Sun,
Who brings the day; and light you give us through him.
How beautiful is he, how radiant in all his splendor.
Of you, most high he bears the likeness.
All praise be Yours, my Lord through Sister Moon and Stars;
In the heavens You have made them, bright
And precious and fair.
All praise be Yours, my Lord, through Brothers Wind and Air,
And fair and stormy, all the weather's moods,
By which You cherish all that You have made.
All praise be Yours, my Lord, through the Sister Water,
So useful, lowly, precious and pure.
All praise be Yours, my Lord, through Brother Fire,
Through whom you brighten up the night.
How beautiful he is, how gay! Full of power and strength.
All praise be Yours, my Lord, through Sister Earth, my mother
Who feeds us in her sovereignty and produces
Various fruits with colored flowers and herbs.

Francis preached to flowers and birds, removed worms from walkways ways to save them from being trampled, and set loose fish that had been caught all as an expression of his dedication to the belief in the Brotherhood of all created things. Peace meant bringing all Creation into harmony and cooperation (Armstrong, 1973; Cook, 1989).

To Francis every creature was a mirror of God's presence and his delight in nature resulted from his belief that all created things provided clues to the handiwork and glory of God. Unlike other lovers of nature his compassion extend to all of the natural world not just those things that were beautiful. His references to nature emphasized an inherent value not a utilitarian attitude. Francis believed that only that which was needed for sustenance should be taken from the earth. He and his followers had no urge to transform or remake the physical world, to dominate nature, or to exploit the natural world for personal gain. These desires were replaced by a sense of joy, wonder, praise and gratitude for the simple gift of life (McDonagh, 1987; Sorrel, 1988; Cook, 1989; Dreyer, 1991).

Modern Influences

Although Western societies have traditionally failed to encourage a worshipful delight in the natural world modern examples of nature inspired mysticism include the writings of Teilhard de Chardin (1959), Thomas Merton (1960), Thomas Berry (1988), Ian Bradley (1992), Annie Dillard (1974, 1982), Ed McGaa (1990), Lewis Thomas (1974), Barry Holstun Lopez (1978), Carolyn Merchant (1990), and Matthew Fox (1980, 1983, 1988, 1991).

The thought of Thomas Berry and Matthew Fox have been especially influential in promoting the development of an ecological consciousness within a theological conceptual base. The American monk and eco-theologian Father Thomas Berry was influenced to a large extent by the mystical vision of cosmic history promoted by Teilhard de Chardin (see Chapter 1). Berry believes that humanity is on the verge of entering a ecological age brought about by a new understanding of our place in cosmic history. Cosmic evolution began in the stars and persisted until the attainment of self-consciousness some 15 billion years later (Berry, 1988; Berry, 1990). Berry believes, however, that the development of self-consciousness has been a mixed blessing. Led by the Western industrial nations, humanity has entered an era characterized by ecological devastation brought about by mankind's enchantment with science and technology.

Berry's brand of nature mysticism emphasizes the immanence of the Divine in nature not in the process of transcendence. The universe, nature, and the various forms of life around us transmit to us the mystery of God through our experiences with them. To redirect humanity to a path of ecological consciousness will require humanity to complete rethink its relationship with the earth and its non-human inhabitants in order to

include this perspective (Teasdale, 1991). Only complete awareness and acceptance of our cosmic communion with all of Creation will usher in the ecological age.

The former Dominican friar and teacher Matthew Fox encourages a return to the creation-centered spirituality founded in panentheism to restore dignity to created things and remove them from the realm of human exploitation (Teasdale, 1991). As opposed to a fall-redemption spirituality that defines the world as sinful and alienated from God, creation-centered spiritualities emphasize that the original nature of all things is good. Creation-centered spiritualities promote a human-nature relationship that encourages creativity, playfulness, cooperation, and harmony while subordinating the need to dominate or control (Ruether, 1990).

Familiar with the inner life, Fox has encouraged a mystical search for the Cosmic Christ to free the Church from its anthropocentric teachings concerning salvation. Fox, believing that a spiritual response will be necessary to combat the environmentally destructive practices of the modern world, advocates a greening of the religious life (eco-spirituality). Worship must be on the cosmological level (Boulton, 1991) and emphasize the sacredness of all creation (Fox, 1990).

As a Basis for Eco-theology

He is before all things, and in him all things hold together.
Col. 1: 17

Nature Mysticism has been suggested as a basis for the development of an ecologically sensitive theology (Eco-theology) which emphasizes a dynamic and mutual relationship between God and all of creation. Within such philosophies the common understanding of mysticism as being world-denying is replaced by one that encourages a celebration of life on both the biological and spiritual levels. Nature, no longer envisioned as merely the background scenery against which the God-human drama is acted out, becomes a basic participant in the process of creation and redemption (Bratton, 1984; Santimire, 1985).

One of the main concerns of Christian eco-theologians is the promotion of a cosmology, rooted in religious doctrine, that advocates planetary health. By encouraging a modification of social, psychological, economic, and educational theory while seriously addressing the moral and ethical implications of the ill-treatment of the earth, Christian eco-theologians hope to halt the sinful destruction of creation. (Berry, 1990; Dreyer, 1991; Fox, 1988).

Modern eco-theologians interpret scriptural passages concerning humanity's relationship with nature within a context of stewardship. Because the world belongs to God all of nature remains holy. As a result the freedom to "subdue" and "have dominion" over nature is always limited and under a higher authority. All life forms, as well as the earth itself, possessed inherent value and rights as a result of their being the work of God and their ability to praise the creator:

> *God looked at everything he made, and he found it very good.*
> Gen. 1:31

> *Praise the Lord from the earth, you see monsters and all depths; Fire and hail, snow and mist; storm winds that fulfill his word; You mountains and all you hills, you fruit trees and all you cedars; You wild things and all tame animals, you creeping things and you winged fowl.*
> Psalm 148: 7-10

Eco-theologians suggest that the very processes, systems, and connections that exist within nature are also part of God's creation. To destroy the holistic qualities of the natural world is to sin against the very structure of the world that God created. (Baer, 1966; Bratton, 1984; Fox, 1988; Heirs, 1984; Nash, 1989). Our failure to fulfill or obligation as faithful trustees of creation has resulted in the rebellion of the earth against humanity and will eventually bring God's judgment upon us.

An eco-theology founded within the tradition of Nature Mysticism redefines religious terminology within an ecological context. The mystical quality of unity is expressed as connection or inter-relatedness. Every particle of reality is envisioned as being connected to every other. Reality itself becomes an ecological question because all things are defined within their relationship to other things. The interior emptying characteristic of the mystical process is re-interpreted as the development of a humble self-image that allows the individual to approach all of creation in a reverent manner. Salvation becomes an ecological word in the sense that it is the restoration of a holy relationship that has been corrupted. In this way the ecological concept of a fundamental kinship with the non-human world is promoted (Dreyer, 1991; Joransen and Butigan; 1984; Sitter, 1970).

Within the context of eco-theology, environmental responsibility becomes a matter of obeying Christ, not providing human needs. Jesus is seen not only as a Savior of mankind but of the whole created world. The coming of the Cosmic Christ serves to restore the broken harmony of the world. Only when this perspective is obtained is it possible to see the destruction of nature as an affront to God (Berry, 1982; Dreyer, 1991; Hughes, 1975; Sitter 1970).

CHAPTER 3

EDUCATION IN A SUSTAINABLE SOCIETY

We do not have solitary beings. Every creature is, in some sense, connected to and dependent upon the rest.

Lewis Thomas (1974)

One of the penalties of an ecological education is that one lives alone in a world of wounds.

