

SPECULATING A SUSTAINABLE FUTURE: SCIENCE FICTION AND THE
PEDAGOGY OF ECOLOGICAL LITERACY

By

ERIC OTTO

A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

UNIVERSITY OF FLORIDA

2002

Copyright 2002

by

Eric Otto

For Tricia

ACKNOWLEDGMENTS

I am indebted to many for helping me with this project. I thank my thesis advisors, Andrew Gordon and Sid Dobrin, for their commentary on matters both critical to my arguments and to the details of my writing. I appreciate your time immensely. I thank Andrew Gordon and my friends and colleagues in his Fall 2001, American Science Fiction course for introducing me to the world of science fiction. In matters environmental, I thank Eve and Joe Otto for our trips to the Boyd Hill Nature Trail; Dorothy and Don Kane for Minneha Beach Resort in Battle Lake, Minnesota; my dad and my brother Casey for our trips to “the grocery store”; my mom for sending me to the Science Center every summer when I was a kid; and my brother Joey for our adventures wading the flats behind O’Neil’s, catching snook in Wild Turkey Bay in “the slowest boat I ever seen,” and spending every summer in quest of the Silver King. I also thank the faculty of Florida Gulf Coast University—particularly Peter Blaze Corcoran, Jack Crocker, Joe Wisdom, Jim Wohlpart, and Rebecca Totaro—for their encouragement over the years. Finally, and to repeat a few names, this project would not have been possible—nor am I possible—without the love and support of my family: Mom, Dad, Tracy, Joey, Casey, Ricky, Chad, and my fiancée Tricia.

TABLE OF CONTENTS

	<u>page</u>
ACKNOWLEDGMENTS	iv
ABSTRACT.....	vii
CHAPTER	
1 INTRODUCTION: SCIENCE FICTION, ECOLOGY, AND PEDAGOGY.....	1
Science Fiction as Critical Theory.....	2
The Pedagogy of Ecological Literacy and Environmental Sustainability	4
SF and Environmental Thought: Texts for Change.....	7
2 FRANK HERBERT’S <i>DUNE</i> AND ECOLOGICAL LITERACY	9
<i>Dune</i> and Ecology: The Critical Tradition.....	10
Indigenous Fremen and Stillsuits as Living Machines	13
Interrogating Resident Paradigms.....	19
“Afflicted by a Hero”: The Fremen Jihad as Social Trap.....	22
Ecological Literacy: A Paradigm for Change.....	26
3 THE DEEP ECOLOGY OF ENVIRONMENTAL UTOPIA: ECOSOPHY, <i>ECOTOPIA</i> , AND <i>WOMAN ON THE EDGE OF TIME</i>	29
The Population Problem	33
“Forward, into the past?”: Deep Ecology and Stable-State Economy.....	36
Teaching “The relational, total-field image”	40
Sustainability through Community and Autonomy	43
Dwelling Lightly.....	46
4 KIM STANLEY ROBINSON’S <i>MARS</i> TRILOGY AND THE LEOPOLDIAN LAND ETHIC.....	49
Aldo Leopold’s Land Ethic.....	51
The <i>Mars</i> Trilogy and the Economically Based Land Relation	54
Eco-Economics: Toward a Land Ethic	58
Spiritual Aspects of the Land Ethic	61
Synthesizing Conceptions of the Land-Human Relationship.....	64
Conclusion: Robinson’s Land Ethic	77

5 CONCLUSION.....	80
REFERENCES	83
BIOGRAPHICAL SKETCH	87

Abstract of Thesis Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Master of Arts

SPECULATING A SUSTAINABLE FUTURE: SCIENCE FICTION AND THE
PEDAGOGY OF ECOLOGICAL LITERACY

By

Eric Otto

December 2002

Chair: Andrew Gordon
Major Department: English

This thesis fuses current discussions about science fiction (SF) as critical discourse with ongoing discussions about the importance of ecological literacy as a component of educating for environmental sustainability. The introduction—Chapter 1, “Science Fiction, Ecology, and Pedagogy”—argues for the value of science fiction as critical theory and, more specifically, as a genre that contributes to the pedagogy of ecological literacy and thus to environmental sustainability.

By ecocritically analyzing several works of science fiction, the subsequent chapters demonstrate the value of the genre for teaching ecological literacy. Chapter 2, “Frank Herbert’s *Dune* and Ecological Literacy,” demonstrates how the science fiction imagination often speculates changes and ideas that parallel the revisionary ideas of ecological thinkers. Chapter 3 looks at two utopian novels—Ernest Callenbach’s *Ecotopia* and Marge Piercy’s *Woman on the Edge of Time*—within the contexts of deep ecology, and it uses the revisionary concepts of thinkers like Arne Naess and Gary

Snyder to do so. Finally, Chapter 4 discusses Kim Stanley Robinson's *Mars* trilogy within the context of Aldo Leopold's "land ethic."

Ultimately, this work shows that science fiction deserves critical attention as a genre concerned about speculating crucial changes for the future, in this case, for a more ecologically sustainable future. It also demonstrates the detailed attention SF often gives to issues of ecology. Because of this attention, science fiction can assist the pedagogy of ecological literacy. Works in the genre, such as the ones discussed in this thesis, become crucial texts in the growing bibliography of works aimed to make readers more aware of ecologically sustainable modes of thought and existence.

CHAPTER 1
INTRODUCTION: SCIENCE FICTION, ECOLOGY, AND PEDAGOGY

The following work presents an effort to fuse current discussions about science fiction (SF) as critical discourse with ongoing discussions about the importance of ecological literacy in educating for environmental sustainability. The first discussion is of interest to science fiction scholars, as literary critics are currently pointing out the potential for science fiction to act as a mode of revisionary cultural criticism. The latter discussion is important on a broader scale. Increasing numbers of people today recognize that high consumption patterns, growth-centered economic habits, and other characteristics of the modern, “developed” world damage the Earth’s ecosystems in ways that are both unhealthy and unethical and that we must make efforts to revise our ways of thinking and acting into more ecologically sustainable paradigms and practices. Ecological literacy leads to such a revision, as it stresses the importance of the question “*And then what?*” while it calls attention to ideas that address this question from an ecological perspective (Hardin 25).

In bringing these discourses together, this work considers several contemporary science fiction texts—Frank Herbert’s *Dune* (1965), Ernest Callenbach’s *Ecotopia* (1975), Marge Piercy’s *Woman on the Edge of Time* (1976), and Kim Stanley Robinson’s *Mars* trilogy (1993, 1994, 1996)—as critical treatises that promote ecological literacy and environmentally conscientious ways of life. I hope that after reading this text some may see science fiction in a new way and incorporate ecological perspectives into their reading and/or teaching of these and other works in the genre. By the same token, I hope

environmental educators will find in science fiction a tool for exploring perceptive expressions of ecologically literate thought, thought required for achieving an environmentally sustainability society.

Science Fiction as Critical Theory

A recent call for papers (CFP) for a special issue of *Publications of the Modern Language Association of America* declares, “As futurity becomes an ever more urgent concern, the importance of science fiction (the genre of the future par excellence) is increasingly evident, and science fiction criticism becomes a privileged mode of literary and cultural analysis” (Barr and Freedman 198). Would-be contributors are asked to explore “the potential of [science fiction criticism] to define the literary profession of [the first decade of the twenty-first century]” (198). Though at the time of my writing the special issue has yet to be published, this CFP alone demonstrates the critical importance scholars are beginning to attribute to science fiction. In fact, Carl Freedman, co-author of this call for papers, insists in *Critical Theory and Science Fiction* that the critical stance of many SF texts positions the genre as having “the potential to play a role in the liberation of humanity from oppression” (xx).

Critical theory, as Freedman says, is “unswervingly *oppositional*” (8). Supporting this, Freedman cites the Marxist opposition to “the increasingly ‘totalitarian’ character of capitalism,” the psychoanalytic opposition to simplified models of knowledge, the poststructuralist opposition to totality, and the feminist opposition to patriarchal social constructs (9). To exercise critical theory is thus to intervene in culturally dominant modes of thinking and being in an effort to challenge what is inherently limiting, oppressive, or dangerous in those modes. As Freedman claims, science fiction also performs these operations.

Science fiction does not get the same privileges in academia as do canonized works of literature. It is often devalued as pulp and pop. Nevertheless, critical theory—which “constantly shows that things are not what they seem to be *and* that things need not eternally be as they are”—inherently privileges science fiction (Freedman 8). As Brooks Landon shows, science fiction resists concrete definitions; but, he admits, “we have a pretty good idea of the kinds of territory it covers and the kinds of experiences we can expect in those territories” (32). SF “territories,” according to the definitions Landon cites, include considering how science and technology affect humanity, focusing on affairs more significant than the fate of one individual or community, and speculating on fundamental conceptual innovations in order to challenge traditional constructs of knowledge and being (31-33). The subversive nature of these territories assures a healthy SF/critical theory symbiosis, for science fiction speculates about other pasts, other presents, other futures, other worlds, other technologies, and even other Others. Like critical theory’s revisionary and oppositional speculations, science fiction ultimately contemplates potential changes in the ideological status quo for a better human existence on the Earth.

As a result, science fiction does occupy a privileged position for those whose scholarly interests are in emancipating individuals and groups from hegemonic paradigms of power, race, class, sexuality, and so forth. As critical discourse, science fiction draws our attention to the faults of dominant and oppressive modes of social reality as it also constructs paradigms that better support the egalitarian world that critical theory hopes to create.

The Pedagogy of Ecological Literacy and Environmental Sustainability

Emancipatory pedagogy is succeeding in applying the tenets of critical theory in the classroom. But while the revisionary attitude of the classes being offered in many universities, and in the texts used to teach these classes, promises to instill in students the conscientious outlooks and worldviews that critical theory supports, its lack of attention to ecology and environment demonstrates what ecological thinker C.A. Bowers calls “the liberal impasse” toward issues of ecology (73-116).

Taking issue with critical pedagogy, Bowers suggests that the current push toward emancipatory, critical theory-based teaching errs in several ways. The liberated individual

is still viewed as independent of the natural environment; critical reflection remains the only legitimate expression of intelligence, which excludes both traditional cultures and the complex information exchanges that characterize an ecology; change is still understood in human and culturally specific terms that equate progress only with an expansion of the individual’s sense of freedom. (115)

In other words, the emphasis critical theory and emancipatory pedagogy have placed on freeing individuals from oppressive social paradigms and hegemonic power structures has allowed important issues of ecology to go unnoticed, to get lost in the anthropocentrism of supposedly radical thought.

A truly radical revision of the academy would occur, according to Bowers, if we developed “an ecology based approach to education,” an approach that considers “how we think about the nature of time, knowledge, freedom, change, community, science, and technology” in terms of an “ecological model of existence” (164). Under Bowers’s vision of a curriculum that focuses on ecological literacy, the “Guiding metaphors of a culture of progress and environmental exploitation” shift to “New (and ancient) guiding

metaphors for a sustainable culture” (167). Change in the way of innovation and experimentation surrenders to tradition and an “awareness of continuities with the past”; community as a collection of humans surrenders to community as an “ecology of life forms”; and faith in rational knowledge surrenders to faith in many forms of knowledge, including tacit, critical, folk, and spiritual knowledge (167-168).

Such a shift in the guiding metaphors of modern culture requires a sustained attention to the ideas of ecological thinkers who have worked out crucial philosophies of human existence as a part of—rather than apart from—the Earth’s natural ecologies. The environmentalists most frequently referred to in this thesis—Aldo Leopold, Arne Naess, Gary Snyder, David W. Orr, and C.A. Bowers—have articulated a multiplicity of ideas regarding, for example, how we should relate to the land community, how we should reevaluate our growth-centered economy and aim for one that is stable and ecologically sustainable, and how we should value and adopt “primitive” modes of existence that view humanity and Earth as intricately interconnected. Indeed, the place for initiating these “deep changes,” as Bowers calls them, is the classroom. Unfortunately, more often than not the ideas taught in contemporary classrooms support a human/nature dichotomy, a faith in modern industrial progress, and, ultimately, a way of knowing and being that disregards the fundamental connections we have with the natural world.

As with any attempt to grasp a topic or phenomenon more fully, becoming more ecologically literate involves understanding an array of concepts and issues. The following chapters only begin to explore potential areas of inquiry within this array. Indeed, alongside my discussion, in Chapter 3, of deep ecology as a crucial environmental philosophy, one could also discuss ecofeminist perspectives on the

environment. Alongside my discussion, in Chapter 4, of Aldo Leopold's land ethic, one could also discuss Rachel Carson's seminal book *Silent Spring* and the ecological ideas communicated there. And because there is such a large volume of quality, critical science fiction, ecocritical readings of other SF works could support discussions of these other environmental topics. The point here, though, is not to aim for quantity. Rather, it is to suggest that science fiction is an invaluable resource for learning about issues of ecology and environment and to demonstrate this claim by exploring several works in the genre.

Further, the broader context for my discussion of ecological literacy is, as the left side of my title suggests, environmental sustainability. Ecological literacy attends to scientific, political, social, psychological, and philosophical views of ecology and environment, and it does so to promote sound concepts of environmental sustainability. Commonly defined as the ability to meet the needs of present generations without threatening the needs of future generations, environmental sustainability is an important agenda for all disciplines to pursue, both inside and outside of academia (World Commission on Environment and Development 43). Severe environmental stress resulting from unsustainable practices appears in recent climate trends as well as in many of the Earth's ecosystems. For this reason, educating for environmental sustainability is crucial. But, as Derek Owens points out in *Composition and Sustainability: Teaching for a Threatened Generation*, sustainability is not a stable idea (21-35). Some, like those in the Brundtland Commission, who coined the abovementioned definition, aim to preserve natural resources for future generations. And because resources, in a capitalist

economy, means capital, others view sustainability in terms of “sustaining profits” (Owens 25).

Ecological literacy, though, can prevent such “*weak*,” ecologically unsound, and resource-based definitions of environmental sustainability by grounding the term in healthier concepts of ecology (Owens 25). Thus, while sustainability is the larger context within which ecological literacy gains its importance, ecological literacy assures that the agenda of environmental sustainability remains focused on altering current paradigms into ones that are more conscious of the workings of natural systems. In the end, texts interested in communicating components of ecological literacy, such as the SF texts below, ultimately have a broader ambition: to oppose resource-based views of ecology and to advance long-term, ethical views of the natural environment.

SF and Environmental Thought: Texts for Change

As scholars and teachers of science fiction, we can work toward the goal of establishing ecologically literate ways of thinking and acting by interpreting the texts we study from an environmental perspective. To do so can bring about an awareness of the various paradigm shifts advocated by ecological thinkers like Orr, Bowers, and others. Such is the goal of the essays that follow.

Chapter 2, “Frank Herbert’s *Dune* and Ecological Literacy,” demonstrates how the science fiction imagination often speculates on changes and ideas that parallel the revisionary ideas of ecological thinkers. I look at *Dune* as a text about ecological literacy. *Dune*’s indigenous Fremen, water-conserving stillsuits, interrogation of ways of life that oppose natural systems, and critique of the hegemony’s control over “primitive” classes display two opposing ecological paradigms: one sustainable and the other environmentally destructive. Herbert’s seminal novel informs readers of the ecological

problems inherent in current political and economic systems as it also supports the thoughts and actions of ecologically literate cultures.

Chapter 3 looks at two utopian novels—Ernest Callenbach’s *Ecotopia* and Marge Piercy’s *Woman on the Edge of Time*—in terms of the deep ecological paradigm they support. I draw from Arne Naess’s and Gary Snyder’s discussions of deep ecology to show that Callenbach’s and Piercy’s novels encourage the fundamental changes this movement advocates—which include reducing world population, reevaluating the growth economy, viewing the world as an interconnected system, developing community and regional attitudes, and reducing human impact on the Earth.

Finally, in Chapter 4 I use Aldo Leopold’s “land ethic” to discuss the thrust of Kim Stanley Robinson’s mammoth *Mars* trilogy. While the books comprising the series document a wealth of future histories, including the terraformation of Mars and the colonization of a new frontier, I argue that Robinson’s ultimate motive is to synthesize a variety of conflicting worldviews into one that sees a fundamental symbiosis among all of the living and nonliving components of an ecosystem, of the land.

In sum, the chapters of this work serve two purposes: (1) they show that science fiction deserves critical attention as a genre concerned about speculating on crucial changes for the future, in this case, for a more ecologically sustainable future; and (2) they demonstrate the detailed attention SF often gives to issues of ecology. Because of this attention, science fiction can assist the pedagogy of ecological literacy. Works in the genre, such as the ones discussed below, become crucial texts in the growing bibliography of works aimed to make readers more aware of ecologically sustainable modes of thought and existence.