Aldo Leopold (1971)

Throughout the world there is a growing sense that humanity stands on the brink of an ecological catastrophe. Levels of pollution, hazardous wastes, habitat destruction, and species extinction remain high while global warming, acid rain, and topsoil erosion, threaten the agricultural foundation upon which world economies are ultimately built. Worldwide, the carry capacity of local ecosystems are strained by the demands of an ever increasing human population. Current estimates suggest that the human population will increase by one billion during each of the next three decades. In underdeveloped nations increasing rates of desertification and deforestation provide evidence for the negative effect of this growth on local habitats. Fueled by the hyperconsumption of raw materials and energy resources by developed nations, humanity races blindly towards an

economic and social disaster that will be global in scale (Brown, 1989; Clark, 1989; Kerr, 1990; Keyfitz, 1989; Orr, 1992; Rowland, 1989).

Incredibly, most "educated" people in Western societies remain ignorant and/or indifferent to the rapidly deteriorating health of the natural systems upon which their economies are built. Chapter One of this dissertation served to demonstrate how assumptions within the Christian and scientific traditions that dominate Western thought have helped to philosophically alienate Western man from nature. One of the consequences of this alienation is that Western man imagines himself separated from the rest of the natural world; independent of its laws and limits. This perceived separation and the resulting refusal to recognize inherent value within nature has contributed to the failure of Western societies to include nature within the boundaries of its ethical consideration. As a result, nature continues to be exploited for economic and political gain and the world is brought to the brink of ecological disaster.

I believe science education as it is practiced in the United States must shoulder a portion of the blame for having failed to seriously address environmental concerns or foster the development of an ecological consciousness within the general population. Current goals, practices, and

instructional methods demonstrate a fundamental failure on the part of the educational establishment to fully acknowledge the seriousness of the looming ecological crisis. In response I will present what I believe to be the essential characteristics of a science curriculum that promotes environmental awareness. Central features of this curriculum include the concept of ecological sustainability and an examination of the philosophical boundaries of environmental ethics.

A. Identifying Problem Areas

> *An education that substitutes curriculum, time-on-task, and SAT scores for wonder, imagination, and joy is an education that destroys the human spirit and permits us to desecrate the Earth.*
>
> Ron Miller (1993)

> *Perhaps the most serious obstacle impeding the evolution of a land ethic is the fact that our educational and economic system is headed away from, rather that toward, an intense consciousness of land.*
>
> *Instead of being taught to see his native countryside with appreciation and intelligence, he is taught to carve cats.*
>
> Aldo Leopold (1971)

C. A. Bowers (1993) has suggested that one of the difficulties associated with the acceptance of an ecologically centered curriculum is the wide spread ignorance within educational circles concerning the

connection between cultural beliefs and environmental issues. Dominated by achievements of Cartesian thought (the dualistic character of the man-nature relationship, the validity of rationality over other forms of knowledge, a mechanistic world view, reductionism) and an anthropocentric image of man's place in the universe, institutions of education continue to operate within an outdated conceptual framework established over two hundred years ago to meet the needs of an emerging industrial society (Bowers, 1992; Oldenski, 1991). Meaningful educational reform must be preceded by wide spread awareness within educational circles of the failure of current cultural paradigms to address important environmental concerns. These reforms are hindered by conservative critics of education reform like William Bennet, Allan Bloom, E. D. Hirsch Jr., and Mortimer Adler who continue to advance a standardized curriculum promoting the ideas, morality, achievements, forms of expression, and social practices of the mainstream, Eurocentric culture (Bowers, 1993, Orr, 1992).

In several ways the current structure of science education in the United States has also contributed to its failure to produce an ecological consciousness within the general population. Traditionally, science education in industrialized countries has been designed to prepare an elite

few to meet the society's demand for persons with the appropriate scientific skills and expertise (Fensham, 1987; Hurd, 1984). The possibility that every individual posses different cognitive strengths of value to the scientific community is not usually recognized or assessed in the average educational setting (Armstrong, 1988). To a large degree science in the United States has been taught with an emphasis on logical thought requiring extensive language skills. This approach has tended to "weed out" the scientifically unqualified. Individuals that don't fit the logical/verbal mold become marginalized in the science classroom and frequently become apathetic to the subject (Fensham, 1987). As a result, although the ability to make ethical judgments through the interpretation of reliable information is recognized as an essential part of social decision making, a large portion of society, including many future educators, graduate as scientific illiterates unable, or unwilling, to comprehend major societal issues related to science (Agin, 1974; Evans, 1970, Shamos, 1988).

Despite recommendations that the main objective of science instruction should be the development of a clear understanding of a select number of important scientific concepts, principles, processes and unifying themes that students can apply to a wide range of experimental

problems (Gardner, 1979; Hurd, 1983; Yager, 1990), teachers overwhelmingly continue to emphasize the memorization of factual material (Evans, 1970; Fensham, 1987). This approach tends to limit the ability of students to experience the natural world in a personal way because meaning is constructed outside the immediate reference frame of the individual teacher or student. A "subject" becomes a list of objectives to be "covered" in well defined units and time periods. Success in science is determined more by a student's capability and willingness to process information than it is by their ability to experience the natural world in a deeply sensual and/or spiritual manner.

There are several important factors that contribute to limit student exposure to personnally relevant material of a scientific nature. Surely one of the most influential has been the movement towards increased accountability. Interest in the development of a national curriculum, the increasing reliance on standardized testing, and the utilization of evaluation instruments to judge teacher effectiveness represent visible aspects of the accountability movement. Teachers, responding to the pressure of school administrators, community leaders, and parent expectations increasingly feel the need to limit their instruction to objectives identified within curriculum guides. Other factors, including

the dominate role textbooks play in curriculum planning, an over reliance on teacher lecture as an instructional technique, a minimal use of community resources, limited post-secondary and in-service preparation for science teachers, and inadequate or antiquated equipment all contribute to limit student exsposure to personally relevant science (Brunkhorst and Padilla, 1987; Costenson and Lawson, 1986; DeRose et al., 1979; Penick et al., 1986; Penick and Yager, 1983).

Whatever the reasons, students typically develop a concept of science that is disjointed and fragmented. When this is coupled with the fact that questions involving value considerations are typically ignored within the science curriculum (Evans 1970; Hurd, 1983) students frequently become unable to recognize the complexity and scope of scientific issues and too often fail to take into consideration associated moral and ethical questions.

Classroom science instruction typically utilizes a historical perspective that defines scientific progress within the confines of the failures and successes of individual scientists and/or the development of fundamental unifying concepts and theories. Too often this approach fails to emphasize either the cultural context within which scientific progress is made or the varied effects of modern science and technology on human affairs (Agin, 1974; Fensham, 1987; Hurd, 1983). As a result, despite the fact that many of the problems facing

humanity are technologically based and will have a major impact on the quality of life for future generations (pollution, limited energy resources, genetic engineering, human organ transplants, environmental resource management) many students fail to recognize the impact science and technology can have on their immediate future or that of society at large.

Finally, science at the high school and university level continues to be taught within narrowly defined subject areas (Hurd, 1983; Yager and Penick, 1987). Students often fail to recognize science as an integrated system involving multiple connections between various scientific and non-scientific disciplines (Agin, 1974; Hurd, 1983). As a result, students who pursue science as careers typically specialize within one of the major disciplines. One possible concern is that this approach limits the ability of the scientific community to visualize the interdisciplinary complexities of environmental issues and hinders the formulation of a consensus concerning required solutions.

B. Characteristics of an Ecological Curriculum

> *Teaching children about the natural world should be treated as one of the most important events in their lives. Children need a story that will bring personal meaning together with the grandeur and meaning of the universe.*
>
> Thomas Berry (1988)

> *One of the requisites for an ecological comprehension of land is an understanding of ecology, and this is by no means co-extensive with "education", in fact, much higher education seems deliberately to avoid ecological concepts. An understanding of ecology does not necessarily originate in courses bearing ecological labels; it is quite as likely to be labeled geography, botany, agronomy, history, or economics.*
>
> Aldo Leopold (1971)

> *Rather, I criticize the myth that science itself is an objective enterprise, done properly only when scientists can shuck the constraints of their culture and view the world as it really is. Science, since people do it, is a socially embedded activity.*
>
> Stephen Gould (1981)

It is unlikely that any area of human endeavor will remain unaffected by the coming ecological crisis. Yet, remarkably, little is being done within the educational establishment to prepare the human community to seriously address problems in identifiable crisis areas. Several educational theorists have suggested that science education will play a critical role in the formation of an ecologically literate and democratically active citizenry. Typically these individuals support a

refocusing of the science curriculum in order to help promote the formation of a new, ecologically-based cultural paradigm which recognizes the interrelatedness of living and non-living things, promotes cooperation and harmony, stress the need to recognize the limited nature of natural resources, takes into consideration the needs of individuals as well as communities, acknowledges the inherent valueof non-human forms of life, and guarantees future generations a quality of life equal to or better than that enjoyed by the current population (Bybee, 1979; Bowers, 1992; Orr, 1992).