CHAPTER 2 FRANK HERBERT'S *DUNE* AND ECOLOGICAL LITERACY

“The thing the ecologically illiterate don’t realize about an ecosystem,” Kynes said, “is that it’s a system. A system! A system maintains a certain fluid stability that can be destroyed by a misstep in just one niche. A system has order, a flowing from point to point. If something dams that flow, order collapses. The untrained might miss that collapse until it was too late. That’s why the highest function of ecology is the understanding of consequences.” (*Dune* 482)

In promoting such thinking, Frank Herbert’s *Dune* is an appropriate source and starting point for discussing the ecological concepts imbedded in science fiction. With the desert planet Arrakis, its indigenous Fremen, and the Fremen stillsuits, the 1965 novel serves as a pedagogical tool for exploring theories and models of ecological literacy that have recently emerged in the texts of contemporary ecological thinkers. This is not to claim any prescience on Herbert’s part; as Peter Nicholls notes in *The Encyclopedia of Science Fiction*, SF is not the literature of prediction (957). However, because Herbert’s work displays such an awareness of the ecological concepts and philosophies about which recent environmental thinkers like Nancy and John Todd, David W. Orr, and C.A. Bowers have written, *Dune* can be situated within an entire bibliography of texts that serve the important purposes of environmental education and the push toward ecological literacy.¹

In this chapter, I want to begin discussing concepts of ecology as they are represented and formulated in science fiction. *Dune* serves this intent well, because it

¹ Such a bibliography can be found in Orr’s *Ecological Literacy: Education and the Transition to a Postmodern World*, 109-124.

brings ecological literacy to the fore. In exploring ecological literacy and how *Dune* cultivates such literacy among the characters in the novel and among those reading it, this chapter also serves as a framework for the subsequent chapters, which focus on more specific ecological ideas—deep ecology and Aldo Leopold’s land ethic, respectively. With its focus on the general concept of ecological literacy and on several components of that literacy, *Dune* thus works to demonstrate the pedagogical possibilities of science fiction for environmental education’s motive to restructure the fundamental ways in which we understand and live with the Earth.

***Dune* and Ecology: The Critical Tradition**

Scholars of Frank Herbert’s work frequently discuss ecology in *Dune*. But ecology means something different for each critic, and in each case the term operates differently from the definition with which I am working. For example, in his reader’s guide to Herbert’s novels, David M. Miller finds the ecological principal of homeostasis to be a pervasive theme throughout *Dune* and Herbert’s other works:

Homeostasis is the tendency of an organism to maintain a uniform and beneficial physiological stability within and between its parts. If we extend this definition to include not only biological organisms but also psychological, social, economic, political, religious, and ecological units, and if we subject that expanded homeostasis to a universal evolutionary imperative, we have a nutshell version of Herbert’s themes. (9)

Miller’s ecological model for Herbert’s work is perceptive and useful for investigating the complex relationships between the many political, social, religious, and cultural facets of *Dune*. Later in Miller’s exploration of the novel, though, homeostasis serves only as a metaphor for a much narrower look into *Dune*’s political dynamics: “The Imperium depends upon the Landsraad, the Landsraad upon the Imperium. Both draw economic power from CHOAM. CHOAM cannot function without the Space Guild, but the Space

Guild is dependent upon spice” (19). This attention to the political ecology of *Dune* is insightful for its emphasis on the significant parallels between the workings of politics and economics and the workings of natural systems, but in reducing ecology to a thematic device and a metaphor for political systems, Miller draws attention away from Herbert’s concentration on the ways in which humans must behave as members of natural systems.

Also using ecology as a metaphor for other foci of Herbert’s work, Timothy O’Reilly emphasizes how the author explores “the ecologist’s emphasis on variety and adaptability as the key to the stability of ecosystems” (6). For O’Reilly, Herbert’s ecological vision in *Dune* stresses “trying to keep up with change rather than to stop it” (8). Such adaptability is indeed ecological; but in O’Reilly’s concept of ecology, it is Paul Atreides’s future jihad—rather than any incidents involving natural systems—that demonstrates this natural adaptability, for it is an element of chaos not “for the sake of chaos, but a natural order trying to reassert itself” (125). That O’Reilly, like Miller, undervalues Herbert’s attention to natural ecology is evident when he states, “what Herbert does in Paul’s visions [of the jihad] is to take ecological concepts to a much deeper level. Paul comes to see opposition between the aims of civilization and those of nature, as represented by the human unconscious” (50). Imbedded in O’Reilly’s observation is the idea that ecology, as a complex state of natural ecosystems, becomes more deep and complex either when internalized as a psychological tension between culture (civilization) and nature (individual psychology), or when that tension is played out in the political sphere—i.e., status quo versus jihad. Again, ecology becomes simply a metaphor for addressing the complexities of human psychology or politics.

Finally, in his study of Frank Herbert, William F. Touponce claims that ecology is the principal theme of *Dune*, but like Miller and O'Reilly, he qualifies the term in a way that undermines the significance of Herbert's focus on ecological literacy: "Ecology [. . .] has a much broader meaning than the study of organisms and their interaction with their environments. It can mean globally social ecology, political ecology, economic ecology, and even language" (14). Touponce's specific interest is the latter: the semantic ecology of *Dune*. He notices a system of interaction between indirect discourse (authorial narration), direct discourse (inner speech and audible speech), and quasi-direct discourse (narrational speech that preserves the language of a particular character). This interaction is ecological in the sense that Herbert uses it "to create a smooth flow between these modes, so that we hardly notice that we have passed from skirting the depths of the unconscious to a level of conscious analysis" (20). Furthermore, according to Touponce, the dialogue in *Dune* becomes ecological as "utterances derive most of their meaning from the social contexts of communication in which they are produced and from paralinguistics," "all the pauses, grunts, sighs, facial and body movements that, it turns out, always convey exactly what we are really aiming at and are always received and (at least for most people) unconsciously understood" (21).

Miller, O'Reilly, and Touponce use principles of ecology to elaborate on *Dune*'s political and structural elements. These critics are interested in and draw our attention briefly to the workings of natural systems, but because they ignore the actual manifestations of natural ecology and concepts of ecological literacy in the novel, their work overlooks *Dune*'s most pedagogically useful aspects. In emphasizing ecology only as a metaphor for other systems—politics, economics, semantics, and so forth—the

principles of natural ecology merely become theoretical starting points for analyzing such supposedly “deeper” issues.

If education in the twenty-first century must strive toward deep changes in the ways in which we think about the environment, then ecological readings of texts must start by asking not how ecology can be used as a metaphor for understanding previously existing political, economic, and semantic systems, but, in Cheryll Glotfelty’s words, “How is nature represented in this sonnet?” “What role does the physical setting play in the plot of this novel?” “Are the values expressed in this play consistent with ecological wisdom?” (par. 2). To Glotfelty’s list of questions, and in reference to *Dune*, I add, “What worldviews does this novel show best support environmental sustainability?” “What aspects of this novel contribute to our knowledge of and thinking about natural systems?” “Does this novel anticipate deep challenges to the goal of environmental sustainability?” Ultimately, ecologically focused literary analysis must hold natural ecology as its primary interest and ecological literacy through thoughtful pedagogy as its means for working toward a more sustainable future.

Indigenous Fremen and Stillsuits as Living Machines

To investigate what worldviews *Dune* shows best support environmental sustainability and what aspects of *Dune* contribute to our knowledge of and thinking about natural systems we may turn to the indigenous Fremen of Arrakis, the desert planet that gives *Dune* its title, and to the stillsuits that help maintain them in near moistureless conditions. In his book *Ecological Literacy: Education and the Transition to a Postmodern World*, David W. Orr asserts that any move toward ecological sustainability must be “rooted as much in past practices, folkways, and traditions as in the creation of new knowledge” (31). “Ecological sustainability,” Orr continues,

will require a patient and systematic effort to restore and preserve traditional knowledge of the land and its functions. This is knowledge of specific places and their peculiar traits of soils, microclimate, wildlife, and vegetation, as well as the history and the cultural practices that work in each particular setting. Sustainability will not come primarily from homogenized top-down approaches but from the careful adaptation of people to particular places. This is as much a process of *rediscovery* as it is of research. (33)

C.A. Bowers makes a similar observation: “Native American cultures, of course, had evolved in ecologically responsive ways; but what could have been learned from their thousands of years of experience in adapting to the unique characteristics of their habitat was ignored because they were perceived as unenlightened and pre-modern” (11). The focus here is on the necessity for modern technocratic societies to understand ecological systems in the same way indigenous cultures do. Only in such understanding can we achieve ecological sustainability.

Given Bowers’s support of Native American indigenous knowledge, it is interesting that *Dune*’s own indigenous culture, the Fremen, have been compared to the Apache and to other natives of the North American Southwest. The Fremen possess a “superb knowledge of their environment” and “a kind of earth-wisdom” that allows them to live with the hostilities of Arrakis’s dry climate and carnivorous sandworms (O’Reilly 41, 42). As ecologically literate inhabitants of an arid ecosystem, the Fremen have developed “the ability to sense even the slightest change in the air’s moisture” (*Dune* 301). In school, Fremen children chant ““Tree, grass, dune, wind, mountain, hill, fire, lightning, rock, rocks, dust, sand, heat, shelter, heat, full, winter, cold, empty, erosion, summer, cavern, day, tension, moon, night, caprock, slope, planting, binder,”” demonstrating their indoctrination into an aboriginal society that lives in harmony with nature rather than apart from it (336). Indeed, the Fremen are “dwellers”; they live well

in their place. Unlike the transient regimes that the Emperor places as administrators of Arrakis and that merely need to know how to mine spice—the planet’s one economic resource—in order to reside there, the Fremen inhabit Arrakis.

Environmental thinkers distinguish dwellers, or inhabitants, from residents, providing an ideal framework for discussing the ecological value of *Dune*’s indigenous Fremen culture as well as the environmentally disastrous paradigms of the novel’s politically and economically powerful characters. As Orr notes, “The inhabitant and a particular habitat cannot be separated without doing violence to both. [. . .] The inhabitant and place mutually shape each other” (102). To dwell, as Ivan Illich defines it, is “to inhabit one’s own traces, to let daily life write the webs and knots of one’s biography into the landscape” (22). By contrast, “the resident is a temporary and rootless occupant who mostly needs to know where the banks and stores are in order to plug in. [. . .] To reside is to live as a transient and as a stranger to one’s place” (Orr 102).

Because the Fremen are dwellers, Arrakis’s desertscape has shaped their cultural practices. Demonstrating this effectively, Herbert contrasts the cultural assumptions of the foreign Atreides clan, who have recently moved to Arrakis from the water-rich planet of Caladan, with those of the indigenous, ecologically literate Fremen. In one tense scene, Stilgar, a Fremen leader, spits on Duke Leto Atreides’s table:

The Fremen stared at the Duke, then slowly pulled aside his veil, revealing a thin nose and full-lipped mouth in a glistening black beard. Deliberately he bent over the end of the table, spat on its polished surface.

As the men around the table started to surge to their feet, Idaho’s voice boomed across the room: “Hold!”

Into the sudden charged stillness, Idaho said: “We thank you, Stilgar, for the gift of your body’s moisture. We accept it in the spirit with which it is given.” And Idaho spat on the table in front of the Duke. (92)

Duncan Idaho, one of the Duke's men, must then remind the Duke of the value of water, and thus of saliva, on Arrakis. Similarly, the Fremen see crying—particularly crying at the time of someone's death—differently than do the Atreides. In fact, when Paul Atreides cries over the death of Jamis, a Fremen man he has just killed in a ritual battle, the Fremen worship his gift of “moisture to the dead” (306). It is here, too, when Paul's mother, Jessica, learns the value of water, as did his father in the spitting incident. And indeed, as Leto and Jessica learn these deep connections between ecology and culture, so do we.

While Fremen custom draws our attention to developing a cultural sense of place within our own environments, it also raises questions about the fundamental ways in which we view the individual/community relationship; for the Fremen are all members of a community-oriented culture. Discussing the weaknesses of Enlightenment conceptions of the individual as a free, autonomous self, Bowers suggests, “the current image of individualism does not recognize the complex nature of tradition and the authority that it has in people's lives. This is [. . .] a critically important issue in any serious discussion of the characteristics of an ecologically sustainable culture” (26). To think of the self as autonomous, Bowers continues, “undermines the sense of being interdependent with the larger social and biotic community” (27). If, as Bowers claims along with Gary Snyder, life involves participation in ecological networks, then *Dune's* Fremen exemplify such an ecologically literate worldview (27). They have evolved patterns of community in which “the bond of water” binds individual members to the collective goals of the tribe. *Dune* therefore insists that solidarity is an important component of ecologically literate dwelling cultures, and thus of environmental sustainability.

Like the symbolic bond of water that joins the Fremen in a community, the stillsuits they wear to conserve water in their bodies also attest to their ecological literacy. Explaining the stillsuits, Liet-Kynes, *Dune*'s important planetary ecologist, states, "It's basically a micro-sandwich—a high-efficiency filter and heat-exchange system. [. . .] The skin-contact layer's porous. Perspiration passes through it, having cooled the body . . . near-normal evaporation process. The next two layers [. . .] include heat exchange filaments and salt precipitators. Salt's reclaimed" (109). Along with these functions, the stillsuit processes urine and feces and reclaims most of the body's water for its Fremen wearer to drink again, all with the energy—the "pumping force"—provided by body movement (109). "With a Fremen suit in good working order," Kynes insists, "you won't lose more than a thimbleful of moisture a day" (109). The stillsuits demonstrate an awareness of conservation that characterizes ecologically literate, dwelling indigenous cultures and that must emerge in technocratic cultures with a pressing need to adopt environmentally sustainable practices. In this regard, the stillsuits act symbolically: as the Fremen wear the suits to preserve water, which is very scarce on Arrakis, so must we find appropriate "technologies" that will preserve rather than destroy the Earth's natural systems.

While the publication of *Dune* precedes Nancy and John Todd's living machines by twenty-two years, Fremen stillsuit technology anticipates the Todds' environmentally sustainable water-purification systems. Though Herbert does not predict the emergence of such a sustainable technology, with the Fremen stillsuits he builds a framework for thinking about how we can live sustainably in the natural world. As the Todds describe them, living machines are

self-contained networks of ecological systems powered by the sun and designed to accomplish specific purposes. Frequently they are housed inside greenhouse structures. Based on the precepts that waste is a resource out of place and that nature handles every form of waste by turning it into a resource, [living machines] imitate the purifying and recycling abilities of natural aquatic ecosystems. (xvii)

The differences between living machines and stillsuits are obvious but basic: living machines are greenhouses, stillsuits are apparel; living machines use aquatic systems and organisms to purify water, stillsuits use micro-technology and body movements. But as *Dune* can educate us about ecologically literate cultural practices and the value of community for maintaining environmental sustainability, so can the novel help us look to explore more sustainable technologies. Thus, stillsuits are living machines because they are self-contained, relying on their enclosed systems to perform recycling and purification. They also process the body's waste, as do living machines and as does nature with waste in general. Most important, however, is that like the aspects of *Dune* discussed so far, stillsuits represent an ecological paradigm. In this case, it is a paradigm that stresses "ceaseless mutual causality and interdependence" between elements of natural systems in an effort to reproduce those systems and thus conserve natural, ecological integrity (Todd and Todd 8).

Herbert's representation of Fremen culture thus raises awareness of ecologically literate cultural and technological practices. As dwellers, the Fremen do not make traditional Cartesian distinctions between nature and culture, and therefore they evolve customs and technologies that demonstrate interconnectedness with the natural environment.

Interrogating Resident Paradigms

As dwelling, and the ecologically literate practices and technologies that come with dwelling, is represented in *Dune* as the way of life for those who are environmentally in-tune, so residing is represented as the routine of the ecologically illiterate but politically powerful. The latter group demonstrates such contempt for the former that we can easily discern Herbert's subtext: to live well in a place—to be indigenous—opposes and thus disrupts the mechanisms of the residing powerful, who see place only through an economic lens, in this case, through the promise of spice profits. The Fremen are “marked down on no census of the Imperial Regate”; the Imperium does not recognize their existence (5). In fact, the Emperor's thought about the Fremen demonstrates this erasure of identity and being, while it also shows how the hegemony views place not in terms of natural ecology but of economic class: “. . . but what else is one to expect of barbarians whose dearest dream is to live outside the ordered security of the faufreluches?” the Imperial system of place based on class distinctions (78, 501). Herbert thus sets up a dichotomy between the powerful residents and the powerless dwellers. Later I will address how the nature of this dichotomy and of binary thinking in general dooms the ecological literacy of even the Fremen. Now, however, it is important to interrogate the value that the Imperium and other groups place on residential thinking and to demonstrate how such ecological illiteracy undermines ecological sustainability in *Dune* and, by extension, in the world we live on.

To use an important example, it may be because residential visions of power interfere with any interest Paul may develop in Arrakis as a dwelling that Paul gives in to his visions of a violent, “holy ‘green’ war against the existing order” (Ellis 121). Early in *Dune*, Thufir Hawat, Duke Leto Atrides's Mentat or “human computer,” insists, ““A

place is only a place. [. . .] And Arrakis is just another place,” thereby instilling in Paul a valueless sense of ecological place and dwelling (28). Furthermore, Paul admits he has been studying the great desert storms of Arrakis, and Hawat again attempts to prevent Paul from developing a connection to the planet:

“Those storms build up across six or seven thousand kilometers of flatlands, feed on anything that can give them a push—coriolis force, other storms, anything that has an ounce of energy in it. They can blow up to seven hundred kilometers an hour, loaded with everything loose that’s in their way—sand, dust, everything. They can eat flesh off bones and etch the bones to slivers.” (28)

And like the Emperor, Hawat scorns Arrakis’s Fremen, stating, ““There’s little to tell them from the folk of the graben and sink. They all wear those great flowing robes. And they stink to heaven in any closed space. It’s from those suits they wear—call them ‘stillsuits’—that reclaim the body’s own water”” (29). Ultimately, Hawat distances Paul from any close connection to Arrakis as a place to dwell, and even from their ecologically literate stillsuit technology. He teaches Paul to fear the harsh planet, and he admits to himself the reason for doing so: *“Perhaps I’m doing it, getting across to him the importance of this planet as an enemy. It’s madness to go in there without that caution in our minds”* (29).

While Hawat miseducates Paul about Arrakis in order to instill in him the defensive posture required of a future ruler entering the hostile world of capitalist politics and economics, Bene Gesserit Reverend Mother Gaius Helen Mohiam makes Paul very aware of Arrakis’s natural ecology in order to make him a ““good ruler”” who, presumably, knows how to reside on the planet while exploiting its Fremen and its spice (30). The Reverend Mother tells Paul to ““learn his world’s language, [. . .] the language of the rocks and growing things, the language you don’t hear just with your ears”” (30).

As critic Susan Stratton notes, Paul does “solve the mysteries of Arrakis ecology and learn to fit into the corresponding culture of its indigenous people”; though he does so not to become an inhabitant of the planet but to “accomplish his goal, which is to reclaim the planet for the Atreides” after the rival House Harkonnen wrests power from Paul’s father (307). Paul’s educators, Hawat and the Reverend Mother, condition him to be a resident before he even steps on Arrakis. The former teaches him to dread the planet and to despise its inhabitants; and indeed, when Paul sees a Fremen for the first time he thinks, “*Who is this creature?*” (67). The Reverend Mother, on the other hand, tries to instill in Paul a false sense of dwelling with the underlying purpose to make him a better, more manipulative ruler.

That the Fremen are dwellers and the Emperor, House Atreides, the Bene Gesserit, and all others involved in the commercial exploitation of Arrakis are residents is an important distinction. Such an observation gives more credence to *Dune* as a valuable text about ecological literacy and environmental sustainability and not just as “an important first step for a generation of SF readers who needed to learn the fundamentals of ecology” (Stratton 313). R. J. Ellis argues that in *Dune* Herbert fails to “portray the climatological blight upon Dune as being the product of [. . .] profit-taking by the multi-national, or rather multi-planetary corporation, CHOAM, which is encouraged to preserve Dune as a barren desert, since it is there the spice is found” (119). Contrary to Ellis’s claim, and to Stratton’s observation that “*Dune* does nothing to show us a way out of the environmental crisis we face,” Herbert’s novel does take an active role in exploring causes of and examining solutions to environmentally unsustainable practices (314). In particular, if we look at *Dune* within the contexts of the inhabitant/resident dichotomy it

sets up—an observation that the book encourages and that would therefore not be an imposition upon the text—we find that the novel favors the sense of place and community maintained by the indigenous Fremen while it criticizes the resident attitudes of power held by those involved in Arrakis’s exploitation, attitudes that ultimately infiltrate even the Fremen ways.

“Afflicted by a Hero”: The Fremen Jihad as Social Trap

In *Dune*, Frank Herbert questions the sustainability of the powerful/powerless binary that gives the ecological and political aspects of his novel its narrative force. The Fremen are represented as powerless but admirable inhabitants of Arrakis, while House Atreides, the Imperium, and House Harkonnen are represented as powerful residents. Under the hegemonic nature of this binary, any attempt at Fremen revolution must, it seems, involve a reckless reversal of extremes: if the Fremen want power, they must adopt resident attitudes at the expense of their cultural connection to the land. Paul Atreides becomes the source of this power and these attitudes. He plays in to his mythical status as “Mahdi”—the messiah who will lead the Fremen to Paradise—to instigate faith in a short-term fix to Arrakis’s climatological problems and in a quick end to the Imperial domination of the planet. The swift measures Paul promises replace the long-term terraformation and slow revolution that Pardot Kynes, the first planetary ecologist of Dune, advocated. As stated in *Appendix I: The Ecology of Dune*, Pardot Kynes’s work “continued: building, planting, digging, training the children,” all going toward the 350-year effort to turn Arrakis into a blue planet (483). “The course had been set by this time,” the appendix says; “the Ecological-Fremen were aimed along their way. Liet-Kynes had only to watch and nudge and spy upon the Harkonnens . . . until the day his planet was afflicted by a Hero” (483).

Thus Paul, with his promise of an immediate end to Imperial rule and an immediate consummation of Kynes's terraforming effort, destabilizes the indigenous ways of Fremen culture. The original plan to change Arrakis, conceived by Pardot Kynes, promoted by his son Liet, and adopted by the Fremen, is not a quick solution to Arrakis's climatological blight. Describing the effort, Stilgar says, "We change [Arrakis] . . . slowly but with certainty . . . to make it fit for human life. Our generation will not see it, nor our children nor our children's children nor the grandchildren of their children . . . but it will come" (283). Important here is that this slow change constitutes hope for an eventual Fremen political change as well as an ecological change, for making Arrakis a water-rich planet will kill off the water-sensitive sandworms, which produce the spice, and end political and economic interest in the planet.

That Herbert is most concerned with a more ecologically literate conception of time best accounts for the narrative complexity of this political-ecological relationship: immediate political revolt is often more violent than productive, just as urgent and thoughtless means to exploit the natural environment often aggravate ecological stability in the long run. That Herbert's concern is with ecologically and politically unsound concepts of time also accounts for the anthropocentrism of the Fremen for wanting to change a planet and exterminate a species. For, as will also be addressed later with Kim Stanley Robinson's *Mars* trilogy, though science fiction authors often seem to encourage the dialectic of Enlightenment and planetary domination—even by the "dwelling" groups—their ecologically focused stories must frequently narrate human-initiated ecological change in order to present a subtext that comments on some critical element of ecological literacy. In Herbert's case, the Fremen terraformation of Arrakis offers a

compelling critique of modern views of power and immediate progress as opposed to more sustainable, traditional concepts of thinking in the long term, concepts often seen by modern cultures as primitive. The question in *Dune* is thus not about why the Fremen want to change Arrakis or even about their human-centered desire to do so. Rather, *Dune's* terraformation narrative raises questions about the time frames allowed for any adaptation, political or ecological, to occur.

The narrative that describes Paul's religious manipulation of the Fremen to serve his purpose to regain Atreides control of Arrakis acts to address what Herbert feels is a deep challenge to environmental sustainability: social traps—in this case, the trap of instant gratification. As David Orr quotes John G. Cross and Melvin J. Guyer, “Social traps draw their victims into certain patterns of behavior with promises of immediate rewards and then confront them with consequences that the victims would rather avoid”

(5). As promises of immediate gratification and the poor sense of time encouraged by such promises have accelerated the environmental crisis, so does Paul's promise of hastening the terraformation of Arrakis contribute to the Fremen crisis, the jihad.

Realizing the power he has as the Atreides' ducal heir, Paul plays in to the Fremen legend of the Mahdi or “Lisan al-Gaib.” To Kynes he states, “You have a legend of the Lisan al-Gaib here, the Voice from the Outer World, the one who will lead the Fremen to Paradise” (219). Though Kynes dismisses the legend as superstition, Paul imbeds himself into it and becomes the messianic hero who vows to quicken the Fremen's terraforming efforts and to free them from Imperial oppression.

The thoughts of Jessica, Paul's mother, make us aware that Paul is indeed playing in to Fremen legend and the Fremen desire to change Arrakis in order to lure them into

the Atreides jihad. Crediting the Missionaria Protectiva—“the arm of the Bene Gesserit order charged with sowing infectious superstitions on primitive worlds, thus opening those regions to exploitation by the Bene Gesserit”—for imbedding the legend of the Mahdi in Fremen culture, Jessica thinks, “*These Fremen are beautifully prepared to believe in us*” (507, 277). She continues, “*All of them [. . .] an entire culture trained to military order. What a priceless thing is here for an outcast Duke!*” (280). Further, Jessica thinks the Fremen “could be wielded like a sword to win back Paul’s place for him” (311). And finally, Jessica’s reasoning demonstrates that Paul’s manipulation of the Fremen is grounded in promises of immediate change to Arrakis’s climate: “*Gathering water, planting the dunes, changing their world slowly but surely—these are no longer enough [. . .]. The little raids, the certain raids—these are no longer enough now that Paul and I have trained them. They feel their power. They want to fight*” (388).

By drawing the Fremen into a pattern of behavior that contradicts the slow political and ecological change they are used to as an ecologically literate culture, Paul’s promise of instant gratification becomes a social trap. Paul’s drive to terraform Arrakis within one generation leads the Fremen away from their original goals. As Leonard M. Scigaj observes of *Dune Messiah*, the second book in the *Dune* series, the Fremen Farok’s “only *personal* motive for enlisting in the war [. . .] is to realize his fantasy of immersing himself in a real sea” (342). Perhaps the reason Farok believes he will see Arrakis as a paradise within his lifetime, as opposed to expecting the change to come in more than four generations, is Paul’s speech in *Dune*: “‘What’s our goal’ Paul asked. ‘To unseat Rabban, the Harkonnen beast, and remake our world into a place where we may raise our families in happiness amidst an abundance of water’” (414). That Paul

believes the living Fremen—“we” rather than “our future generations”—will raise their families in such a paradise shows his short-term, dangerous concept of change.

Ultimately, Herbert questions the modern paradigms that associate immediate progress with political power and slow evolution with primitivism and powerlessness. The jihad happens because resident ideas of power and immediacy have infected the powerless and deliberate Fremen. Under the hegemony of the powerful/powerless binary, jihad replaces the Fremen’s ecologically literate sense of time; and this results in a bloody war and the use of nuclear weapons. Pardot Kynes’s “ecological literacy” finally becomes *Dune*’s solution to the ravages of modern ways.

Ecological Literacy: A Paradigm for Change

So far, what makes *Dune* an appropriate text for the pedagogy of ecological literacy is its presentation of indigenous cultural and technological practices, its interrogation of resident ways of acting toward the environment, and its exploration of modern concepts of time and change as social traps. Because *Dune* is science fiction bordering on fantasy, its narrative relies on extravagant, mythical events and concepts. These events and ideas, though, operate as metaphors for the issues presented above: spitting becomes a component of the ecological literacy of a particular dwelling culture; stillsuits represent ecologically literate methods of conservation and waste renewal; spice mining becomes the capitalist and colonialist exploitation that threatens the natural environment and dwelling cultures; and immediacy in terms of the ways in which humans adapt to the natural world and achieve political ends becomes a social trap that encourages dwelling cultures to adopt the ecologically unsound methods of modern environmental and political exploitation.

It is important to summarize this discussion of *Dune* with one more of the novel's manifestations of a deep concern with environmental sustainability—that is, Pardot Kynes's concept of ecological literacy. In doing this, we again face the challenge of justifying Kynes's seemingly anthropocentric desire to reshape Arrakis to, as admitted in *Appendix I: The Ecology of Dune*, “fit it to man's needs”—a case of adapting the place to the people rather than the people to the place (477). In addition to accounting for this contradiction as showing Herbert's more specific concern with the ways in which adapting to the environment occurs (i.e., hastily versus deliberately), Kynes's ecological change of Arrakis points to another of Herbert's motives: the ecologist's construction of an entire ecosystem serves to demonstrate the complexities of natural systems, which need the interaction of many components to maintain healthy stability. Without this construction of an ecosystem, readers would not learn the intricacies of ecological systems. “Ephemerals [. . .], then scotch broom, low lupine, vine eucalyptus [. . .], dwarf tamarisk, shore pine” all work together in the new Dune ecosystem, as do “candelilla, saguaro, and bis-naga, the barrel cactus [. . .] camel sage, onion grass, gobi feather grass, wild alfalfa, burrow bush, sand verbena, evening primrose, incense bush, smoke tree, creosote bush” (482). The animals needed in the system include “burrowing creatures to open the soil and aerate it,” “predators to keep them in check,” “insects to fill the niches these couldn't reach,” and “the desert bat to keep watch on these” (482). Kynes's ecological project, then, recognizes interrelatedness and is therefore, in Orr's words, “a revolt from Cartesian logic, reductionism, and the fragmentation characteristic of modern science” (37). While the human-centered “specter of terra (terror)forming,” as Ernest J. Yanarella calls it, may still haunt *Dune*, Herbert's message is clear if we see Kynes's

terraforming less as a narrative manifestation of the Enlightenment will-to-dominate nature and more as an informative lesson on the interconnectedness inherent in healthy ecological systems (225).

Kynes teaches the Fremen that “the highest function of ecology is the understanding of consequences” (482). O’Reilly observes that Kynes’s statement is taken almost directly from ecologist Paul B. Sears (55). This definition of ecology is also supported by biologist Garrett Hardin, who sees ecological literacy or “ecolacy” as the ability to ask “*And then what?*” (25). And David Orr notes, “[ecological literacy] implies the ability to think broadly, to know something of what is hitched to what” (87). Kynes’s declaration that an ecosystem is a system that can be destroyed merely if one of its components is eliminated educates readers in the same way as do the assertions of the abovementioned environmental thinkers. Kynes’s ultimate motive—or rather Herbert’s ultimate motive for including the planetary ecologist in his novel—is to help develop in readers a sense of the complexity of natural systems and of the fragility of these systems when treated in ecologically illiterate manners. Thus a careful reading of *Dune* encourages us to reevaluate ecologically unsustainable practices and to achieve more advanced degrees of ecological literacy.

CHAPTER 3
THE DEEP ECOLOGY OF ENVIRONMENTAL UTOPIA: ECOSOPHY, *ECOTOPIA*,
AND *WOMAN ON THE EDGE OF TIME*

Among the most challenging but necessary steps for moving toward the ecologically literate, dwelling-oriented culture that Frank Herbert's *Dune* calls for is to deconstruct modern mechanistic and anthropocentric worldviews and to locate new ecocentric paradigms. As physicist Fritjof Capra notes in his 1987 essay "Deep Ecology: A New Paradigm," the destruction of the natural world involves a "crisis of perception [. . .] derive[d] from the fact that most of us and especially our large social institutions subscribe to the concepts and values of an outdated worldview, which is inadequate for dealing with the problems of our overpopulated, globally interconnected world" (19). The worldview Capra sees as outdated and inadequate is the modern, Western one, which includes the mechanistic and human-centered ideas of Galileo, Bacon, Newton, and Descartes as well as the assumption that all economic growth "is good and that more growth is always better" (23).

Capra, though, observes the emergence of a paradigm that effectively challenges the perceptions that Western and Western-influenced societies have developed as a result of anthropocentric and growth-centered modern thought: deep ecology, or ecosophy. Deep ecology is "a holistic worldview," "an ecological worldview," a worldview that "recognizes the intrinsic values of all living beings and views humans as just one particular strand in the web of life" (Capra 20). In such recognition, deep ecology encourages profound changes in our values, in how we view population, economic

growth, and biotic diversity; in how we live as communities; and in how we treat the Earth.

In this chapter, I demonstrate how two utopian science fiction novels of the 1970s—Ernest Callenbach’s *Ecotopia* (1975) and Marge Piercy’s *Woman on the Edge of Time* (1976)—dramatize the changes in perception advocated by Capra, but more specifically by Arne Naess and Gary Snyder, deep ecologists who published influential tracts immediately prior to Callenbach’s and Piercy’s novels. Although I do not aim to show that Callenbach and Piercy are deep ecologists, I do hope to elevate their science fictional ecotopias as important texts for learning about and exploring the possibilities of the fundamental changes deep ecologists encourage. Thus, I support Bill Devall and George Sessions’ vision of ecotopian possibility:

Creating ecotopian futures has practical value. It helps us articulate our goals and presents an ideal which may never be completely realized but which keeps us focused on the ideal. We can also compare our personal actions and collective public decisions on specific issues with this goal. [. . .] [E]cotopian visions help us see the distance between what ought to be and what is now reality in our technocratic-industrial society. (162)

Ecotopia chronicles the visit of *New York Times-Post* reporter William Weston to Ecotopia, the area once comprising Washington, Oregon, and Northern California. Ecotopia, “a perfect society, a new stage of humanity, in which the ideals of John Muir and the Sierra Club have been realized,” seceded from the United States twenty years prior to Weston’s visit, and Weston’s job is to write a series of articles documenting the practices of the nation’s inhabitants (Crow 9). These practices include the development of a “stable-state,” anti-growth economy, a national goal to reduce population, and ritual war games. Early in the text, William’s newspaper articles—which, along with his private diary, make up the novel—are openly critical of Ecotopian ways: their lack of

traffic and billboards is drab and isolating, their recycling is “an enormous expenditure of personal effort,” and their elimination of processed foods and putting certain foods on “Bad Practice lists” is “a loophole that might house a large and rather totalitarian rat” (10, 18, 20-21). Despite the reporter’s bias, later in the novel he admits in a journal entry that his attitude toward the eco-friendly nation is changing: “*the more closely I look at the fabric of Ecotopian life, the more I am forced to admit its strength and its beauty*” (103). And though William’s assignment is only supposed to last six weeks, he ultimately stays in Ecotopia. In a letter to his editor he writes, “*I’ve decided not to come back, Max. You’ll understand why from the notebook. But thank you for sending me on this assignment, when neither you nor I knew where it might lead. It led me home*” (181).