It should be stressed that a curriculum that attempts to promote wide-spread ecological awareness does not require a complete rejection of science or its methods. Modern science has produced numerous advancements that cannot afford to be lost as a result of an ill-conceived, romantic longing for simpler times. Competency in science must continue to be promoted as an essential component of the general education of all members of society. What is needed is a new direction in which science educators are no longer overly responsive to outdated cultural values which promote narrowly defined perceptions of scientific knowledge, require scientifically literate individuals to ignore the social implications of scientific progress, or attempt to produce an elite number of technologically competent individuals at the expense of wide spread

scientific or ecological literacy.

Essential Features

The development of an ecological society will be dependent upon the establishment of a democratic, politically active and ecologically literate population (Orr, 1992). In response to this need the science curriculum must provide opportunities to explore science and technology in a culturally valid setting; emphasize personal, social, and career application; prepare students to make knowledgeable decisions on ethical questions of societal importance; and promote wide spread scientific literacy. Educational theorists for at least the past 25 years have supported the development of curricula that address these needs at the lower levels of schooling. Typically approaches promote the use of rational thinking to solve relevant problems; recommend the use of a wide range of instructional techniques (open ended disscussion, long range projects, hands-on experiments), and condone the integration of other subjects into the science curriculum (Agin, 1974; Brunkhurst and Padilla, 1987; Brovey, 1980; Doda et al., 1987; Evan 1970; Fensham, 1987; gardner, 1979; Hurd, 1983; Watson, 1982; Yager, 1988).

Science, by its very nature, is a cooperative venture. Current research builds upon discoveries made in the past and findings are

subjected to both public and peer review. Typically a lead researcher is dependent upon technicians both to conduct experimental work and to develop new technologies. Artists, writers, photographers, teachers, public affairs experts and advertising executives are but a few of the various professions that lend their expertise and skill to scientific endeavors. In fact there are probably few skills that are not marketable to the scientific community in some manner. Numerous studies have indicated that classrooms organized so that students work in groups, tutor each other and share in a reward system are characterized by a greater mastery of material than their more traditionally taught counterparts (Joyce and Weil, 1986). In addition, cooperative learning appears to have a positive effect on self-esteem, inter-group relations, mutual concern among students and attitudes towards school (Slavin, 1980; Slavin, 1989). Common sense suggests that science should be taught utilizing a cooperative approach that cultivates and values a variety of abilities and perspectives.

The movement towards ecological consciousness will most likely be a grass roots effort directed upwards to higher levels of political and social organization. A critical first step in this process is the recognition that all education must have an ecological component. The development of an ecological "mind set" should be encouraged through a multi-disciplinary

approach in which ecological concepts, principles and language permeate the curriculum at all levels. Important metaphors for a curriculum that would encourage ecological literacy include; community, dependency, and connection. Course work should encourage an investigation of relationships, patterns, and causality at all levels. Individuals must be taught to recognize the complexity and scope of environmental issues and be allowed to examine the historical origins of current attitudes towards the natural world. The moral and ethical dimensions of our wide spread dependency on technology should be examined through serious discussion and debate (Bowers, 1979; Orr, 1992).

Widespread competence on environmental issues and the workings of natural systems is essential to the development of an ecological consciousness and should be promoted through the study of natural history and ecology at every level of schooling. Additional course work in the sciences should be mandatory and have as an objective redefining the human position in the natural world (Bybee, 1979; Orr, 1992). Students of all ages must be provided the opportunity to have direct involvement with nature in the hope that they will develop an aesthetic appreciation for, and a deeply personal relationship with, the natural world (Orr, 1992).

One of the primary goals of education in a ecological society must be to modify the way people live in relationship with nature. Simplicity and decentralization should be the motivating concepts in the design and construction of new technologies, farming practices, communities, and educational institutions (Berry, 1988; Orr, 1992). Students in all careers will need instruction on how to modify current practices to adhere more closely to these concepts. Learning how to live within, and in rhythm with, regional biotic systems and natural cycles should be an important objective of such a curriculum. Knowledge must be relevant on a personal and community level and provide individuals the opportunity to seek purpose, meaning, and wholeness (Bowers, 1992).

Finally, education in a ecological society must realistically address the severity, scope, and underlying causes of the coming ecological crisis. Efforts at reform must be coordinated at all levels, long-term, and visionary. Despite the seriousness, complexity, and magnitude of the looming problems, efforts must be made to minimize despair and hopelessness while promoting optimism and the unlimitedness of the human potential.

The Issue of Sustainability

The issue of sustainability is central to the long-term health of planetary biotic systems and a key ingredient to any curriculum promoting ecological consciousness. An ecologically centered curriculum should provide an understanding of the nature and root causes of the present sustainablity crisis while helping students identify and explore potential solutions.

A sustainable society can be defined as one that utilizes its resources in a manner that does not endanger the well-being of future generations (Berry, 1985; Brown et al., 1990; Bowers, 1992; Orr, 1992). Orr (1992) identifies three crisis areas in which current levels of resource use are unsustainable. The first is a food crisis that will develop as a result of a combination of exponential population growth and worldwide soil losses. The second is an energy crisis that looms due to the exhaustion of fossil fuels and the inability to produce efficient, cheap, and environmentally safe alternatives. The third results from humanity's inability to maintain the integrity of world ecosystems as vast tracts of land are cleared for development and species are driven to extinction. Together these problems constitute a planetary crisis which requires drastic changes be made in the next decade or two concerning the way

humans relate to each other and to nature.

Orr (1992) classifies the root causes of the current crisis of sustainability into five inter-related and over lapping areas. The existence of "social traps" that promise immediate rewards while down playing the long-term costs represents one root cause of the sustainability crisis (Costanza, 1987). The history of pesticide use represents an excellent example of the concept of a social trap. Originally intended to reduce crop loss due to insects and other pests, long-term effects on other members of the biotic community were either ignored or unforeseen. One result several species of predatory birds were brought to the brink of extinction as increasing levels of pesticides adversely effected their reproductive success. Not until the publication of *Silent Spring* (Carson, 1962) did Western science begin to understand the long-term costs of wide spread pesticide use.

The tendency of industrial societies to expect continued economic growth represents a second root cause of the sustainability crisis (Meadows et al., 1972; Webb, 1975). In fact the rate of economic growth is often regarded as a sound measure of the success or failure of a government. It is becoming apparent however that the rapid economic growth of Western societies during the past several hundred years has

been a anomaly not likely to be repeated (Meadows et al., 1972: Webb, 1975). As is the case with many exponential growth systems, the flaws in mainstream economic theory and practices may not become apparent soon enough to avoid global catastrophe.

A third cause for the crisis of sustainability can be traced to the human urge to dominate nature (White, 1967; Mumford, 1970). The fundamental arguments suggesting this urge may be a result of the influence of the Judaic-Christian tradition and/or their impact of modern science were presented in Chapter One of this dissertation.

The crisis of sustainability may be the result of an ecological wrong turn. In our historical transition from a hunter-gatherer lifestyle to an agricultural-urban society we may have acquired anti-social behaviors (aggressiveness, greed, a tendency towards violence, sexist and racist attitudes) at the expense of others that promoted peaceful coexistence with the rest of nature (Shepard, 1973; Shepard, 1982; Diamond, 1981).