A similar reevaluation of ecotopian life occurs in Marge Piercy’s *Woman on the Edge of Time*, as the book’s main character, Connie Ramos, admits she wishes her young daughter could grow up in Mattapoissett, the novel’s ecotopia:

She will be strange, but she will be glad and strong and she will not be afraid. She will have enough. She will have pride. She will love her own brown skin and be loved for her strength and her good work. She will walk in strength like a man and never sell her body and she will nurse her babies like a woman and live in love like a garden, like that children’s house of many colors. People of the rainbow with its end fixed in earth, I give her to you! (133)

Connie has reasons to wish such a fate for her daughter, for Connie has grown up in a fast-paced New York City, has lived on the streets, has been beaten and mentally abused by men, has had the one man she ever loved taken away from her by the prison system and killed in a medical experiment, and during the course of the novel is forced into a medical experiment while living in a mental institution. Despite the aversion Connie should have toward existing social institutions, like William Weston she is reluctant to accept the promises of ecotopia, of Mattapoissett. Her friend from Mattapoissett in the year

2137, Luciente, informs her of the fundamental changes that have occurred in the alternative future; but Connie, living under the supremacy of modern technocratic thought, can only doubt the viability of these changes. She questions the city's lack of social hierarchy, of patriarchy, and of government. Connie's relationship with those revolutionaries living in the ecotopian future, though, assists her on a journey to free herself from the forces that have dominated her life for so long. In the end, while she does not get to live in the future ecotopia, "she thought of Mattapoissett" as she revolts against the hegemony (364).¹

As novels that contrast the perceptions and actions of modern, Western culture with those of ecotopian possibility, and that favor the latter, *Ecotopia* and *Woman on the Edge of Time* explore the changes that deep ecologists support. In summarizing the strategies for ecological sustainability promoted by Arne Naess, the Norwegian environmental philosopher who coined the expression "deep ecology" in the early 1970s, David E. Cooper writes, "Among the policies advocated by Naess are radical reduction of the world's population, abandonment of the goal of economic growth in the developed world, conservation of biotic diversity, living in small, simple, and self-reliant communities, and—less specifically—a commitment 'to touch the Earth lightly'" (213). Indeed, Callenbach's and Piercy's novels display similar commitments to these policies. An analysis of each issue—the population problem, economic growth, conservation of diversity, community living, and light living—will demonstrate how these two works of

¹ Billie Maciunas sees Connie's revolt—poisoning four doctors with pesticide she stole from her brother—as an act of violence, a poor course for implementing utopian changes (256). Importantly, though, Connie's use of violence attests to the dominance of the patriarchal worldview to which she has been indoctrinated all her life, and therefore to which she must succumb in order to undergo a personal revolution. Piercy's controversial ending thus demonstrates her awareness that changing from modern paradigms to utopian paradigms is a difficult task, as the hegemony will not respond to the diplomatic tools of utopia.

utopian science fiction challenge traditional paradigms, advance ecologically literate and thus sustainable worldviews and practices, and teach deep ecology.

The Population Problem

Both Arne Naess and Gary Snyder agree that taking steps to reduce world population is central to achieving ecological sustainability. In his seminal 1973 essay “The Shallow and the Deep, Long-Range Ecology Movements: A Summary,” Naess sketches his concept of biospherical egalitarianism, which is a fundamental principle of environmental movements wishing to go beyond mere “shallow” efforts to cut pollution and resource depletion, efforts aimed to preserve “natural resources” for affluent nations (151). Biospherical egalitarianism requires “a deep-seated respect, or even veneration, for ways and forms of life” (151-152). Like all modes of egalitarianism, it eschews modern hierarchies of being, instead observing “*the equal right to live and blossom*” for all forms of life (152). Furthermore, biospherical egalitarianism “implies the reinterpretation of the future-research variable, ‘level of crowding,’ so that *general mammalian crowding and loss of life-equality is taken seriously, not only human crowding*” (152). It is implicit in Naess’s argument that species equality necessitates the protection of appropriate life-space requirements for all organisms. And since life-space for any one species is reduced as another species—including humans—overcrowds and infiltrates, overpopulation violates egalitarian principles.

Because human overcrowding poses such a threat to the rights of other species, Gary Snyder, in “Four Changes,” suggests cutting the present world population—that of 1974—in half. His reasoning is similar to Naess’s:

Position: Man is but a part of the fabric of life—dependent on the whole fabric for his very existence. As the most highly developed tool-using animal, he must recognize that the unknown evolutionary destinies of other life forms are to be respected, and act as gentle stewards of the earth's community of being.

Situation: There are now too many human beings, and the problem is growing rapidly worse. It is potentially disastrous not only for the human race but for most other life forms. (141-142)

Human population has increased by two billion since Snyder's plea, making population reduction that much more important if we want to maintain the egalitarian ecological values that deep ecologists advocate.² The population problem can be addressed on the social and political levels, Snyder believes, by convincing governments that human overpopulation is a serious problem, by legalizing abortion and promoting sterilization, by questioning and correcting cultural ways of thinking that press women to have children, and by refusing to see a nation's growing population as a sign of a good economy (142). On the level of community, Snyder endorses alternative marriage structures, sharing "the pleasures of raising children widely, so that all need not directly reproduce to enter into this basic human experience," limiting family size, adopting children, and as Naess also encourages, developing "a reverence for other species" (142, 143).

Reflecting the spirit of this deep ecological thinking, *Ecotopia* approaches the human population problem in a similar manner to Naess and Snyder. As if guided by Snyder's political concerns, "After secession, Ecotopians adopted a formal national goal of a declining population" (67). One of the reasons Ecotopians want to reduce population is to minimize pressure on other species, a move Naess supports. And in a seemingly

² World population in 1974, the year of Snyder's writing, was approximately four billion. World population reached six billion in 2000 (Orr, 50; Brown, 212).

direct reference to several of Gary Snyder's other solutions, Ecotopians begin their efforts to reduce their population by legalizing and lowering the cost of abortion, by universalizing female contraceptives, by associating life quality with a decentralized society dispersed "into the countryside" rather than with population growth and economic expansion, and by disintegrating the nuclear family (67-69). On this final point, "Ecotopians still speak of 'families,' but they mean by that term a group of between five and 20 people, some of them actually related and some not, who live together" (69-70). Raising children is a shared duty in these "communal groups" (70).

The efforts to control population in *Woman on the Edge of Time* similarly reflect the spirit of deep ecology. Though Mattapoissett's use of "brooders," in which babies are grown in tanks, is more of a science fictional example of population control than Ecotopia's political and social methods, it nevertheless represents a mode of consciousness that values conscientious control over a society's population (95). Analyzing science fiction texts as narrating critical changes in our society often uncovers such strange examples of how to go about change; but since the nature of the genre is to fictionalize speculative thought, examples like Mattapoissett's brooders—or *Dune's* stillsuits—must be viewed as fictional representations of particular modes of consciousness. Thus the brooders become not real possibilities but manifestations of a particular brand of thinking, in this case, of deep ecological population paradigms. Besides the brooders as a means of population control, the residents of Mattapoissett also choose not to use their scientific expertise to find ways to prolong life. Addressing this issue, Luciente admits, "I think it comes down to the fact we're still reducing population" (269). Finally, similar to the communal groups of *Ecotopia*, and to the

community child raising Gary Snyder proposes, Mattapoisett's children are assigned three "mothers," or nurturers, who can be male or female.³

Ecotopia and *Woman on the Edge of Time* thus serve the pedagogy of deep ecology in that they present societies attempting to fulfill the movement's goal to reduce population. The methods of the former are less fictional than those of *Woman on the Edge of Time*, and in fact mirror Gary Snyder's viable proposals, while the latter novel exploits the generic conventions of science fiction as it speculates on fantastic solutions to the human population problem. Despite these differences, the novels both operate to generate awareness of ecologically literate paradigms of population control, awareness that deep ecology finds key to creating an ecologically sustainable world.

"Forward, into the past?": Deep Ecology and Stable-State Economy

As George Sessions, coauthor of *Deep Ecology: Living as if Nature Mattered* and editor of *Deep Ecology for the 21st Century: Readings on the Philosophy and Practice of the New Environmentalism* notes in his preface to the latter volume,

Government leaders and economic elites in Industrial Growth Societies continue to push for endless economic growth and development. [. . .] Third World countries are now entering global markets and trying to become First World countries by destroying their ecosystems and wild species as they emulate the industrial and consumer patterns of the ecologically destructive unsustainable First World. (xx)

The mania surrounding economic growth and consumerism has indeed distressed the world's ecosystems by encouraging a severe exceeding of natural thresholds. Earth Policy Institute president Lester R. Brown writes, "Over the last half-century, the sevenfold expansion of the global economy has pushed the demand on local ecosystems

³ As Barbara Drake summarizes, "What Piercy substitutes for the paired father and mother is a cooperative of three 'Mothers' for each child. They may be male or female. They volunteer to 'Mother.' [. . .] With the mothers, the child becomes part of a loose familial group, co-mothers and others" (114).

beyond the sustainable yield in country after country” (79). Brown’s specific concern is with the growth economy’s injurious effects on oceanic fisheries, forests, and rangelands. Since economic growth is so responsible for violating the tenets of biospherical egalitarianism, deep ecologists advocate fundamental changes in the ways in which “developing” and industrial societies view such growth. Rather than valuing economic expansion, deep ecologists—and the SF writers discussed here—look toward more ecologically sustainable economic paradigms.

Arne Naess outlines several “lifestyle” changes necessary for restructuring a growth mentality to an ecologically literate way of thinking about economy: “Anticonsumerism and minimization of personal property”; “Endeavor to maintain and increase sensitivity and appreciation of goods of which there is enough for all to enjoy”; “Absence or low degree of ‘novophilia’—the love of what is new merely because it is new. Cherishing old and well-worn things”; “the attempt to avoid a material standard of living too much different from and higher than the needy”; and “Appreciation of lifestyles which are universalizable, which are not blatantly impossible to sustain without injustice toward fellow humans or other species” (“Deep Ecology and Lifestyle” 260). All of these changes are central to deep ecology, for in encouraging less consumption, common standards of living, and egalitarianism between and among species, they advance life behaviors that reject practices of the modern growth economy and instead work toward maintaining the world’s ecosystems.

Like Naess, Gary Snyder hopes for changes in modern society’s deep-seated, unsustainable economic worldview. He, in fact, offers a very Thoreauvian maxim: “True affluence is not needing anything” (146). This adage is a direct challenge to the

growth economy; and along with his assertion that “a continually ‘growing economy’ is no longer healthy, but a Cancer,” Snyder offers a potent critique of the myth of progress (146). Rather than blindly valuing economic progress and accepting it without considering its deleterious effect on ecosystems, Snyder supports an economy that operates as a part of ecology, that handles production, distribution, and consumption “with the same elegance and sparseness one sees in nature” (146). Under Snyder, personal possessions surrender to communal sharing, and the modern fascination with new age technologies surrenders to a high esteem for the ways of old: “handicrafts, gardening, home skills, mid-wifery, herbs—all the things that can make us independent, beautiful and whole” (146). Both *Ecotopia* and *Woman on the Edge of Time* share similar, deep ecological concerns.

In his first newspaper article on the subject of *Ecotopia*, William Weston displays his growth-centered culture’s fear of the utopian nation’s anti-growth economy: “*Ecotopia* still poses a nagging challenge to the underlying national philosophy of America: ever-continuing progress, the fruit of industrialization for all, a rising Gross National Product” (4). Weston sees *Ecotopia*’s “stable-state” system as a “nagging challenge” because “it means giving up any notions of progress. You just want to get to that stable point and stay there, like a lump” (33). The language of these passages suggests a deep-seated cultural faith in the myth of progress, while it censures economic systems that see progress, industrialization, and a rising GNP as unnecessary and unhealthy.

What Weston fails to understand about *Ecotopia*’s economic model is its underlying motive to preserve the integrity of ecological systems and to fulfill the ethics

of ecological equality—in short, to respect the values of deep ecology. He does communicate the Ecotopian point-of-view later, stating “humans were meant to take their modest place in a seamless, stable-state web of living organisms, disturbing that web as little as possible” and “People were to be happy not to the extent they dominated their fellow creatures on the earth, but to the extent they lived in balance with them” (47-48). But Weston’s ensuing rhetoric reflects the attitudes of the growth-centered hegemony. He analyzes Ecotopia’s stable-state economy using the doctrines of the capitalist system—a move that neglects the possibility of a new language and philosophy for the stable-state—inevitably condemning the new system as hopeless. For if Weston’s readers believe, along with the Ecotopian economists who are “highly regarded in the American nation,” that Ecotopia cannot maintain a decent “standard of living” with its twenty-hour work week, that Ecotopia’s system cannot attract “capital,” and that the nation will suffer “financial collapse,” then they will see Ecotopia’s economic paradigm shift as a failure even if it succeeds (48). Indeed, viewed within the context of capitalism, the stable-state system will always fail. *Ecotopia* shares the concerns of deep ecology, then, as it presents the fundamental challenges of moving from an ecologically unsustainable but hegemonic and seemingly natural economic structure to one that devalues economic expansion and works toward Snyder’s true affluence. If individuals, societies, and governments continue to see material growth as rational economic behavior, then they cannot explore the possibilities of more ecologically sustainable economic practices.

Such an ecologically sustainable system also exists in Marge Piercy’s book, and again, the system is one that someone indoctrinated into the capitalist myth of progress

would find distasteful and difficult to understand. Connie's expectations when first traveling to Mattapoissett demonstrate her faith in a booming capitalist future: "Rocket ships, skyscrapers into the stratosphere, an underground mole world miles deep, glass domes over everything" (62). But, opening her eyes, she sees the village of a bucolic past, prompting her to ask Luciente, "You sure we went in the right direction? Into the future?" (62). Luciente assents, and Connie replies, "Forward, into the past? Okay, it's better to live in a green meadow than on 111th Street. But all this striving and struggling to end up in the same old bind" (64). This sentiment repeats William Weston's concern that Ecotopia's stable-state is weak because it lacks "progress." Both protagonists reflect the capitalist tendency to view pastoral ways of life as primitive, as barely supporting even the impoverished. Like *Ecotopia, Woman on the Edge of Time's* contribution to the conversations of deep ecology exists in its presentation of how ruling economic dogma prevents its followers from envisioning the potentials of ecologically sustainable economic systems. But if Callenbach and Piercy have positive messages, they are both communicated by the facts that William Weston and Connie Ramos ultimately accept these ecotopias as more viable and healthier places to exist.

Teaching "The relational, total-field image"

Besides encouraging a reduction of world population and a steady-state economy, deep ecology—and Callenbach and Piercy—supports "*the relational, total-field image*," perceiving "Organisms as knots in the biospherical net or field of intrinsic relations" (Naess, "The Shallow and the Deep" 151). Such thinking requires a fundamental change in the way in which post-Enlightenment, Western societies view the world. Rather than separating humans from the surrounding world—as higher up in an ontological hierarchy or as actors upon a wealth of "natural resources"—deep ecologists promote an

epistemology that sees no disconnections between and among species, and even between species and landscapes. In other words, and to borrow from Arne Naess, to divide A and B changes the constitutions of both, thus A cannot be said to exist on its own, without B. Ultimately, the total-field image parallels the inhabitant/resident dichotomy discussed earlier in relation to Frank Herbert's *Dune* and its ecologically literate Fremen: to inhabit is to consider the total field of intrinsic relations, to see the self and society as parts of the natural environment; to reside is to sever this basic relationship, to surrender the self and society to the ecologically illiterate paradigms of the modern world.

When Gary Snyder observes "Man is but a part of the fabric of life—dependent on the whole fabric for his very existence," he displays his awareness of the total-field image (141). In fact, in "Four Changes" he insists in different terms that the total-field image is necessary for solving the population boom, limiting pollution and consumption, and restraining the rapid and unsustainable growth of civilization. Indeed, to see the intrinsic connections between the components of natural systems is also to understand the harsh effects modern human civilization has imposed on the environment, because alterations of ecosystems forced by destructive technologies, impulsive residential development, rapid extraction of resources, and so forth, jeopardize the healthy, total-field of those systems. Any pedagogy of ecological literacy must, then, approach total-field epistemology at all levels.

Certainly, Callenbach's utopian society comprehends the importance of the relational, total-field image. About the outdoor life of Ecotopian school children, William Weston writes,

The experiences of the children are closely tied in with studies of plants, animals and landscape. I have been impressed with the knowledge that even young children have of such matters—a six-year-old can tell you all about the ‘ecological niches’ of the creatures and plants he encounters in his daily life. He will also know what roots and berries are edible, how to use soap plant, how to carve a pot holder from a branch. (38-39)

Further, an Ecotopian ten-year-old knows “how hundreds of species of plants and animals live, both around their schools and in the areas they explore on backpacking expeditions” (130). Such knowledge, even in young children, would be taken for granted in an ecologically sustainable society. Instead, American education takes for granted conservative pedagogical models, which according to C.A. Bowers emphasize “the recovery (and rediscovery) of the intellectual achievements of the past”; “moral and spiritual growth; the ability to participate as an enfranchised citizen who bears both freedoms and responsibilities; and the intellectual foundations and skills necessary for earning a living” rather than the knowledge necessary to live with the environment (37-38). Just as ignorant of ecology is the liberal model of education, which focuses on “the progressive nature of social development,” individualism, and rational, linear thinking (Bowers 74-76). Perhaps William Weston writes “‘ecological niches’” within quotation marks because of his readers’ unfamiliarity with the term. To be sure, their Western education has not accounted for ecology in the same way the Ecotopians’ has. In fact, Ecotopian adults can be heard saying, “*Knowing yourself as an animal creature on the earth, as we do. It can feel more comfortable than [Weston’s] kind of life*” and “*We don’t think in terms of ‘things,’ there’s no such thing as a thing—there are only systems*” (87-88). *Ecotopia* thus encourages pedagogical models that emphasize ecological literacy and total-field thinking.

Like *Ecotopia*, *Woman on the Edge of Time* demonstrates an awareness of the relational, total-field image through describing the children's education. Indeed, that Mattapoisett's community gardens follow the principles of a sort of total-field gardening—"tomato plants growing with rose bushes and onions, pansies and bean plants"—attests to the ecological literacy of the town's residents (122). But, more specifically, that the rite-of-passage for Mattapoisett's children to become full members of the community involves their spending one week in the woods by themselves shows that the ecotopian town views nature as community rather than as commodity. And this latter distinction has roots in the total-field image. For if a society regards nature as an intrinsic part of its being—enough, in fact, to make the woods central to its adulthood rituals—then it has developed a clear, symbiotic relationship with the land. On the contrary, if a society sees the land as a provider of valuable and infinite resources, then it adheres to modern and unsustainable images of nature as commodity. Ultimately, by making experience in nature a significant part of childhood education, *Ecotopia* and *Mattapoisett* participate in the deep ecological desire to establish ecologically literate ways of knowing and being.

Sustainability through Community and Autonomy

By now, the fundamental connections between all of the changes mentioned so far should be apparent. Population cannot stabilize or drop without radical reevaluations of the growth economy, and modern views of the growth economy cannot be adequately challenged without also positioning curriculums around experiences that relate the total-field image of ecology. Continuing, the total-field image cannot emerge in a current society that has eroded the sense of community and bioregional autonomy so inherent in dwelling cultures. As *Ecotopia* and *Woman on the Edge of Time* have so far provided

narrative models for addressing the paradigm shifts hoped for by deep ecologists, so can these texts generate further awareness of more sustainable models of community and ecological autonomy.

Arne Naess sees as an ecological guideline the need to cultivate life in community. Community ties, for the deep ecologist, go beyond mere social interaction, though. A community, or a total ecological field, is a life system—even a form of life. And because “The vulnerability of a form of life is roughly proportional to the weight of influences from afar, from outside the local region in which that form has obtained an ecological equilibrium,” our current social and economic tendencies to import and export commodities and ways of life disrupts the autonomous character of natural systems—the system of the self included (Naess, “The Shallow and the Deep” 153). The results are displaced individuals living in ecosystems destabilized as a result of external influences. To solve this problem, Naess advocates decentralization, “efforts to strengthen local self-government and material and mental self-sufficiency” (154).

Gary Snyder supports a similar move toward social and ecological autonomy: “Division by natural and cultural boundaries rather than arbitrary political boundaries” and “land-use being sensitive to the properties of each region” (147). Such bioregional thought pervades contemporary discussions of ecological literacy and environmental pedagogy. David Orr believes we must “Use locally available resources,” “Rebuild local and regional economies,” and “Rebuild strong, participatory communities” in order to achieve ecological sustainability (161). And on the subject of pedagogy, C.A. Bowers advocates a bioregional curriculum, one which studies “the plants, animals, soils, sources of water, economic and technological practices, and the community of memory that

encodes the collective wisdom about both past mistakes and sustainable practices” (175). Collectively, what these environmental thinkers promote is a bioregional worldview that is rooted in the strength of local community dynamics and the lessons of community history, as well as in adopting life practices specific to local regions.

As Naess, Snyder, Orr, and Bowers theorize the strengths of community and bioregional autonomy, so do Callenbach and Piercy speculate on these strengths in their science-fiction narratives. Callenbach does so in three ways. First, all Ecotopian food, energy, and building materials are locally harvested; and the nature of this practice is such that local systems remain healthy and foreign systems remain untouched—at least by the Ecotopians. Second, in terms of self, community, and bioregionality, William Weston becomes aware of his disconnectedness from the community and from place. He writes, “*I’m beginning to see that to an Ecotopian, who always has a strong collective base to return to, a place and the people of that place, my existence must seem pathetically insecure*” (138). When Weston states “*I have never cried about it. But maybe I should,*” Callenbach issues a compelling request for readers to reevaluate their own disconnectedness and to envision life in community, with a strong sense of place (138). Finally, *Ecotopia* participates in Naess’s and Snyder’s political calls to decentralize the operations of local regions. Explaining the nation’s move, Weston writes, “the Ecotopians largely dismantled their national tax and spending system, and local communities regained control over all basic life systems” (67). The change benefits Ecotopian life in many ways: communities arrange their lives more deliberately, population density drops, medical services improve, and previously threatened ecosystems flourish.

Mattapoisett is also communally and regionally oriented, demonstrating the ecological value of strong community and bioregional networks. Like Ecotopia, the village is “ownfed,” “Self-sufficient as possible in proteins” (64). Further, sense of place matters to the inhabitants of Mattapoisett. As Jackrabbit, one of the town’s dwellers, says, “A sense of land, of village and base and family. We’re strongly rooted” (116). On this point, one might think Mattapoisett is Ecotopia, that had Marge Piercy given Connie Ramos a journal in which to write her reflections, she would have written something similar to William Weston’s lament about feeling displaced. Indeed, Connie does wish her daughter could grow up in Mattapoisett. And as members of a bioregion with limited resources, Mattapoisett’s inhabitants “see [themselves] as partners with water, air, birds, fish, trees,” a worldview advocated in Aldo Leopold’s land ethic, to be discussed in the next chapter (118).

Dwelling Lightly

Finally, one might say the ultimate goal for deep ecologists—the reason for reducing population, slowing economic growth, adopting a total-field image, and thinking in terms of bioregion—is, to borrow from Mathis Wackernagel and William Rees, to limit humans’ “ecological footprint.” In *Our Ecological Footprint: Reducing Human Impact on the Earth*, Wackernagel and Rees admit, “there is wide agreement that the Earth’s ecosystems cannot sustain current levels of economic and material consumption” (1). Indeed, Naess and Snyder share this point. They, along with other deep ecologists, hope to “cultivate an ecological consciousness” that will reverse the growth and consumer tendencies of Western culture and thus lessen human influence on the environment (Devall and Sessions ix).

Again, *Ecotopia* and *Woman on the Edge of Time* share deep ecological sentiments on dwelling lightly. Certainly, these novels contribute to the deep ecological desire to reduce human impact on the Earth. But, certain moments in each text attest to a specific hope: to create a society whose cultural practices have a minimal impact on the stability of ecosystems. Both *Ecotopia* and *Mattapoisett* are recycling societies, with the latter composting and reusing everything—the attitude being that nothing can be thrown away on a round world. Dwelling lightly in these ecotopias, though, goes beyond recycling and into profound moral and philosophical principles. What matters most to *Ecotopians*, according to William Weston, “*is the aspiration to live in balance with nature, ‘walk lightly on the land,’ treat the earth as a mother*” (32). With this moral principle as the core paradigm of social practice—indeed, in direct challenge to the core paradigm of Western society, which is to live in opposition to nature—*Ecotopians* approach living with ecological sustainability and balance as their main objective.

As *Ecotopia* roots itself in practices that inherently challenge Western modes of existence, of consumption and wastefulness, so does *Mattapoisett*. Critiquing the Cartesian model of being, Bolivar, a key spokesperson for social opinion in *Mattapoisett*, states,

“I guess I see the original division of labor, that first dichotomy, as enabling later divvies into haves and have-nots, powerful and powerless, enjoyers and workers, rapists and victims. The patriarchal mind/body split turned the body to machine and the rest of the universe into booty on which the will could run rampant, using, discarding, destroying.” (203)

Here, Bolivar sums up the critical, deconstructive stance of the *ecotopian* community.

Western models of being, which include the mind/body and man/nature split, have disconnected us from the ecology within which we exist. The separation justifies environmental exploitation; and instead of dwelling lightly, we reside unsustainably. As

a community that thinks critically about such fundamental ideas, Mattapoisett initiates a thoroughgoing revision of Western dichotomies, electing to live in opposition to modern, technocratic ways and thus in favor of “primitive” and more sustainable modes of existence.

For all these reasons, *Ecotopia* and *Woman on the Edge of Time* serve the pedagogy of ecological literacy. Individually, each text narrates the revisionary ideas of deep ecology; and together, they demonstrate the value of ecotopian science fiction for communicating and exploring the changes advocated by deep ecologists. Scholars of *Ecotopia* have warned critics to be careful when considering the revisionary potential of utopian narratives, but in the context of environmental education, it is vital to understand these texts in terms of their contribution to ecological literacy and to the bibliography of texts that make up the canon of environmental pedagogy.⁴ This is not to ignore their weaknesses in narrative, in argument, or in the feasibility of their propositions. Rather, to focus on these ecotopian texts and the ecological ideas they support is to generate important questions about how we currently treat the Earth and crucial ideas about how we should treat it.

⁴ See Naomi Jacobs, “Failures of the Imagination in *Ecotopia*,” *Extrapolation* 38.4 (1997): 318-326; and Heinz Tschachler, “Despotic Reason in Arcadia? Ernest Callenbach’s Ecological Utopias,” *Science Fiction Studies* 11.3 (1984): 304-317.

CHAPTER 4
KIM STANLEY ROBINSON'S *MARS* TRILOGY AND THE LEOPOLDIAN LAND
ETHIC

[. . .] and as it yo-yoed back and forth it loomed before them in all its immense potential: tabula rasa, blank slate. A blank red slate. Anything was possible, anything could happen—in that sense they were, in just these last few days, perfectly free. Free of the past, free of the future, weightless in their own warm air, floating like spirits about to invest a material world. (*Red Mars* 85)

Set on barren Mars, Kim Stanley Robinson's *Mars* trilogy speculates what paradigms the planet's fictional settlers will inscribe on the "blank red slate." Anything is possible for the group of one hundred chosen to establish the first Martian colony. Their sense of freedom from past political constraints and from future Terran political regulation sets up the utopian potential of the new settlement. And Robinson uses all 1900-plus pages of his trilogy to illustrate the challenges of moving beyond a history spawned on Earth and toward a future, Martian history generated by utopian social, political, scientific, and ecological ideas.

The settlers' hopes are indeed utopian in the sense that utopia is, by definition, always impossible and always existing nowhere. Before the group even lands on Mars, "rival cliques" develop and arguments become "frequent, and vehement" (*Red Mars* 73, 75). As Maya Katarina Toitovna, the settlement's leader of the Russian contingent, reflects, "Interest groups, micropolitics—they really were fragmenting. One hundred people only, and yet they were too large a community to cohere!" (76). These arguments include Phyllis Boyle's defense of Christianity against John Boone's rational, scientific logic; Arkady Bogdanov's insistence that the architecture of the settlement be redesigned

to suggest equality rather than hierarchy; and, more generally, the group's disagreements over their job assignments once the Mars colony is established. In short, and to borrow one of the many technological metaphors in *Red Mars*, "the international nature of the equipment meant that there were inevitable mismatches of size and function" (108).¹

Though we may read the first few chapters of *Red Mars* as fiction about the unlikelihood of materializing utopian visions of new histories, new presents, and new futures, Robinson is not sending the message that utopia is hopeless. Rather, as William Dynes notes, "the Mars series evokes a utopian call for community: of wholeness within the self, within interpersonal relationships, within political and economic entities, within the species itself" (151). In fact, in an interview with Bud Foote, Robinson states, "Utopia has to be rescued as a word, to mean 'working towards a more egalitarian society, a global society.' Which means at every point defending it, going to the mat for the term and for the concept of Utopia" (56). In defending utopia, Robinson's trilogy focuses on the reasons our current paradigms make this brand of utopia difficult to achieve and on the things we can do to move toward it more effectively. In other words, Robinson uses his *Mars* trilogy not to advance a cynical view of humanity and of humanity's inability to improve the conditions of life, but to show us the difficulties inherent in any attempt to do so and to model ways of moving closer to an equal society.

Robinson's concerns include interpersonal relationships, intercultural relationships, political ideologies, economic systems, and environmental issues. Each of these concerns, as well as many others in the trilogy, merit scholarly attention. But my focus in this chapter is on Robinson's interest in ecology, and more specifically on the land ethic advance by the three books. I suggest that *Red Mars* (1993), *Green Mars*

¹ For more on the technological metaphors in *Red Mars*, see Bud Foote, "Notes" 62.

(1994), and *Blue Mars* (1996) work together to envision a contemporary rendering of Aldo Leopold's "Land Ethic," as defined in his 1949 book *A Sand County Almanac*. Kim Stanley Robinson gives us a range of perspectives regarding the human relationship to the land, from treating the land as an economic resource to leaving the land in its primal state. By the end of *Blue Mars*, the final book in the trilogy, we realize that it is our responsibility to synthesize the ecological and not-so-ecological viewpoints that Robinson provides in order to construct a model for maintaining ecological sustainability and an egalitarian relationship between all of nature's components—in short, to model the land ethic of ecological utopia. In the broader context of this thesis, then, the *Mars* trilogy contributes to the pedagogy of ecological literacy by defining and exploring the land ethic, a crucial concept in the vocabulary of ecological literacy.

Aldo Leopold's Land Ethic

Leopold begins his discussion of the land ethic by defining *ethic*. Any ethic "has its origin in the tendency of interdependent individuals or groups to evolve modes of cooperation" (238). He refers to The Golden Rule and democracy as ethical systems that, in the former case, "integrate the individual to society," and in the latter case, "integrate social organization to the individual" (238). Noticing such tendencies between individuals and between groups to evolve these modes of cooperation, Leopold then questions the absence of the land in modern society's ethical paradigms. He complains that while traditional ethics emphasize the obligations humans hold for each other, no ethic as yet—in 1949—encourages principled cooperation with the land. By definition, then, "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land" (239).

To arrive at such an ethic involves fundamental changes in the way in which we view the land, for “No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions” (246). Among these changes, land can no longer be seen only for its economic value. “Land, like Odysseus’ slave-girls, is still property. The land-relation is still strictly economic, entailing privileges but not obligations” (238). This still holds true over fifty years after Leopold wrote it. For Leopold, even justifying conservation on economic grounds is a bad idea, for “most members of the land community have no economic value” (246). So, while it may be productive for saving economically useful species or landscapes, justifying conservation on economic grounds still fails to change the utilitarian view of the natural environment into the scientific and philosophical views that Leopold feels are necessary to maintain ecological sustainability. An economic view of the environment also does not consider the complexity of natural systems. Any attempt to govern ecology based on its “use” value tends to overlook those “unusable” components that are essential to the health of the whole system.

This leads to another fundamental change that Leopold advocates in his land ethic; that is, to approach ecology with the aim of understanding the complexity of the environment and what makes the environment healthy. Leopold’s central image for discussing a healthy environment is the pyramid, “a tangle of chains so complex as to seem disorderly, yet the stability of the system proves it to be a highly organized structure. Its functioning depends on the co-operation and competition of its diverse parts” (252-253). Developing an understanding of this complexity—developing an ecological consciousness—involves acknowledging that many human alterations of

ecological systems result in violent releases of the land's energy that destabilize the environment and make it sick. And not only do the changes humans make to the land often cause environmental problems, they also “[steer] the course of history,” as Leopold demonstrates by referring to the settlement of the Mississippi valley.² For Leopold scholar James I. McClintock, “History, whether in terms of losses or gains, is understood as humans acting within, not outside or above nature” (30). To cultivate an ecological consciousness, then, is to cultivate both a scientific understanding of the complexity of land and to revision our histories, past and future, in terms of ecology.

Leopold's land ethic thus involves reworking paradigms of economics, education, and history. Leopold wants to revision the land as valuable not as commodity but as community. He wants to educate individuals about the complexity of the land and about how human alterations of this complexity often infect the environment with instability. Finally, he wants to examine the historical importance of the natural environment. At the root of Leopold's land ethic—at the root of all these desired changes—is “*The Outlook*,” the questioning of traditional paradigms that must lead to entirely new philosophies. We must interrogate “the same basic paradoxes: man the conqueror *versus* man the biotic citizen; science the sharpener of his sword *versus* science the searchlight on his universe; land the slave and servant *versus* land the collective organism” (260-261). Indeed, to

² “Consider,” Leopold states, “the settlement of the Mississippi valley. In the years following the Revolution, three groups were contending for its control: the native Indian, the French and English traders, and the American settlers. Historians wonder what would have happened if the English at Detroit had thrown a little more weight into the Indian side of those tipsy scales which decided the outcome of the colonial migration into the cane-lands of Kentucky. It is time now to ponder the fact that the cane-lands, when subjected to the particular mixture of forces represented by the cow, plow, fire, and axe of the pioneer, became bluegrass. What if the plant succession inherent in this dark and bloody ground had, under the impact of those forces, given us some worthless sedge, shrub, or weed? Would Boone and Kenton have held out? Would there have been any overflow into Ohio, Indiana, Illinois, and Missouri? Any Louisiana Purchase? Any transcontinental union of new states? Any Civil War?” (241).

bring forth the land ethic—to become “biotic citizens” of “land the collective organism” to the fullest extent possible in our times—we must first value the land “in the philosophical sense,” with “love, respect, and admiration” (261).