Finally, the crisis of sustainability may be the result of inherent flaws in the human species. It has been suggested that our insatiable appetites for power and material possessions coupled with our restless nature may prevent us from living in harmony with nature (Becker, 1973; Livingston, 1982).

Ecological sustainability is concerned with identifying and developing alternatives to the destructive practices that have plagued mankind's tenure on the earth. Advocates recognize the fallible and limited nature of mankind to comprehend things above a certain scale of complexity. This does not, however, preclude the need for an active, competent citizenry. Supporters do not regard nature simply as a set of limits but also as a model for the design and scale of human structures, technologies, and economies. Traditional values and beliefs are viewed as sources of knowledge concerning community cooperation on both the human and natural level. Finally, proponents of ecological sustainability recognize the complexity and interrelatedness of world systems. Neither humanity or the natural world can be fully understood through a process of detailed dissection and inspection of individual components (Berry, 1988; Orr, 1992).

A sound knowledge of the intellectual boundaries of environmental issues is in itself insufficient to seriously address problems associated with the looming ecological crisis. The attainment of ecologically sustainibility requires members of society to modify their ethical relationship with the natural world and with each other. The study and promotion of environmental ethics is therefore an essential component of

an ecologically-based curriculum which seeks to replace existing paradigms with one founded in the principles of ecology.

C. Environmental Ethics in a Sustainable Society

> *In the relations of humans with the animals, with the flowers, with the objects of creation, there is a whole great ethic scarcely seen as yet, but which will eventually break through into the light and be the corollary and the complement to human ethics.*
>
> Victor Hugo ((1890)

> *What the environmentalist perspective does is to invite us to see the scope of our moral relationships as greatly broadened to include fellow human beings throughout the world, to include future generations and to include non-human life or the world of nature as a whole, rather than just fellow human beings.*
>
> Nigel Dower, (1989)

> *The great fault of all ethics hitherto has been that they believed themselves to have to deal only with the relations of man to man.*
>
> Albert Schweitzer (1949)

As a result of its commitment to the well-being of posterity, a sustainable society is clearly obligated to develop an code of social conduct that extends ethical considerations outside the realm of immediate human concerns. To what extent, however, should ethical boundaries be expanded to include the rights of non-human members of the biotic community? In his famous essay *"The Land Ethic"* Aldo Leopold (1971) reiterated his belief that all ethics rest upon the single premise

that the individual is a member of a community of interdependent parts. Environmental ethics attempt to expand the boundaries of ethical consideration to include non-human members of the biotic community. As a consequence, the degree to which humanity can force its will upon the rest of the biotic community is limited. Humanity no longer plays the role of conqueror and instead becomes an equal member in the community of nature (Leopold, 1971; Regan, 1981). Needless to say the idea of nature having equal ethical standing has not gained wide-spread acceptance in a society in which attitudes towards nature continue to be dominated by economic self-interests, Cartesian dualism, and anthropocentrism.

It would be impossible within the confines of this project to thoroughly discuss the complex issues currently being debated within the arena of environmental ethics. Besides, a detailed treatment of such topics is beyond the scope of the typical high school science curriculum. Instead my purpose is to identify important basic concepts, questions, and areas of debate that must be appreciated by any society laying claim to ecological literacy. What follows represents a summary of what I believe to be the fundamental issues that could serve as an introduction to the topic of environmental ethics within the high school curriculum.

The Myth of Cultural Neutrality

> *Yet I suspect that it is not these more complex and hidden forms of knowledge that cause the scientists to ignore the impact of their discoveries up the fabric of culture, but rather the long-held belief that science is culturally neutral.*
>
> C. A. Bowers (1992)

Science, by the very fact that people do it, is a culturally embedded activity. Typically, however, students in the science classroom are taught that science is done best when conducted in a non-biased, value free manner. Responsible environmental ethics begin with the assumption that there is something of value in the natural world worthy of protection. The integration of environmental ethics into a science curriculum requires those participating in the education process to be willing and able to manage questions that involve value judgements. It is essential therefore that efforts be made in a ecologically-based curriculum to dispose of the persistent myth of cultural neutrality that is present in many science classrooms.

Although a sustainable society must remain dependent upon science to provide information concerning the composition and intricate processes of the biotic community, it should remain cautious about allowing the scientific community to act in isolation in the formation of attitudes concerning the value of nature. Too often, perhaps as a consequence of the wide-spread and long-

held belief concerning the cultural neutrality of science, there has seldom been any forethought given to the long-term consequences of scientific progress and values on the society at large. Social dilemmas concerning the disposal of nuclear and industrial wastes, increasing levels of deforestation and ozone depletion, biotechnology, the threat of nuclear war, endangered species, euthanasia, abortion, and genetic engineering represent only a handful of the problems that are a result of the inability of ethical standards to match the pace of scientific progress. The issue of environmental ethics will require both society and the scientific community to work together in the formulation of a sustainable environmental policy. Students must, therefore, be given the opportunity to investigate the historical influence of science on the formation of social policy and attitudes towards nature as well as the impact of cultural values on the direction and nature of scientific progess.

Homocentricism and Obligations to Posterity

In reality the idea of extending ethical boundaries to include non-human members of thebiotic community is a relatively recent and remarkable intellectual development. Traditionally, industrial societies have regarded nature merely as a commodity which has *instrumental* value as a result of its potential to be used for the production of human fulfillment. Ethical systems in which humanity is morally authorized and obligated to utilize the

world in a manner that maximizes the quality of human life are said to be homocentrically based. Although nature lacks *inherent* value within a homocentric ethic, any misuse of natural resources that diminishes the quality of life for existing human beings can still be considered morally offensive (Dooley, 1986; Godfrey-Smith, 1979; Regan, 1981).

The issue of assigning value to posterity as a result of an ethical obligation is central to a sustainable society, yet this obligation is somewhat ambiguous within a strict homocentric ethic. By definition, future generations do not exist and cannot therefore be considered to have moral standing in relation to existing peoples. In addition, any concern about environmental protection on the behalf of future generations is always an act of sacrifice. Conservation of natural resources will occur only under conditions in which their preservation is necessary to meet some present well defined human need (Dooley, 1986). Godfrey-Smith (1979) has identified four arguments within the homocentric worldview which define the boundaries of human ethical consideration by assigning instrumental value to nature in order to justify its preservation. The first "preservation for people" argument envisions the natural world as a *"laboratory"* providing vital subject matter for scientific inquiry. Through the study of biological systems we gain a better understanding of the

human condition and the limitations we face in our struggle for existence. A second view emphasizes the importance of preserving nature as a stockpile of genetic diversity (nature as a *silo*) which may have unforeseen pharmacological value. A third instrumental argument regards nature as a "*gymnasium*" important for athletic or recreational activities. Finally, nature can be seen as a "*cathedral*" which provides opportunities for spiritual and moral healing and aesthetic satisfaction. Other instrumental values assigned to nature can be classified as economic, historical, cultural-symbolization, and life-support (Rolston, 1988).

There are difficulties associated with utilizing a purely instrumental approach to assign values to nature. Obviously there will be occasions when activities justified by different instrumental arguments are in conflict with each other (Godfrey-Smith, 1979). A proponent of the "cathedral" view may find the clear-cutting of large tracts of wilderness for profit to be offensive. A biologist attempting to do field work on wild populations may have difficulty collecting data in an area frequented by horseback riders or hikers. Within an homocentric viewpoint it may be natural to assume that these conflicts can be resolved simply by determining which activity provides the greatest satisfaction for the greatest number of people. This has proved to be difficult in practice. It

assumes that the values assigned to various activities can be accurately estimated and are commensurable. Attempts to utilize an economic standard frequently fail because most members of biotic communities have no direct economic value and yet are essential to the continued functioning of ecosystems (Godfrey-Smith, 1979; Leopold, 1971).