As McClintock notes in his book *Nature's Kindred Spirits*, “Rhetorically, Leopold manages to clothe his argument in language that blurs distinctions between scientific, social, and spiritual realms, thus appealing to his audience’s longed-for reconciliation between science, social conduct, and spiritual belief” (35). At the heart of McClintock’s advocacy of Leopold’s land ethic, then, is his realization that an ecological consciousness bridges the gap between the is/ought problem, which places scientific “facts” in opposition with social and religious values. McClintock asserts, “One need not turn to mysticism and against science to defend a land ethic” (44). By the same token, one need not turn to science and against mysticism to establish a better model of environmental ethics. Rather, the land ethic involves a both/and view of the is/ought problem. The land ethic is itself an ecological system involving scientific, economic, social, and philosophical discourse, which only in dialog can bring about Leopold’s desired paradigm shift.

The *Mars* Trilogy and the Economically Based Land Relation

Turning now to Kim Stanley Robinson’s *Mars* trilogy, I suggest that the books involve a dialogue between different views of the land, a dialogue that Robinson asks us to listen to and to synthesize into what is ultimately a Leopoldian land ethic. Just as *Dune* narrates several tenets of ecological literacy, and *Ecotopia* and *Woman on the Edge of Time* speculate changes advocated by deep ecologists, the *Mars* trilogy is a series that dramatizes the changes Leopold promotes. Whether it is critiquing the economic view of the land held by transnational and metanational corporations, demonstrating the

complexity of ecological systems, emphasizing the mystical side of the land ethic, or contrasting and synthesizing opposing views of science, Robinson's books promote an ecological consciousness and a view of the land as part of the community.

In an interview, Robinson says, "science fiction is an enjambment of facts and values in a way that our culture desperately needs right now. The fact-value problem is specifically relevant to today's world, because we have a culture that is making developments and cultural changes without much regard for the underlying values that are going to be thereby expressed" (53). Science fiction, for Robinson, is a literary genre that allows readers to see the connections between science-based facts and the cultural values expressed in fiction. This being the case, SF like the *Mars* trilogy is most appropriate for taking on environmental issues, issues that involve conflicts of both facts and values. What Robinson attempts in his three books, though, is not to make a case either for a fact-based land ethic or for a value-based land-ethic, but to show how both fact and value need to be parts of our ecological consciousness.

The subject through which Robinson explores the land ethic is the terraforming of Mars, the alteration of the Martian surface to allow for life. By making terraformation the focus of his fiction, Robinson directly confronts issues that apply to the Earth's environment; for the alteration of environments is necessary for human civilization. In terraforming Mars, as in "terraforming" Earth, though, there exist a range of perspectives about the degree to which we should alter the land for human habitation. For Robinson, this range includes contrasting economic and scientific models, mystical perceptions of the environment, and dueling conceptions of the land-human relationship, all of which he explores in the *Mars* books.

Like Aldo Leopold, Robinson spends much time implicating traditional economic paradigms for disallowing a viable land ethic or land-human symbiosis. Though we learn early in *Red Mars* that the Mars settlement team of one hundred scientists has hopes of beginning a small scientific research station, later, in the chapter entitled “The Crucible,” we are introduced to the motives of those higher powers responsible for sending these scientists: to terraform Mars rapidly. As UNOMA—the U.N. Office for Martian Affairs—approves the terraformation of Mars, Earth’s own environmental protection policies break down as a previously protected Antarctica starts being mined and drilled for its oil. The parallel between the terraforming of Mars and the treatment of Antarctica is indeed deliberate on Robinson’s part; for as an ecologically conscious science-fiction writer he wants to suggest that as “the last clean place on Earth is gone” so the next clean place, Mars, is becoming the victim of the same economic motives (251). To relate terraforming Mars to the destruction of Antarctica is thus to foreshadow the ultimate motive that UNOMA has for altering the planet—to mine its resources—and to suggest the destructiveness of an economically based land relation.

By the end of “The Crucible” and through the early parts of the next chapter, “Falling into History,” then, we learn that the scientific motives of the first settlers have succumbed to the capitalistic intentions of the bureaucracy. Though many of the first one hundred are pleased with UNOMA’s decision to support terraformation, it is the subsequent intrusion of transnational corporate interests that instigates many of these settlers to revolt later in *Red Mars*. The first sign of this intrusion is when the German millionaire and UNOMA bureaucrat Helmut Bronski violates the Mars treaty by allowing Armscor, a transnational organization, to begin prospecting on Mars. As John Boone, the

settlement's symbolic father, observes the mining operations at Bradbury Point, which are taking place for economic reasons, his thoughts suggest an environmentalist's distress over a relationship to the land based solely on economic motives:

John shook his head. That afternoon they drove for an hour back to the habitat, past raw pits and slag heaps, toward the distant plume of the refineries on the other sides of the habitat mesa. He was used to seeing the land torn up for building purposes, but this . . . It was amazing what a few hundred people could do. [. . .] wreaking such havoc just to strip away metals, destined for Earth's insatiable demand (277)

Though by this point in the book Mars has only recently been settled, the developing industrial landscape already reflects the contaminated atmosphere of a world being torn apart by greedy capitalists.

Robinson's reflections on the capitalist economy and its effects on the environment do not end with John's observation of the Armscor mining project—the “gold rush,” as John later calls it (284). One of the most awful (in both senses of the word) technologies created in *Red Mars* is the space elevator, a thirty-seven-thousand kilometer long elevator that allows the various ores being mined from Mars to be shipped to Earth efficiently. As Phyllis Boyle, the primary visionary of the space elevator, explains,

“It will also be possible to use the cable's rotation as a slingshot; objects released from the ballast asteroid toward Earth will be using the power of Mars's rotation as their push, and will have an energy-free high-speed takeoff. It's a clean, efficient, extraordinarily cheap method, both for lifting bulk into space and for accelerating it towards Earth. And given the recent discoveries of strategic metals, which are becoming ever more scarce on Earth, a cheap lift and push like this is literally invaluable. It creates the possibility of an exchange that wasn't economically viable before; it will be a critical component of the Martian economy, the keystone of it industry.” (306-307)³

³ In this passage, and elsewhere throughout *Red Mars* and *Green Mars*, there is also an implicit critique of Christianity; for Phyllis Boyle believes “God gave us this planet to make in our image, to create a new

Important in Phyllis's defense of the proposed elevator is her argument for an economically based land relation, one that Robinson, like Aldo Leopold and like Frank Herbert in *Dune*, argues against. Though Phyllis promotes the elevator's cleanliness and its low energy use, her assurance is odd after reading John's observation thirty pages earlier of the "raw pits," "slag heaps," and "distant plume[s]" that litter the Martian landscape and that are the results of the mining that Phyllis sees as key to the developing Martian economy. Furthermore, Phyllis's promotion of the space elevator is even more awkward if we consider her awareness that Earth's own supply of metals is dwindling. Indeed, the economic view of the land lacks a land ethic. The philosophy of "Minimize expenses, maximize profits" excludes both the expenses the land suffers and the non-economic profits of maintaining a healthy ecosystem (442).

Eco-Economics: Toward a Land Ethic

Before expanding on how Robinson questions the economically based land relation in the *Mars* trilogy, it is crucial to outline the counter-model of economics that Robinson presents: eco-economics. Thought up by the biological team of Vladimir Taneev and Marina Tokareva, eco-economics places value on individuals according to their biological contributions to the ecosystem: "Everyone should make their living, so to speak, based on a calculation of their real contribution to the human ecology" (298). Though Vlad and Marina's eco-economics does not and cannot specifically consider the land of Mars as part of the ecological community—for, the Martian surface is not yet habitable in *Red Mars* and the human community lives underneath large tents—it is the ethic inherent in eco-economics that makes it applicable to developing an ecologically

Eden," while at the same time she becomes the foremost advocate of the space elevator and of the capitalist intentions behind it (*Red Mars* 171).

literate worldview. Eco-economics posits, as Robert Markley notes, that “Restricting consumption becomes a far more effective means to increase one’s value to the system than accelerating production because production invariably strains scarce resources” (776). So, in imagining such a system, Vlad and Ursula envision a human-land symbioses based on the ethical imperative to include land in the community.

Robinson thus establishes a tension between the capitalist view of land as an economic resource and an ethical view of land as a part of the community. As one component in the dialogue that ultimately leads to the land ethic of the *Mars* books, this tension continues through the three books and is resolved in *Blue Mars*. In a distinctly Leopoldian manner, Robinson shows how the rapid alterations of the Martian surface—particularly the heating of the atmosphere and the subsequent melting of the ice in Mars’s thick permafrost layers—have caused environmental instability or sickness. The action at the end of *Red Mars* takes place among avalanches and floods, Leopold’s “penalties of violence” (255). Furthermore, as in *Red Mars*, the environmental violence of *Green Mars* is also prefaced by Phyllis’s faith in an economically based land relation: “All the stockpiled metals from the last forty years are ready to enter the Terran market, and that’s going to stimulate the entire two-world economy unbelievably. We’ll see more production out of Earth now, and more investment here, more emigration too” (183). Soon after Phyllis says this, Sax Russell, a scientist whose view of the land becomes central to the trilogy, reflects on the negative effects of the rapid changes to the Martian environment: “Mass wasting was causing many landslides a day, and fatalities and unexplained disappearances were not at all uncommon. Cross-country travel was dangerous. Canyons and fresh craters were no longer safe places to locate a town, or

even to spend a night” (217). Here, Robinson again questions the economic view of the land by drawing attention to Leopold’s penalties of violence. In *Red Mars* he describes the polluted landscape and the effects of this economic contamination, and in *Green Mars* he continues to show how the altered landscape has erupted with sickness and instability, mostly the result of capitalist interference, of a faith in the growth economy critiqued also in *Ecotopia* and stood on its head in *Woman on the Edge of Time*.

The eco-economic model of land relations becomes, for Robinson, the most viable model for limiting the influence of capitalist institutions on the fragile Martian environment. Having finally gained independence from Earth’s metanational institutions, the leaders of Mars in *Blue Mars* organize a congress to establish an official Martian government. Because Mars is a completely new social, political, economic, and environmental situation, it is difficult for these leaders to turn to historical models for help in creating their political system. Despite all the possible conflicts inherent in trying to form a new system, though, the issue that provokes the most debate is land-use, an environmental concern. While much of this debate revolves around the terraforming of Mars—the Red/Green debate—the debate over land-use also involves finding an ethical economic system that stresses not the monetary value of the land, as does capitalism, but the ethical importance of a land-based community. Phyllis defends capitalism in both *Red Mars* and *Green Mars*, and her sentiments are repeated in *Blue Mars* by another character, Antar.

At the end of the chapter entitled “A New Constitution,” Antar claims that the eco-economic model of the Martian economy ““is a radical and unprecedented intrusion of government into business”” (141). Unconvinced, Vlad outlines the eco-economic

system, which provides the equal rights and self-rule that the hierarchical structure of capitalism cannot. Environmentally, such a true democracy also requires a view of the land that opposes capitalist paradigms. As Vlad states, “the world is something we all steward together” (144). Important in the eco-economic model, then, is its synthesis of socialist elements—workers owning the means of production and “hiring capital rather than the other way around,” for example—with ecological elements (147). Stewardship becomes everyone’s responsibility, and environmental courts “estimate the real and complete environmental costs of economic activities, and help to coordinate plans that impact the environment” (146). Ultimately, the eco-economic model is voted in, and the new Martian system thus addresses one of Leopold’s paradoxes: man the conqueror *versus* man the biotic citizen. Martian civilization becomes a biotic citizenry through a new economic paradigm that values a land-human symbiosis.

Spiritual Aspects of the Land Ethic

Besides supporting a land-based economy, the *Mars* trilogy further becomes a Leopoldian text by focusing on the religious aspects of environmental thinking. In this sense, Robinson, like Leopold, approaches ecology at once through the social science of political ideology and economics and through the more speculative world of myth. And nowhere is Robinson’s interest in the possibilities of mysticism more evident than in his character Hiroko Ai, “the Japanese prodigy of biosphere design” (*Red Mars* 32). As Aldo Leopold asks for “an intense consciousness of land,” so Hiroko Ai provides this intensity (261).

Saying things like, “Mars will tell us what it wants and then we’ll have to do it,” Hiroko is the most religious ecological thinker in the *Mars* books (*Red Mars* 115). Hiroko’s “areophany” is “a kind of landscape religion, a consciousness of Mars as a

physical space suffused with *kami*, which was the spiritual energy or power that rested in the land itself” (*Red Mars* 229). As the critic William Dynes observes, “The focus of the areophany is a celebration of interdependency with the planet rather than an exploitation of it” (160). Hiroko’s “*viriditas*” encourages followers of the areophany to foster the positive feelings of ecological connectedness by spreading life everywhere. Initiated into this areophany, Michel Duval, a French psychologist, must eat dirt in a ritual with other members of Hiroko’s group. ““This is your initiation into the areophany, the celebration of the body of Mars,”” Hiroko says to Michel during the ceremony, ““Welcome to it. We worship this world. We intend to make a place for ourselves here, a place that is beautiful in a new Martian way, a way never seen on Earth”” (*Red Mars* 230). That Hiroko’s followers eat dirt is symbolic of the connection between humanity and land that Leopold advocates.

Green Mars opens with Hiroko teaching the first generation Martian children about *viriditas*. On the beach with the children, she says,

“Look at the pattern this seashell makes. The dappled whorl, curving inward to infinity. That’s the shape of the universe itself. There’s a constant pressure, pushing toward pattern. A tendency in matter to evolve into ever more complex forms. It’s a kind of pattern gravity, a holy greening power we call *viriditas*, and it is the driving force in the cosmos. Life, you see. Like these sand fleas and limpets and krill—although these krill in particular are dead, and helping the fleas. Like all of us. [. . .] And because we are alive, the universe must be said to be alive. We are its consciousness as well as our own. We rise out of the cosmos and we see its mesh of patterns, and it strikes us as beautiful. And that feeling is the most important thing in all the universe.” (9)

Thus, Hiroko becomes the environmental philosopher-educator of the *Mars* trilogy. Her brand of education, though, is rooted not in political ideology, but in religion.⁴ She is a

⁴ Dynes rightly warns readers that Hiroko’s areophany suffers from a “narrowness of vision” (160). To develop Dynes’s claim, Hiroko does present a dogmatic veneration for abstract values that is similar to the

philosopher whose ideas are necessary to prompt thoughts of Martian independence and ultimately of ecological connectedness. Markley states, “it is the moral force of [Hiroko’s] lived-philosophy of *viriditas* that brings together the scattered groups of the underground in a loose confederation and that eventually provides the rationale and moral authority of independence” (784).

When Hiroko is forced to leave Sabishii, the capital city of the underground groups who are organizing a revolution against the powerful corporate entities that run Mars, she disappears for the rest of the trilogy, either slain with her closest followers or else choosing voluntary exile. Her presence continues, though, in the form of mythology: Sax Russell believes she rescues him from a cold death in *Blue Mars*, and her son Nirgal hears rumors that she is in England, in Elysium, Mars, and somewhere in the Uranian system. At the end of *Blue Mars*, we even experience a Hiroko sighting: “Down the beach an old Asian woman was surf-fishing” (760). Accordingly, then, Hiroko’s mystical presence in the *Mars* books balances with Robinson’s close attention to politics and economics. If as McClintock notes, Aldo Leopold’s “‘The Land Ethic’ essay mythically combines philosophy, religion, science, and political ideology,” then Robinson’s attention to political ideology and religion positions his trilogy as a contemporary, science-fictional representation of the ideas Leopold advocated decades ago (34).

Kakaze, a radical anti-terraforming group. While the parallel may seem extreme, it is significant that as the Kakaze vehemently pursues Red ideology, Hiroko’s group religiously pursues the areophany, frequently escaping political involvement by isolating themselves in the Martian south. And indeed, Red ideology and the areophany are both value-laden conceptual positions that disregard recursive modes of building a viable land-human symbiosis. Nevertheless, as I will argue later, it is in a synthesis of the *Mars* trilogy’s various ecological paradigms that we construct the books’ ultimate environmental message. So while we must be critical of the areophany’s negatives, we must focus on what its ideas contribute to ecological thought.