Biocentricism: Inherent Value in Nature

> *I have never yet happened upon a trace of evidence that seemed to show that any one animal was ever made for another as much as it was made for itself.*
>
> John Muir (1875)

Some argue that economic considerations are simply inappropriate when it comes to determining the value of nature. Proponents of a biocentric (or ecologic) ethic suggest that the natural world has an intrinsic value independent of any assigned to it by human beings (Dooley, 1986; Godfrey-Smith, 1979; Nash, 1989; Rolston, 1988). Within a biocentric ethic there is a deep commitment to the preservation of life at all levels, human and non-human lives are of comparable worth and the welfare of each must be considered equally. Biocentric ethics typically emphasize the inter-relatedness of all things across both physical and temporal dimensions. Some biocentric philosophers have promoted a

metaphysical interpretation of this idea suggesting that all things are bound together by a god-like moral force that pervades the universe. As a consequence, biocentric ethics recognize a moral obligation to both future generations of humanity and non-human members of the biotic community.

America's preoccupation with economic priorities and its own civil rights issues, along with the wide spread cultural acceptance of the myth of inexhaustible natural resources, have all contributed to provide little opportunity for those espousing a biocentric view of nature to be heard or seriously considered (Bybee, 1979; Berry, 1985; Nash, 1989). Although economic and social themes should be examined within the context of their historical development and importance within American culture, one of the priorities of a high school curriculum in a sustainable society should also be to examine the arguments made by Henry David Thoreau, John Muir, George Perkins Marsh, Charles Darwin and Aldo Leopold concerning the rights of nature and man's place in the natural world.

Critics identify several shortcomings associated with biocentric ethics. Taken literally, a biocentric ethic would find both the murder of a human being and intentionally stepping on an ant of equal moral seriousness. Such a point of view fails to seriously address political and social realities (Dooley, 1986). It would be difficult to imagine, for

example, any governing body denying starving citizens access to domesticated animals for purely biocentric reasons. Kinship theories attempt to address this moral dilemma by reserving ethical consideration for those beings resembling human beings in some fundamental way (consciousness i.e.). Typically, because of their reliance on the homocentric assumption that humanity is justifiably ranked first among living organisms, kinship theories are no more than thinly-disguised homocentric arguments. Finally, it has been suggested that biocentric ethics have been inspired by romantic views of nature that result from misinterpretation of biological facts and poorly conducted science (Dooley, 1986; Regan, 1981).

Environmental Ethics in Practice

An in depth examination of the merits and shortcomings of an environmental ethic could serve as a useful exercise for students. Several environmental ethics have been proposed including:

> *A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.*
> (Leopold, 1971)

> *The survival interests of human beings ought to outweigh those of the rest of the biotic community and the survival interests of the rest of the biotic community ought to outweigh the non-survival interests of human beings.*
> (Heffernan, 1982)

Students could be asked to evaluate whether the proposed ethic represented a homocentric or biocentric point of view; examine how its adoption might influence the formation of social and economic policy; and debate its impact on posterity. In addition students could be asked to apply the proposed ethic to several current environmental issues (whale hunting, the use of drift nets, the global trade in wildlife products) in order to determine how the ethic might be utilized in practice. Finally, students could compare various environmental ethics in order to identify the strengths and weaknesses of each. Eventually this process of evaluation might lead to the formulation of an environmental ethic of the student's own design.

* * *

The adoption of an ethical standard that takes into consideration the rights of non-human members of the biotic community requires the adoption of a holistic worldview. Holistic thinking encourages humanity to understand that all life is intrinsically connected and that by altering one aspect of a biological system we influence a network of relationships. This perspective requires an understanding of not only the physical structure of biological systems, but also an appreciation for their inherent processes and relationships, as well as a reverence for life at all levels. Within a holistic worldview there is a recognition of an inherent value

within the natural world regardless of nature's indifference to human concerns or interests. Such an attitude requires the development of a fundamental respect for the diversity, complexity, vitality, and wisdom of organic systems. A holistic worldview requires a change from reductionist to holistic models of thinking that reject Cartesian dualism and remove humanity from the center of the biological world. Humanity is envisioned as being deeply connected to nature; integrated into the fabric of the natural world (Godfrey-Smith, 1979; Miller, 1993).

* * *

In the process of redefining the fundamental philosophical position from which we view our relationship with the natural world each of us must confront, as the most basic level, our beliefs concerning human nature and the meaning of our existence. I have come to believe that the refusal of Western societies to include nature within the boundaries of ethical consideration represents an affront to creation-centered, holistic (ecological) interpretations of Catholic theology. I also believe it is my spiritual obligation as a Catholic to confront this issue within the societal context in which it has developed and continues to be promoted. I believe that any further delay on my part to address the moral dilemmas I find myself facing concerning humanity's ethical treatment of nature would

only serve to prolong the spiritual alienation that has permeated much of my adult life.

CHAPTER 4

A SPIRITUAL PATH

The ethical person shatters no ice crystal, breaks off no flower, and is careful not to crush any insect as he walks.
Albert Schweitzer (1923)

This dissertation is reflective of the spiritual journey I began with earnest over three years ago. Like photographs in a vacation album, clues to the nature of the spiritual path I have travelled lie layered between these pages. Now, as I look back upon the past three years, I find myself searching these clues in the hope that I might grasp some understanding of the fundamental change that has occurred within my spiritual life as well as the impact of this change on my responsibilities as a Catholic educator. I confess that at times I have been tempted to turn away from the internal struggle that has characterized much of this dissertation project and torn at the fabric of my soul. Something much deeper and stronger, however, has continued to pull me inward in a desperate search for spiritual healing. As I write the final chapter of this dissertation I have come to realize that I have not reached the end of my spiritual journey but rather at a resting place upon which this healing can begin and new challenges and directions

assessed.

A. Reflections

The focus of my doctoral work has been to seek within the spiritual tradition of Catholicism a valid position from which I could address, as an educator, questions concerning humanity's ethical treatment of the natural world. In this way I hoped to reconcile the alienation that has existed between my Catholic faith, my career as a teacher, and my life long interest in the study of the natural world. Initially I found myself struggling with the prospect that it might be impossible to achieve such a position. The first insights I had suggesting that this union was indeed possible were the result of my recollection of the intimate experiences with nature I had earlier in my life. Once I came to appreciate the significant influence these deeply spiritual moments had been in defining my understanding of nature and my relationship with God, I realized I had begun a journey which I hoped would end the spiritual alienation that permeated my life.

Eventually I began to question the influences that had caused me to distance myself from the emotionally intimate relationship with nature I had experienced earlier in my life. Thus began a long and difficult study in which I sought to understand the influence of both Christianity and modern

science on the alienation of Western man from nature. As a result of my study of the historical development of science I began to appreciate the degree to which my own perceptions of nature had been influenced by dominant scientific paradigms. I also began to understand how the alienation I felt existed between my scientific interests and religious beliefs in some ways reflected the historical separation of science and Christianity that has existed in Western civilization since the Enlightenment. Finally, and somewhat painfully, I realized that certain interpretations of fundamental Christian teachings had contributed to the consistent refusal of Western societies to include nature within its ethical boundaries.

During this period of intense study I became aware of the rich tradition of mysticism within the Catholic faith. I became particularly interested in those aspects of mysticism that emphasized the creative nature of God and the development of ecologically based (holistic) attitudes towards nature. Increasingly I was able to identify individuals throughout the history of Catholicism who had struggled, as I had, with the problem of defining the boundaries of the God-human-nature relationship. At the same time my growing awareness of theological perspectives that emphasized the ecological motif (Nature Mysticism, creation-centered

theologies, eco-theology) allowed me to validate a personal understanding of this relationship within the Catholic faith.

During the preparation of the written portion of my qualifying exams I had the opportunity to investigate the characteristics of an ecologically-based curriculum. Two topics in particular were of interest because of the possibilities they raised concerning the extension of ethical considerations outside the realm of immediate human concerns. The issue of ecological sustainability is concerned with understanding the problems and possibilities associated with the utilization of natural resources in a manner that does not endanger the well-being of future generations. The promotion of ecological sustainability within a society represents a fundamental recognition of the ethical standing of posterity. Environmental ethics, on the other hand, attempt to expand the boundaries of ethical consideration to include non-human members of the biotic community. The philosophical arguments made within each of these topics helped to confirm my own concerns regarding humanity's ethical mistreatment of nature. At this point I began to appreciate how the promotion of a curriculum that emphasized the ethical standing of both posterity and the non-human world would help me achieve the spiritual union which I have, at one level or another, sought throughout my adult life.

B. Beliefs

> *The greater part of what my neighbors call good I believe in my soul to be bad.*
>
> Henry David Thoreau (1960)

As a result of my attempts over the past several years to understand the alienation that has permeated my adult life I believe I have experienced a fundamental change in my spiritual life. In my search for a spiritual position from which I could address the issue of humanity's mistreatment nature, I have undergone an inner transformation that is reflected in a new understanding of my faith, the natural world, and my responsibilities as a educator. Before elaborating on the implications of this new understanding on my responsibilities as a Catholic educator, I believe it will be helpful to identify the boundaries of my own interpretation of Catholic theology concerning the spiritual and ethical dimensions of the God-human-nature relationship. This statement of belief reflects an understanding of this relationship that has been achieved through both academic studies and persistent contemplation of the desired direction of my spiritual life. What follows is a personal creed that I believe honors both scripture and the spiritual struggle of past and present members of the Catholic community.

An Acceptance of Mysticism

No other influence has had as significant an impact on the direction of my spiritual journey than that brought about through my growing awareness of mysticism and its tradition within the Catholic faith. It seems that almost daily I become aware of ways in which the concept of unity, which is central to the mystical life, has come to influence a new perspective towards my faith, perceptions of nature, and goals and expectations as a teacher. Any meaningful attempt to understanding the direction my spiritual life has taken, or will take, must begin with an appreciation of this influence.

Mysticism has provided a religious context within which I have been able to validate the deeply emotional and spiritually transforming experiences I have had in the presence of nature. During the past several years I have come to recognize that a purely intellectual understanding of nature can be spiritually empty. Mysticism has allowed me to re-learn how spiritually gratifying it is to be overwhelmed with a complete sense of wonder when contemplating the mysteries of the natural world. This new understanding has helped me to achieve a more spiritually balanced unity between my intellectual interests in the natural world and the emotional and sensual experiences with nature that have been so influential in my

life. As a result, I believe I have not only a more mature understanding of my position in the natural world but also a greater appreciation of the inherent worth of the underlying mystery that I believe pervades the universe.

One of the most personally rewarding themes in the mystic tradition is the belief that it is possible to perceive the presence of the living God in one's life. My growing understanding of Nature mysticism, as well as other creation-centered theologies, has helped to validate my belief that this presence, as well as a more complete understanding of the nature of God, can be gained through the study of the created world. I believe that one of my goals as a naturalist has been to fill the spiritual void that was created with my rejection of scripture as a literal source of information concerning the creation of the universe. Much of my adult life as been spent studying the natural world for insights into the nature of God that I do not believe can be gained if one is limited merely to scripture. My belief that the rich variety of life that exists on the earth and the mystery that pervades the universe both reflect fundamental aspects of the God's creative intent is an expression of insight gained through my acceptance of Nature Mysticism.

An understanding of mysticism has also helped me to reconcile difficult concepts that are fundamental to my faith. Since I was a child, Catholic teaching concerning the belief in an all pervasive God existing throughout time has been difficult for me to understand or explain. My growing understanding of mysticism and creation-centered theologies has allowed me to understand that one but has to look at the night sky to appreciate the immensity of God's creative intent and yet his handiwork can be witnessed in the smallest creature. It is only through my study of the natural world in a manner that honors the spiritual dimensions of the man-nature relationship that God has revealed difficult to understand aspects of his existence to me in a way I can more fully understand.

A Rejection of Scientism

I want to know God's thoughts.... the rest are details.
Albert Einstein

It would be difficult to exaggerate the impact of science in the modern world. Advancements in medicine, agriculture, engineering, transportation, communications, and energy-related technologies, represent but a few of the many areas within which science has had a generally positive impact on the quality of human life. To completely

reject rational attempts to understand the fundamental processes of the physical world would result in a degree of physical misery for many of the earth's inhabitants that I am unwilling to accept. Furthermore, I believe that fundamental principles exist that describe the basic workings of the natural world and that once these are fully understood they will provide further insights into the nature of the God's creative intent. A complete rejection of science and its methods, therefore, would only serve to further my own spiritual alienation from God.

There are however aspects of the universe that are outside the realm of science. I do not believe that every event has a rational explanation or that every experience possess characteristics that are quantifiable. To this day I can clearly recall the deep sense of wonder I felt the first time I watched Canada geese skate across the sun-kissed surface of Wisconsin's Horicon Marsh before landing within its placid waters. Rational explanations for the emotions I experienced as a result of that miracle remain meaningless and empty. The experience, the emotional response and the inner transformation that occurred as a result, is what made that event so meaningful in my life. I believe that a complete reliance on the power of rationality to provide meaning in the world results in a distorted and incomplete view of the human experience

because it prevents the discovery of defining features of our spiritual selves.

I believe that as human beings we must become more comfortable with those aspects of the human experience that remained outside the light of rationality. We must recognize the importance of those aspects of our existence that are not subject to scientific description because they lay outside the realm of sensory perception or mental imagery. We must become trustworthy of those features of reality that remain shrouded in darkness while awaiting discovery in the recesses of our soul.

* * *

Through the Eyes of a Child

My daughter Jennifer once asked me why lightening bugs light up the way they do. We were sitting in our backyard one evening in late May repeating our nightly ritual of watching the small insects take to the wing from the grass stems in a field beside our house. The last drops of sunlight were just draining off the edges of the western sky as I began to share with her my somewhat limited knowledge of the biochemical explanations and ecological interpretations of firefly bioluminescence. It took only a few seconds, however, for me to realize that an answer based on a scientific understanding of the process would be meaningless for my

then three-year old daughter. I looked out across the night-swept field searching for an answer that we could both understand.

After a few seconds I turned to my daughter and told her that I believed that lightening bugs lit up the night sky in order to make the world a more beautiful place. To a great extent I believe the renewed sense of inner joy I have come to experience in my spiritual life stems from my willingness to accept the validity of that answer.

* * *

The Inherent Worth of all Living Things

One of the most personally appealing aspects of eco-theology and creation-centered theologies is the fundamental respect they promote for life at all levels. During the course of my spiritual journey I have come to believe that God rejoices in all of creation and has instilled within every aspect of creation a fundamental value and an inherent purpose. As a result I believe the earth and its non-human inhabitants exists for reasons other than merely fulfilling the utilitarians aspirations of mankind. I reject the notion that it is humanity's God given right to seek absolute control over the natural world in such a way that brings about the destruction and degradation of nature. I believe that to desire such control, or to fail to recognize nature's inherent worth, is fundamentally

sinful.

This is not to say that humanity's genuine needs are not to be met through the use of nature or its resources or that the continued existence of any human being is to be subordinate to the continued existence of other forms of life. I believe that a purely biocentric attitude towards nature fails to acknowledge basic social realities that make it fundamentally undesirable and unworkable. The continued acceptance of a strict homocentric attitude towards nature, however, will bring about a degree of human suffering unmatched in the history of humanity. I believe that an ethical attitude that recognizes that all creation belongs to God (theocentric) and therefore possesses inherent value worthy of mankind's respect represents a starting point from which humanity can re-evaluate its relationship with nature.

I believe that as a result of my recognition of the inherent value in all aspects of the natural world I have come to appreciate life itself as a wondrous gift that should be celebrated to its fullest. I believe that within ourselves we must come to recognize the significance of this gift as well as rediscover ways to express our gratitude for having it bestowed upon us. In this way we might begin to end the destructive practices that threaten the physical destruction of the earth and the spiritual destruction

of its human inhabitants.