Synthesizing Conceptions of the Land-Human Relationship

Tracing the conflict between the economically based land relation and the economic model of economics in the *Mars* trilogy gives us insight into one aspect of the land ethic that Robinson advocates: the need for conceiving an economic system that encourages environmentally sustainable behavior. And Robinson's presentation of Hiroko Ai as a mystical "Mother-Goddess of the Earth" with a deeply religious view of the connections between land and human life contributes further to what is ultimately the land ethic of the three books. The land ethic forwarded by Robinson's trilogy, though, involves further concepts of ecology that the author sees as crucial to developing ecological sustainability, namely, the ways in which we view our relationship to the land. Robinson conceptualizes a viable model of this relationship throughout the trilogy by establishing an extended debate between the philosophical "Red" worldview and the scientific "Green" worldview.

The debate between the Reds and the Greens, addressed throughout the *Mars* trilogy by pitting Ann Clayborne, a Red, against Sax Russell, a Green, begins as a debate between advocates of pure science and advocates of applied science. Supporting the former, Ann Clayborne wishes to study Mars in its primal form: "There's as much land on Mars as on Earth, with a unique geology and chemistry. The land has to be thoroughly studied before we can start changing it" (*Red Mars* 39). Excited about the prospects of applying science to the Martian surface in a vast terraforming effort, Sax rebuts Ann's claim, saying, "We'll change [the land] just by landing" (40). With both positions posited so early in *Red Mars*, before we even know the ideological thrusts of the trilogy, we can perhaps accept both Ann's and Sax's positions as scientific outlooks. One simply wants to study Mars as a geologist would study rocks or plate tectonics; the

other wants to experiment with an entirely new environment to see what can be done to make life there possible. As Bud Foote notes, “the appeals and the honesty and the beauty of both sides are presented with skill and passion,” making it difficult to side with either attitude (“Notes” 61). And though Sax’s support for terraforming—for using science as a tool of change—may for some science fiction readers foreshadow a fate similar to Victor Frankenstein’s, it is at least qualified when Sax speculates that even human presence on Mars will alter the landscape. Without such a thoughtful observation, we may think that the terraforming effort is just as impulsive as Frankenstein’s Promethean effort to generate life in a stitched-up assemblage of human body parts.

Though the terraforming debate begins as a conflict between pure science and applied science, it quickly turns into a philosophical debate that involves a conflict of values. With Ann insisting that Mars ““is *its own place*”” and Sax insisting that the planet is ““dead,”” the pure science/applied science debate develops into a contest between philosophical worldviews (*Red Mars* 40). Does Mars, or by extension the land, own itself as an individual owns herself or himself in a democratic or eco-economic state? Or, is Mars dead and valueless? Ann believes the former: the landscape has inherent beauty and worth. She claims that Sax’s interventionist science is ““just playing around””; to ““destroy a beautiful pure landscape”” is ““for *nothing at all*”” (177). Sax, on the other hand, believes ““The beauty of Mars exists in the human mind”” (177). He reduces Mars to ““a collection of atoms, no different than any other random speck of matter in the universe”” (177). Indeed, the argument developing here involves a dichotomy between value and fact that as yet, and for many more pages of the *Mars* trilogy, shows no hope of resolution or of budding into some other worldview. Ann is ecocentric and deep

ecological in believing “We are not lords of the universe. We are one small part of it” (179). Sax is anthropocentric in believing “We are the consciousness of the universe” (178). Is a land ethic possible with such diametrically opposed beliefs? The rest of Robinson’s trilogy serves to answer this question by ultimately working toward a Red/Green synthesis.

Importantly, early in *Red Mars*, before Robinson fleshes out the ensuing Red/Green debate, he raises a question that must remain on our minds as we observe Ann and Sax’s ongoing argument: what is nature? While Robinson never attempts to define nature, he does bring that question to our awareness. Asked what he thinks of the Red/Green debate, Jürgen, a Swiss engineer, replies,

“Both sides say they are in favor of nature, of course. [. . .] The reds say that the Mars that is already here is nature. But it is not nature, because it is dead. It is only rock. The greens tell this, and say they will bring nature to Mars with their terraforming. But that is not nature either, that is only culture. A garden, you know. An artwork. So neither way gets nature. There isn’t such a thing as nature possible on Mars.” (258)

While Ann defines nature as the primal terrain before human alteration, and while Sax insists that nature includes—in fact, relies on—humanity and the changes that humans bring about, Jürgen refutes the former, because for him nature must not be “dead,” and the latter, because it is simply a definition of culture rather than nature. Can we accept Jürgen’s dismissals, though, and appraise Ann and Sax’s contrasting views of nature as simply definitions of other abstractions, death and culture, respectively? If we are reading the *Mars* trilogy for the land ethic Kim Stanley Robinson puts forth—if we are reading science fiction for the reasons Robinson wants us to read it, to reevaluate our value systems—then we cannot dismiss any definition of nature promoted in the books. This is why Robinson presents so many perspectives; and this is why Jürgen does not

contribute any more to the environmental dialog.⁵ His opinion that nature cannot exist on Mars is final, and epistemological finality, for Robinson, leads us away from the recursive processes that are always leading to new knowledge, and in this case, to new definitions of nature and culture. Thus the end of Jürgen and the continuation of the dialogue between Ann and Sax.

Very little else happens in *Red Mars* to suggest an eventual synthesis between the Red and Green worldviews. Instead, we begin to see an increasing fragmentation between the Reds and the Greens as the Reds begin to sabotage Green attempts to terraform the land. They disrupt the moholes—holes drilled deep into the Martian lithosphere that bring the warmth of the planet’s core to the surface; they knock warming mirrors out of orbit; they damage nuclear reactors; and they impair the bioengineering labs. In the process, the Reds risk killing others and themselves, all for their belief in the fundamental rights of the land to remain unharmed by human intervention.

And just as unproductively radical, the Greens approach terraforming like the transnational corporations approach mining—that is, putting no limits on their effort to get what they want out of the land. John Boone talks to Ann about the terraforming efforts: “‘Sax and a lot of others used to talk about doing anything possible to terraform as quick as possible—driving a bunch of asteroids directly into the planet, using hydrogen bombs to try and start volcanoes—whatever it took!’” (252). Of the terraforming efforts that do come to fruition, thousands of small windmill heaters are dropped on the Martian surface to assist in warming the planet, and in these heaters Sax puts a genetically engineered algae in an attempt to introduce biota to the surface. Sax, as

⁵ Both Carol Franko and William Dynes demonstrate the importance that Robinson attributes to dialogue and to the synthesis of multiple perspectives in the *Mars* books.

the scientific leader of the terraforming effort, also redirects an ice asteroid into Martian orbit, where it burns up and adds water to the atmosphere.

The key elements of the terraforming debate thus seem too radically divergent and inflexible to promise an eventual synthesis. Sax's terraforming effort—the "Russell program"—"plans to terraform the planet by all means possible, as fast as they could" (169). This view lacks an ethic because, as Leopold would have it, science becomes the sharpener of man's sword, of the desire to impose human knowledge on the world in order to change it for human purposes that go beyond necessity. Sax does not see the land as part of the community, but rather as an object to be molded to fit an already existing human community. Likewise, Ann's "hands-off attitude" lacks an ethic; for in its fervent defense of the land's natural right to remain in a primitive state, it excludes humanity's inclusion in the biotic community, and in fact, sees humans as burdens to the ecosphere.

It is interesting to consider, here, the symbolic importance of an incident that occurs at the end of *Red Mars*. Driving with eight passengers to escape a massive flood made possible by the Green terraforming efforts and Red sabotage of the mighty space elevator, Ann is distracted by the spectacle of the Martian sky and gets the rover stuck on a boulder. Frank Chalmers, the leader of the American settlement team, attempts to free the car from the rock and dies in the effort. With this incident, Robinson suggests that the Red and Green worldviews are in themselves inadequate ethical paradigms. The flood that washes Frank away is the result of the careless effort to transform the Martian surface as fast as possible. By the same token, and on a more symbolic level, Frank dies

because Ann gets stuck on a rock, something that as a Red geologist she loves so much and would defend to the death.

While *Red Mars* offers no evidence of a land ethic that places the land and humans in a symbiotic relationship, *Green Mars* begins to present such a view. Though this book does not fully propose a viable land ethic, it again uses Ann and Sax to foreshadow what will eventually become the ecological perspective of the *Mars* trilogy.

But as *Red Mars* ends with a land ethic yet to be established, so does *Green Mars* begin with the same Red/Green tensions that pervade the earlier book. In fact, the distance between Ann and Sax is further established early in *Green Mars*. Ann continues her pure scientific studies of Martian geology or areology; and though she is hesitant to identify herself with the Reds—by now an extremist group—she vows to join them after observing “the planet [. . .] melting under her feet. Disintegrated. Reduced to mush in some Terran cartel’s mining venture” (128). In this same chapter, “Long Runout,” we also find Sax pursuing what he believes in—the terraforming effort. He joins a biotech company that is working to terraform Mars.

Having so strongly established Ann and Sax’s differences, Robinson then brings them together for what turns out to be a pivotal debate regarding the land ethic of the trilogy. As in *Red Mars*, Ann and Sax establish themselves as opposites when they admit their respective support of pure science and applied science. Sax reflects on Ann’s position, identifying the ultimate conflict between him and Ann as one between divergent land ethics: “He knew she believed in some kind of intrinsic worth for the mineral reality of Mars; it was a version of what people called the land ethic, but without the land’s biota. A rock ethic, one might say. Ecology without life” (145). Vowing to protect her

“rock ethic,” Ann declares that ““Red resistance”” will curtail Green attempts to terraform Mars (147). Sax asks, ““what’s the point of that, now?”” and Ann replies, ““Mars. Just Mars. The place you’ve never known”” (147). It is this latter statement that Sax, and readers of the *Mars* books, must consider when attempting to see the land ethic from Ann’s radical perspective; for Leopold’s land ethic requires foremost that the land be “known” a certain way, a way that the economically based land relation and applied science often fail to see.

Sax begins to consider Ann’s position as he studies the Martian surface and develops his own sense of place and being within the Martian environment:

Looking down the wild cracked surface of the glacier, he found himself thinking of [Ann]. Every little berg and crevasse stood out as if he still had the 20x magnification on his faceplate, but with an infinite depth of field—every tint of ivory and pink in the pocketed surfaces, every mirror gleam of meltwater, the bumpy hillocks of the far horizon—everything was, for the moment, surgically clear and focused. And it occurred to him that this vision was not a matter of accident (the lensing of tears over his cornea, for instance) but the result of a new and growing understanding of the landscape. It was a kind of cognitive vision, and he could not help but remember Ann saying angrily to him, *Mars is the place you have never seen*. (189)

Sax’s vision of the landscape displays qualities that are indeed “red,” or, more accurately, ethical in the limited but admirable sense that Ann’s vision is ethical. Its focus on the details of the landscape demonstrates that Sax is becoming aware of Mars as more than a scientific experiment. Sax’s “new and growing understanding of the landscape,” however, does not resolve the complicated conflict of ethics between him and Ann. For immediately after Sax’s seemingly pure scientific observation, he also begins to understand the root cause of their conflict: “he was seeing a Mars he had never seen before. But the transformation had come by focusing for a matter of weeks on just those parts of the Martian landscape that Ann despised, the new life-forms” (190). The conflict

is thus one of paradigms, of Sax's valuing life and desiring an ethic that stewards this life, and of Ann's valuing the primal landscape and desiring an ethic that preserves the areology of the pre-colonial Mars. By themselves, neither of these paradigms is conducive to a sustainable land-human ecology.

While Sax may be adopting elements of Ann's land-ethic—even admitting to Ann, ““We should have waited before we started [terraforming]. A few decades of study of the primal state””—Ann has yet to accept Sax's views on the value of life (414). She tries to commit suicide at the end of *Red Mars*, and in *Green Mars* she admits she is no longer taking the gerontological treatments that will significantly prolong her lifespan. Additionally, as the second Martian revolution is underway at the close of *Green Mars*, Ann sees the revolt “as a chance to wreck all terraforming efforts and to remove as many cities and people as possible from the planet, by direct assault if necessary” (581). Ann's “rock ethic” is admirable for its attention to the intrinsic worth of the landscape, but it fails as a viable land ethic, because it does not propose to solve the problem of maintaining a sustainable land-human symbiosis. Instead, it obscures any useful discussion of sustainability by resorting to radical ideas, to killing off humans.

In terms of its contribution to the developing land ethic of the *Mars* trilogy, *Green Mars* is thus a book about Sax Russell's ethical growth and Ann Clayborne's ethical stagnancy. Ann's contribution to our own thoughts about the land ethic goes beyond simply showing the limits of ethical and epistemological inflexibility, though. She makes a point about the historical effects of terraforming that draws our attention to Aldo Leopold's thoughts on landscape and history. As Leopold calls attention to the plant succession of Kentucky and speculates other possible historical scenarios growing from

other possible landscapes, so does Ann argue that terraforming Mars can only prevent the planet from ever becoming independent of Terran hegemony and overpopulation—in short, of ever supporting a successful revolution: ““When the surface is viable [. . .] they’ll be here by the billions. As long as we have to live in shelters, logistics will keep the population in the millions. And that’s the size it needs to be if you want a successful revolution”” (363). Ann’s observation, here, is wholly Leopoldian in that she sees the changing landscape as intricately connected—ecologically connected—to the course of political history; and it is this sort of perception that Leopold wants. “Is history taught in this spirit?” Leopold asks; “It will be, once the concept of land as a community really penetrates our intellectual life” (243).⁶

So though Ann seems to retard the trilogy’s development of a viable land-human relationship by refusing to see human life as part of the ecological community, her steadfast attention to the importance of the landscape is instrumental in causing Sax, and us as readers, to see the land in new ways. Her Red paradigms also influence the congress at Dorsa Brevia, which drafts a temporary Martian constitution. Work point six of the document states, “The Martian landscape itself has certain ‘rights of place’ which must be honored. The goal of our environmental alterations should therefore be

⁶ Ann’s contention stands in contrast to the earlier politico-scientific opinion of Arkady Bogdanov, who claimed that terraforming Mars would usher in a new era of human freedom, rather than of increased population and corporate control. As Arkady argues:

“We have come to Mars for good. We are going to make not only our homes and our food, but also our water and the very air we breathe—all on a planet that has none of these things. We can do this because we have technology to manipulate matter right down to the molecular level. This is an extraordinary ability, think of it! And yet some of us here can accept transforming the entire physical reality of this planet, without doing a single thing to change our selves, or the way we live. [. . .] We must terraform not only Mars, but ourselves.” (Red Mars 89)

Here, as Yanarella notes, Arkady “sees in a terraformed Mars the possibility of a new beginning for the anarchist dream of a decentralized, egalitarian society” (275). Ann’s position emerges in Green Mars after we understand the impossibility of Arkady’s vision; thus her critical view of the landscape and political

minimalist and ecopoetic, reflecting the values of the areophany” (389). Though terraforming will go on, point six does reflect back on Ann’s declaration early in *Red Mars* that the planet “‘is *its own place*,’” and thus planetary changes will be subtle, localized, and uninfluenced by heavy industry—hence the terms “ecopoetic” and “the areophany.”

Blue Mars focuses on the dialogue that occurs between Ann and Sax that ultimately leads to the land ethic of the *Mars* trilogy, and in the book’s conclusion, Robinson finally synthesizes Ann and Sax’s conflicting ethical paradigms. The novel begins with Ann speaking to a group of young, Mars-born Reds about continuing to fight for what they believe in: “*to love Mars for itself*” and to maintain the struggle for complete independence from Earth (4). But as in *Green Mars*, Ann’s deep-seated belief in the intrinsic worth of the planet causes her to undervalue humanity: “though her bloodshot eyes were still fixed, gazing through [the youths] at the rocky battered expanse of the Tyrrhena massif, she was smiling” (4). Here, though Ann has become a leader and an educator, her ethic still disallows her from seeing the value of life; for, she looks through even her students and out into the rock that she values so much.

Robinson continues to elaborate on Ann’s “redness”—her appreciation of abiological life over biological life, her pure science, and the political role she must adopt in order to curtail the terraforming effort. Ann’s paradigms are tested, though, as “redness” actually begins to manifest the radical disregard for life that Ann has so far seemed to advocate. Ann claims to have nothing in common with the Red Kakaze—“a cult,” “religious fanatics,” “some kind of rock-worshipping sect”—but as the Kakaze

history is more valid. Nevertheless, both Ann and Arkady’s visions are grounded in a Leopoldian awareness of the landscape as a key influence on human culture.

admit to wanting to bring down a space elevator, and even to risk a civil war with the Greens, we can only feel that Ann's desire in *Green Mars* to "remove as many cities and people as possible from the planet, by direct assault if necessary" has served as the ideological starting point for such a harsh disregard for life. Indeed, Ann is the founder of this radical Red movement, whether she likes it or not.