A Spiritual and Moral Responsibility to Nature

My growing awareness and understanding of those aspects of Western theology that emphasize the ecological motif has helped me to reject anthropocentric interpretations of scripture that separate humanity from the natural world, physically, spiritually, and/or morally. The understanding that the continued existence of any species of life on earth is dependent upon a complex web of interrelationship between living and non-living things represents one of the most important discoveries of this century. Each creature's actions ripple across the fabric of life effecting, and being affected by, millions of other life forms. The physical survival of humanity is completely dependent upon its connection to the resources provided by the natural world. As a result humanity is subject to the same laws and limits that regulate the existence of all other forms of life. Meaningful attempts to establish a ecologically sustainable society must begin with the recognition of this relationship and the potential impact humanity has on the fragile balance that exists between all living things.

Beyond this obvious connection to the natural world, I believe humanity exist in a state of spiritual unity with all of creation. This belief is founded upon an acceptance of the basic tenet of panentheism; the

belief that all things are seen to exist in God and he in all things. God's pervasiveness in all things establishes an intimate relationship between humanity and the rest of creation. This fundamentally holistic understanding of man's relationship with nature denies interpretations of theology that promote spiritual separation between man and nature. Instead I believe nature is as an active and essential participant in the salvation of humanity's holy relationship with God. Spiritual reunion with the Divine is not achieved through a process that seeks to transcend the physical world but rather during periods of mystical in-dwelling provoked by the contemplation of the natural world.

* * *

The spiritual growth I have experience during the past three years has made it impossible for me to accept religious or scientific points of view that fail to recognize either the physical or spiritual state of interconnectedness and mutual dependence that exist between humanity and the rest of creation. Humanity must begin to seriously address the environmentally destructive practices that threaten the health of planetary systems and endanger the quality of life future generations can expect. In order to accomplish this I believe Western societies must be willing to redefine their relationship with the natural world within an

ethical context that promotes a recognition of the physical and spiritual kinship humanity shares with the rest of creation. As a result I have come to accept that the issue of humanity's ethical treatment of the natural world is a fundamentally moral, and therefore religious, concern to which I have a spiritual obligation to address.

C. Concerns

The idea that humanity's relationship with nature is a fundamentally moral (religious) one, in which the freedom of human action as it relates to the natural world is constrained by ethics, is not widely accepted in Western societies. This is reflected in the fact that throughout much of my adult life the religious, scientific, and professional training I received has not encouraged me to pursue the spiritual or ethical dimensions of my relationship with the nature world. Spiritually transforming experiences triggered by the contemplation of nature were not considered valid means of pursuing either a deeper relationship with God or addressing personal concerns involving the needless destruction of the created world. I believe that the separation of these spiritually sensual experiences from my intellectual attempts to understand the universe and my place in it represents the source of the alienation that exists between my professional and religious life.

It is only recently that I have come to recognize that it is the spiritual dimension of my relationship with nature that represents the one unifying theme in my life that holds promise for ending this state of spiritual alienation. I believe the spiritual unity I seek requires both a more complete appreciation and continued acceptance of this theme within my own life, as well as an understanding of how I can promote, within a educational context, the importance of developing a spiritual dimension within humanity's relationship with nature. I believe the interaction between these two themes will determine the future direction of my spiritual quest.

Areas of Personal Concern

Although a growing understanding of mysticism has helped to begin to heal the wounds of my spiritual alienation I believe the future holds several difficult issues I will be forced to deal with in my search for spiritual unity. Many of the problems I continue to struggle with as a Catholic educator and scientist are the result of dominant cultural paradigms that refuse to promote a fundamental respect for the spiritual and ethical dimension of our relationship with the natural world. During the preparation of this dissertation I have frequently discovered that efforts made by individual scientists, religious leaders, and teachers at all

levels of education to promote a more holistic approach to curriculum design are frequently ignored, dismissed, or met with open ridicule. Personally I find this fact depressing as I prepare to finish my own graduate work and begin to contemplate the possibility of confronting this issue on a broader professional level.

I find the continued failure of educational policy makers, religious leaders, and scientists to recognize the importance of widespread ecological literacy difficult to understand and personally troubling. I believe there is enough evidence world-wide testifying to the problems associated with an attitude that disregards humanity's dependency on natural systems. Environmentally destructive practices, including the continued hyperconsumption of raw materials and energy resources by Western industrialized nations, continue to contribute to widespread human suffering. Yet we fail to address in our schools and churches the difficult problems of population control, widespread technological dependency, unsustainable agricultural practices or the underlying belief systems that allow us to devastate so much of the natural world.

My own attempts to integrate a spiritual and ethical dimension into my own teaching have remained fragmented and incomplete. I frequently struggle to find within my lesson plans a balance between objectives

identified within state adopted curriculum and issues I believe to be spiritually and ethically important. As a consequence I find myself torn between meeting both the spiritual needs of my students and the expectations of school administrators interested in competency levels measured by standardized tests. Efforts to promote a fundamental understanding of the ecological and ethical dimensions of humanity's relationship with nature have been spiritually uplifting when met with open hearts and emotional devastating when frustrated by closed minds. Serious attempts to find alternatives to classroom practices that encourage the destruction of life or its study outside the context of its natural habitat are sometimes frustrated by time and monetary constraints or utilitarian and materialistic attitudes that promote a fundamental lack of respect for the inherent worth of all living things.

I find the extent to which our culture values quantitative over qualitative research understandable but difficult to accept. Individuals, whose opinions I genuinely respect, have questioned my decision to pursue my doctorate degree in the field of Education considering I had obtained my Master's degree in biology. Their continued doubts concerning the direction of my professional growth have contributed to make it more difficult to separate myself from a worldview in which it is believed that only science

can contribute to definitions of reality. Even the preparation of this dissertation has come to reflect the internal struggle I continue to have as I attempt to wrestle my spiritual being from the grips of dominant scientific paradigms. On numerous occasions I have questioned the validity of writing a non-scientific dissertation that encourages the development of a personal and spiritual perspective on important societal issues. Only the continued encouragement of friends, faculty, and fellow graduate students has allowed me continue this project in such a manner.

* * *

Although these concerns are of a personal nature, I believe them to be reflective of deeper problems inherent within the ethical stance Western societies have adopted towards the natural world. I have come to accept that the refusal of Western societies to include nature within the boundaries of ethical consideration represents an affront to creation-centered, holistic (ecological) interpretations of Catholic theology. I also believe it is my spiritual obligation as a Catholic to confront this issue within the societal context in which it has developed and continues to be promoted. At the present time I find myself deeply immersed within a spiritual dilemma. Although I find it diffic at times to remain optimistic concerning the promotion environmental ethics when so much of our culture's attitude toward nature is dominated by

economic expediency, I believe that only by confronting this challenge can I hope to find spiritual union. The understanding that has come with the realization that there exists a spiritual and deeply religious dimension of my understanding of my relationship with nature has been personally fulfilling and will provide the guiding light along this spiritual path.

* * *

Renewing A Spiritual Commitment

Within the past year my family and I had the opportunity to spend several days camping along stretches of the Blue Ridge Parkway in the mountains of Western North Carolina. We were part of a larger group that consisted mainly of friends I had made while a graduate student at Wake Forest and their families. During the trip two members of the group were conducting a population study of the intestinal parasites of several species of shrews native to the areas in which we camped.

Each evening three to four dozen plastic buckets were set out within the boundaries of selected study sites to serve as pitfall traps to capture the tiny mammals. As a consequence of their extremely high metabolic rate any shrew falling into such a trap would literally starve to death within a few hours. Because it was believed likely that death by starvation would disrupt the normal distribution of parasites in the

intestine each pitfall was filled with a few inches of water so that individual shrews would drown in a matter of minutes. Early each morning each trap was examined for any shrews that might have stumbled into them during the previous evening. Dead animals were separated by species and study site, returned to camp, and immediately dissected and examined for parasites. Over a period of approximately two weeks the intestinal parasites in hundreds of shrews were collected in this manner and preserved in formalin. At no time during the several days I participated in the study was there any serious discussion concerning the ethical dimensions of this project.

Reflecting on this experience during the past year has been difficult. I find it painful to realize how eager I was to participate in the study even after realizing it entailed what I believe to be a fundamental waste of life. I am also concerned that I allowed my older children to participate in the study while I attempted to justify it using scientific arguments that I myself refuse to accept. On the contrary, I have always attempted to model to my children a fundamental respect for life regardless of cultural perceptions of worth.

I have come to accept that studies of this type are representative of the lack of ethical concern for the non-human world within the scientific

community. I have often thought about the response I would receive from the individuals involved in this study if I were to seriously voice my ethical concerns about their work and the methods in which it is conducted. I believe it to be a sad commentary on the current state of the ethical relationship between many scientists and the world they study that such an attempt would do little more than cost me two friends.

Although I now find my actions and behavior during my participation in this project to be morally offensive, I believe the experience has helped to recommit myself to the spiritual relationship with nature that I find so valuable. I now realize that simply teaching or writing about the issue of environmental ethics is in itself insufficient; one must learn to live in such a manner that honors the inherent worth of all living things. For me this involves a renewed commitment to the promotion of ideals that encourage a fundamental respect for life and the development of a spiritual dimension to humanity's relationship with the natural world.

* * *

D. Response

I, then, a prisoner for the Lord, urge you to live in a manner worthy of the call you have received, with all humility and gentleness, with patience, bearing with one another through love, striving to preserve the unity of the spirit through the bond of peace: one body and one Spirit, as you were also called to the one hope of your call; one Lord, one faith, one baptism; one God and father of all, who is over all and through all and in all.

Ephesians 4:. 1-6

The sublime mission of modern education is to reveal the true importance of this story (cosmology) for the total range of human and earthly affairs.

Thomas Berry (1988)

We can be ethical only in relation to somethings we can see, feel, understand, love, or otherwise have faith in.

Aldo Leopold (1972)

However, those who are preoccupied with preserving their own identities will be too interested in separateness to allow a relationship with nature to grow into something pervaded by the Spirit of God.

Wayne Simsic (1991)

One of the fundamental teachings of Catholicism that has provided direction along my spiritual journey is that the world is the proper arena for religious activity. As a member of the Catholic community I believe it is my spiritual obligation to remain connected to the physical world. To seek a union with God that requires a separation from the rest of humanity denies the very essence of this obligation. Only by continually seeking to

honor this responsibility can I achieve personal salvation while at the same time play a role in God's redemptive plan.

As a member of the Catholic community I accept the responsibility to confront societal issues that promote the development of attitudes that are in conflict with Catholic teaching. I believe the refusal of Western societies to include nature within the boundaries of ethical consideration represents such an issue. Homocentric attitudes that dominate Western ethics are an affront to Catholic teaching concerning the inherent value of all life and threaten the well-being of future generations of humanity. I believe it to be my spiritual obligation to confront this issue within the societal context in which it has developed and continues to be promoted. It is with this obligation in mind that I have sought to understand my spiritual responsibilities an educator and scientist.

As part of my Catholic faith, I acknowledge a moral obligation to promote and model a lifestyle that encourages a fundamental respect for life while guaranteeing future generations a quality of life equal to or better than my own. This belief is founded upon interpretations of Catholic theology that celebrate God's creative presence in every aspect of creation. This presence not only instills within creation an inherent value and purpose but serves as a spiritual connection between humanity and the

natural world. I recognize, however, that this represents a position influence by religious beliefs and therefore may not be shared by every member of society. As a result I find myself confronted with the dilemma of attempting to teach what I accept to be fundamentally moral principles within a spiritual context that others may not identify as being of a moral or spiritual nature. This is the nature of my spiritual struggle.

Influenced by my scientific study of environmental issues and ecological principles, I have come to believe that humanity stands on the brink of an ecological catastrophe as a result of its failure to recognize a physical connection to the natural world. The degree of human suffering resulting from human ignorance or apathy concerning our relationship with the natural world could be unmatched in human history. I therefore believe that despite the lack of a widespread agreement as to the moral, ethical and spiritual dimensions of humanity's relationship with the non-human world, I have a spiritual obligation to do what is within my power to minimize the potential extent of this suffering

In this regard I believe it is my responsibility as an educator to work to promote the acceptance of an ecologically-based curriculum that promotes environmental awareness and sensitivity, a thorough understanding of ecological principles and concepts, and an acceptance of

the ethical implications of the concept of ecological sustainability.

A mere understanding of environmental issues and ecological principles is, however, insufficient in itself to seriously address the looming ecological crisis. There must be a fundamental commitment by members of society to modify their ethical relationship with the natural world. Consequentially, I believe my responsibilities as an educator include the promotion of a serious debate within society at large, and the educational community in particular, concerning the topic of environmental ethics.

To teach only the ethical dimensions of our relationship with the natural world is for me, however, a fundamental denial of the spiritual connection I share with God and the natural world. Although I acknowledge the impossibility of scientifically proving the existence of this connection, my failure to acknowledge that it does exist would lead to my spiritual death. Some might argue that to promote a spiritual dimension of our relationship with the natural world based upon a fundamental reverence for life would in itself be sufficient to halt the environmentally destructive practices we are now engaged in as a species. Although I suspect this is true, such an attitude does not require the acknowledgment of the spiritual presence of God within all things that bestows upon them

inherent worth and purpose. This understanding is at the center of my own beliefs concerning humanity's ethical responsibility to the natural world. I do not believe I can fully end the alienation in my life until I can pursue my spiritual goals in a manner that fully acknowledges this spiritual influence.

At the present time I believe my ability to teach the essential components of ecological literacy to the fullest extent of my spiritual calling is severely limited as a result of the position I hold as a science teacher in a secular setting. Although I deeply value the opportunity to influence the view my students have of the universe and their role in it, I believe I can have a greater impact within an educational forum that allows me to reach a broader audience while honoring my desire to teach in a manner that does not require a denial of God's active presence in my life. My love of writing and teaching suggests to me it is within these areas that I can hope to have the greatest and most rewarding influence on the lives of others who share my interests and concerns. It is with a certain amount of regret, however, that I realize that the very act of completing this dissertation project takes me one step further away from the intimate and deeply enriching contact I have had with young people during the past fourteen years. It is my sincerest hope that as a result of the

influence I hope to have as I pursue my spiritual goals, there will be more individuals standing in front of classrooms helping young people uncover their own spiritual connection to God and the natural world.

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During the writing of this dissertation I found it helpful to identify the boundaries of my own interpretation of Catholic theology concerning the spiritual and ethical dimensions of the God-human-nature relationship. What follows represents a statement of belief, a personal creed, that I believe honors both scripture and the spiritual struggle of past and present members of the Catholic community.

CREDO

I- I believe...
that God's creative presence pervades the entire Universe in a dynamic and mutually present relationship.

II- I believe...
it is possible to perceive the presence of the living God in one's life through a process that involves inner contemplation and prayer.

III- I believe...
it is possible to discern insights into the nature of the Creator through an understanding of the physical world; its processes, interactions, systems, connections, and forces.

IV- I believe...
that all life has an inherent, sacred value.

V- I believe...
that the careless and/or needless destruction of life, at any level, is morally offensive.

VI- I believe...
that all life should be celebrated and viewed as the ultimate gift.

VII- I believe...

that the world is always new, often mysterious, and possesses qualities that are unknowable and unquantifiable.

VIII- I believe...

that humanity exist in a state of fundamental kinship with the non-human world.

IX- I believe...

that the Christian call to love should be extended to include all creation.

X- I believe...

we must include nature within the boundaries of ethical consideration in order to halt the ecological devestation that threatens the quality of life of earth's future inhabitants.

XI- I believe...

that the coming of the Cosmic Christ will restore the broken harmony of the world and result in the salvation of both mankind and the whole of creation.

XII - I believe...

that nature is an active participant in the salvation of Humanity's holy relationship with God.

XIII- I believe...

it is my spiritual obligation to promote within society a wider understanding of the ethical dimensions of humanity's relationship with the natural world.

XIV- I believe...

the spiritual journey I began three years ago represents the renewal of a life-long mystical quest.