Thus Ann's will to defend what she sees as the land is challenged from within her own movement. As Kasei and Dao, the leaders of the Kakaze, make a reality out of the ideology she advocates, Ann tries to intervene. And while she couches her rhetoric in terms that make it seem like her main concern with the Kakaze's revolutionary effort is that it needs more time to be planned, we see that her ethical concerns are finally starting to include human life: "A direct assault was a bad idea [. . .]. It worked in Burroughs, but that was a different kind of situation. Here it failed. People who might have lived a thousand years are dead. The cable wasn't worth that. We're going to go into hiding and wait for our next chance, our next real chance" (41). Kasei and Dao die, and Ann grows weak-kneed as she thinks her son Peter, a Green, might also be dead. Confronting this senseless violence, Ann finally begins to see the value of life and agrees to negotiate with the Greens and with Sax. Ann promises Sax that she will help stop Red acts of sabotage if he returns the favor by removing the soletta, a huge heating lens, from Martian orbit. Though removing the soletta guarantees an ice age, Sax concurs. Red-Green compromise is in the air, though a simple compromise is not Robinson's ultimate goal.

The land ethic of the *Mars* trilogy emerges as Ann and Sax move closer to a romantic union, a union that involves not a compromise or a negotiation between the two opposite individuals, but an "intermixture of red and green" (66). Indeed, it is primarily

Sax's initiative to achieve this intermixture early in *Blue Mars* that leads to a new ethical paradigm for both parties. He desires that Ann see "the beauty of the new biosphere," to "walk over the land, and let it speak for itself" (96). In this desire, Sax also wants to see the land as Ann does. And he does:

The primal planet, in all its sublime glory, red and rust, still as death; dead; altered through the years only by matter's chemical permutations, the immense slow life of geophysics. It was an odd concept—abiological life—but there it was, if one cared to see it, a kind of living, out there spinning, moving through the stars that burned, moving through the universe in its great systolic/diastolic movement, its one big breath, one might say. (97)

That Sax's thoughts are so imbued with alternative concepts of life suggests a major breakdown in the Red/Green opposition that has thus far pervaded the trilogy. Sax's revelation can be expressed as a syllogism: If life can be abiological, as Ann says and as Sax is beginning to understand, and if to be Green is to value life, then to be Green requires one to value those components of the land previously believed to be dead. The Red/Green binary falls apart under this new reasoning, and indeed a new paradigm, an intermixture, emerges.

But as Sax desires a new ethical paradigm, so does Ann. Her drive to revision the Red's revolutionary methods—to avoid bloodshed—draws from Green values of biological life. Certainly Ann still advocates preserving Mars's primal state, but her increased political activism, her shift from advocate of radicalism to advocate of less harmful revolutionary methods, suggests that she, like Sax, is developing a more viable land-human symbiosis, one in which humanity also has inherent value. That Ann wants "to stain that green until it turns some other color," in fact, demonstrates her and Sax's parallel intentions; for they are both searching for other colors, other conceptions of the land-human relationship (272).

Though much of the remainder of *Blue Mars* is punctuated with moments where both Ann and Sax seem to revert to their respective ethical positions, which attests to the difficulty of synthesizing such opposing viewpoints, the conclusion presents a new ethic. As Sax comes to believe that what is important is “Not nature, not culture: just Mars,” he finally breaks down the Red/Green, nature/culture opposition (679). In his revelation, “Sax felt he had come over the years to love what Ann loved in Mars; and now he wanted her to reciprocate, if possible” (680). Thus he seeks out Ann’s company, and as in *Green Mars* he apologizes to Ann for supporting rapid terraforming, which by now has created blue oceans and green life on the formerly red, rocky planet: ““I made mistakes. [. . .] I didn’t see the—the beauty until it was too late. I’m sorry. I’m sorry. I’m sorry. I’m sorry”” (711). And as Sax apologizes and advocates a halt to further terraforming efforts, Ann now imagines a future with human life that must be protected: ““Better to die thinking that you’re going to miss a golden age, than to go out thinking that you had taken down your children’s chances with you. That you’d left your descendants with all kinds of toxic long-term debts”” (728).

Ann and Sax’s romantic union represents a union between Red and Green ethical positions that goes beyond mere compromise. Indeed, the new paradigm is a combination of the two viewpoints, but it is a synthesized combination that ultimately becomes, as Ann states, ““something entirely new”” (730). In the final chapter—in fact, in the final paragraph of the trilogy—we are left with what ultimately becomes a key component of the *Mars* trilogy’s land ethic. Appropriately, we see this new “Blue” ethic through Ann’s eyes. Walking on the beach with a child, Ann reflects,

Nowhere on this world were people killing each other, nowhere were they desperate for shelter or food, nowhere were they scared for their kids. There was that to be said. The sand squeaked underfoot as she toed it. She looked more closely: dark grains of basalt, mixed with minute seashell fragments, and a variety of colorful pebbles, some of them no doubt brecciated fragments of the Hellas impact itself. She lifted her eyes to the hills west of the sea, black under the sun. The bones of things stuck out everywhere. Waves broke in swift lines on the beach, and she walked over the sand toward her friends, in the wind, on Mars, on Mars, on Mars, on Mars, on Mars. (761)

This Blue ethic involves for Ann an appreciation of human life, intermixed with a strong awareness of land. It allows Ann to reflect on the value of humanity while she also reflects on the value of the environment that surrounds her. The Blue ethic thus represents a symbiosis between humans and the land that moves beyond a Red/Green, either/or binary. Instead, it places humanity and the land—the biological and the abiological—together as necessary components of a living ecology.

Conclusion: Robinson's Land Ethic

Why does the *Mars* trilogy present a consistent revolt against capitalist institutions? Why does eco-economics prevail over all other economic models presented at the Martian congress? Why does Sax Russell continually apologize to Ann Clayborne for moving too fast with his terraforming project? Why does Ann's vehement defense of Red ideology lead to radical rebellions and several deaths? Why does Hiroko Ai's ecological mysticism prove to be sound philosophically—as a human value—but ineffective politically—as an apparent fact? These questions are best answered if we consider the utopian motives of Kim Stanley Robinson's *Mars* books. As mentioned, Robinson believes that utopia is a state that is always becoming, always potentially present if we maintain ceaseless dialog and questioning. Thus, no one character or ideology in Robinson's three books provides the most possible utopian vision. Only in

combination do the characters and ideas of the trilogy contribute to its utopian vision, or, more specifically, its utopian ecological vision—its vision of the land ethic. And contrary to what Ernest J. Yanarella has argued, this “polyphony of subject-positions” does not act “as an authorial ruse to exonerate Robinson of the apparent responsibility for choosing or determining the outcome of the terraforming controversy and the fate of the Martian experiment” (280). Rather, it attests to Robinson’s desire to move closer to utopia by presenting us with a multi-positional issue and requiring us to become responsible synthesizers of information, information that is without a doubt rich with hints of Robinson’s own ecological perspective.

In Robinson’s utopia, then, capitalism falls to eco-economics because capitalism refuses to change according to the nature of ecology. Sax apologizes to Ann because he learns that the land does have value. Ann’s radical ethic results in the loss of human life because in the *Mars* trilogy’s utopia—in Leopold’s and Robinson’s land ethic—neither life nor land can be overlooked. It is necessary to strive for a land-human symbiosis, not to sacrifice one for the sake of the other. And Hiroko Ai is at once philosophically brilliant and politically anomalous because that conundrum solidifies Robinson’s call to pursue ecological utopia intellectually, without falling prey to unproductive abstractions. The *Mars* trilogy, as a series more about the Earth than about Mars, requests that we work toward developing a land ethic that places the environment and humans within the same community. To do this, we must value land as much as life, and life as much as land. In fact, to take this notion of a Blue ethic a step further into Hiroko’s paradigm, we must not draw traditional distinctions between life and land. Instead, it is crucial that we

shift our ontological paradigms to include the being of the land, to see community not in anthropocentric terms, but as a complex ecology of ideas, of people, and of places.

According to J. Baird Callicott, “what [Leopold] wishes us to conclude is (i) that *we* are members of a human community (now grown from the savage clan to the ‘family of Man,’ and in reference to which we have evolved ethical limitations upon our conduct), (ii) that *we* are also members of a biotic, or land, or ecological community, and (iii) that accordingly, *we* should evolve or assume environmental ethical limitations upon *our* conduct” (67). In the *Mars Trilogy*, Kim Stanley Robinson wishes us to conclude something similar. The utopia that he strives for through his science fiction places political, religious, philosophical, and scientific ideas into a crucible. And as John Boone becomes the “utopian social engineer” within *Red Mars* by synthesizing the paradigms of various settlement groups, so do we, as readers whose active participation is demanded by the *Mars* books, become utopian engineers of ecological literacy by reaching into Robinson’s crucible and pulling out a fully synthesized vision of an eco-economic/areophonic/Blue, and altogether Leopoldian, land ethic (Franko 61).

CHAPTER 5 CONCLUSION

In his address to the North American Association for Environmental Educators at the 1998 Sanibel Symposium held on Sanibel Island, Florida, David Orr insisted, “The challenge of equipping students to participate in the building of a sustainable and decent society is the fundamental challenge to educational institutions at all levels” (14). The compilation in which Orr’s address is published—*Academic Planning in College and University Environmental Programs: Proceedings of the 1998 Sanibel Symposium*—reflects this sentiment throughout, and indeed all educators concerned with environmental sustainability also stress the importance of such ecological literacy. The agenda of environmental education is to provide students with the knowledge necessary to understand the relationships among themselves, their communities, and the natural world, as well as to be aware of and act upon the psychological, social, political, and economic systems that have threatened the health of ecological systems. Such a motive is certainly a complex task involving a multi-disciplinary effort, but it is a task many educators have accepted.

This thesis has acknowledged Orr’s challenge, and it has done so through the discipline of literary interpretation and through the pedagogy available to those who interpret literature. My method has been hermeneutic and ecocritical—that is, I have relied on textual interpretation to explore issues of ecology and environment in science fiction. Though literary interpretation itself cannot directly initiate environmental activism or changes in environmental policy, it can prompt such actions by uncovering

the critical stances of writers whose foci involve issues of ecology, and by generating the knowledge necessary to stage further discussions of environmental issues in the public sphere.

The list of science fiction I have mentioned as texts that contribute to the pedagogy of ecological literacy is limited, as is my list of ecological attitudes and environmental philosophies. I have examined *Dune* and the concept of ecological literacy, and have continued this look at ecological literacy by exploring *Ecotopia* and *Woman on the Edge of Time*, the tenets of deep ecology, the *Mars* trilogy, and Leopold's land ethic. Further studies could attend to Ursula K. Le Guin's *Hainish* series, particularly to *The Left Hand of Darkness*, where Western dualisms are challenged, and *The Word for World is Forest*, where demand for "resources" jeopardizes the health of a planet and the integrity of a culture. Further, Gregory Benford's *Timescape* presents a society threatened by a destabilized ecosystem and thus encourages a discussion about the nature of stable ecosystems and about ways to assure that humans do not continue to injure such ecosystems. Even books that present simulated nature and electronically replicated environments, such as Philip K. Dick's *Do Androids Dream of Electric Sheep?* and William Gibson's *Neuromancer*, raise issues about the human disconnection from nature. Indeed, exploring the absence of nature in these speculative works can be productive.

Deep ecology and the land ethic are not the only ideas currently circulating in discussions of ecological literacy. The critical points ecofeminism raises about the parallels between the exploitation of the female body and the exploitation of the Earth deserve attention, perhaps in relation to Le Guin's work and to other SF texts that are

concerned with patriarchal oppression. Also, ecocomposition, a burgeoning movement in academic environmentalism, moves away from literary interpretation and concerns itself with “textual production and the environments that affect and are affected by the production of discourse” (Dobrin and Weisser 24). Applied to science fiction, ecocomposition can be invaluable for explorations not into what ecologically focused SF writers are writing about—spice exploitation in *Dune*, for example—but into how these writers use language to construct other worlds, all the while maintaining the sense that the contemporary Earth is the environment producing their writing.

Thus, there are many SF and ecology connections still to be made. Hopefully, though, this thesis has adequately introduced the critical potential for science fiction to participate in ecological discourse and to communicate the various ideas of ecological movements and environmental thinkers. As Le Guin writes,

Science fiction properly conceived, like all serious fiction, however funny, is a way of trying to describe what is in fact going on, what people actually do and feel, how people relate to everything else in this vast sack, this belly of the universe, this womb of things to be and tomb of things that were, this unending story. In it, as in all fiction, there is room enough to keep even Man where he belongs, in his place in the scheme of things. (154)

Science fiction does indeed describe what is going on here on Earth; it does indeed explore the reality of the human relationship with the world to which we are intricately connected. Bolstered by its generic obligation to provide readers with fantastic speculations about other worlds or alternative social institutions, SF roams in territories other genres cannot. Its strength in terms of ecological thinking is thus its ability to speculate critically on environmental issues and, in doing so, to assist the pedagogy of ecological literacy.

REFERENCES

- Barr, Marleen S., and Carl Freedman, coords. "Science Fiction and Literary Studies: The Next Millennium." *PMLA* 117.2 (2002): 198.
- Bowers, C.A. *Education, Cultural Myths, and the Ecological Crisis: Toward Deep Changes*. Albany: State U of New York P, 1993.
- Brown, Lester R. *Eco-Economy: Building an Economy for the Earth*. New York: Norton, 2001.
- Callenbach, Ernest. *Ecotopia*. New York: Bantam, 1975.
- Callicott, J. Baird. *In Defense of the Land Ethic: Essays in Environmental Philosophy*. New York: State U of New York P, 1989.
- Capra, Fritjof. "Deep Ecology: A New Paradigm." Sessions 19-25.
- Cooper, David E. "Arne Naess." *Fifty Key Thinkers on the Environment*. Eds. Joy A. Palmer, David E. Cooper, and Peter Blaze Corcoran. London: Routledge, 2001. 211-216.
- Crow, Charles L. "Homecoming in the California Visionary Romance." *Western American Literature* 24.1 (1989): 3-19.
- Devall, Bill, and George Sessions. *Deep Ecology: Living as if Nature Mattered*. Salt Lake City: Gibbs Smith, 1985.
- Dobrin, Sidney I., and Christian R. Weisser. *Natural Discourse: Toward Ecocomposition*. Albany: State U of New York P, 2002.
- Drake, Barbara. "Two Utopias: Marge Piercy's *Woman on the Edge of Time* and Ursula Le Guin's *The Dispossessed*." *Still the Frame Holds: Essays on Women Poets and Writers*. Eds. Sheila Roberts and Yvonne Pacheco Tevis. San Bernardino: Borgo, 1993. 109-127.
- Dynes, William. "Multiple Perspectives in Kim Stanley Robinson's Mars Series." *Extrapolation* 42.2 (2001): 150-164.

- Ellis, R.J. "Frank Herbert's *Dune* and the Discourse of Apocalyptic Ecologism in the United States." *Science Fiction Roots and Branches: Contemporary Critical Approaches*. Eds. Rhys Garnett and R.J. Ellis. New York: St. Martin's, 1990. 104-124.
- Foote, Bud. "Notes on Kim Stanley Robinson's Red Mars." *Science-Fiction Studies* 21.1 (1994): 61-66.
- Franko, Carol. "The Density of Utopian Destiny in Robinson's Red Mars." *Extrapolation* 38.1 (1997): 57-65.
- Freedman, Carl. *Critical Theory and Science Fiction*. Hanover: Wesleyan UP, 2000.
- Glotfelty, Cheryll. "What is Ecocriticism?." *ASLE Online*. April 2002. <http://www.asle.umn.edu/conf/other_conf/wla/glotfelty.html>.
- Hardin, Garrett. *Filters Against Folly: How to Survive Despite Economists, Ecologists, and the Merely Eloquent*. New York: Viking, 1985.
- Herbert, Frank. *Dune*. New York: Ace, 1965.
- Illich, Ivan. "Dwelling: How to Tell a Resident from an Inhabitant." *CoEvolution Quarterly* 41 (Spring 1984): 22-27.
- Landon, Brooks. *Science Fiction After 1900: From the Steam Man to the Stars*. New York: Twayne, 1997.
- Le Guin, Ursula K. "The Carrier Bag Theory of Fiction." *The Ecocriticism Reader: Landmarks in Literary Ecology*. Eds. Cheryll Glotfelty and Harold Fromm. Athens: U of Georgia P, 1996. 149-154.
- Leopold, Aldo. *A Sand County Almanac, With Essays on Conservation from Round River*. New York: Ballantine, 1966.
- Maciunas, Billie. "Feminist Epistemology in Piercy's Woman on the Edge of Time." *Women's Studies* 20 (1992): 249-258.
- Markley, Robert. "Falling into Theory: Simulation, Terraformation, and Eco-Economics in Kim Stanley Robinson's Martian Trilogy." *Modern Fiction Studies* 43.3 (1997): 773-799.
- McClintock, James I. *Nature's Kindred Spirits: Aldo Leopold, Joseph Wood Crutch, Edward Abbey, Annie Dillard, and Gary Snyder*. Madison: U of Wisconsin P, 1994.

- Miller, David M. *Frank Herbert*. Mercer Island: Starport, 1980.
- Naess, Arne. "The Shallow and the Deep, Long-Range Ecology Movements: A Summary." Sessions 151-155.
- . "Deep Ecology and Lifestyle." Sessions 259-261.
- Nicholls, Peter. "Prediction." *The Encyclopedia of Science Fiction*. Eds. John Clute and Peter Nicholls. New York: St. Martin's, 1995.
- O'Reilly, Timothy. *Frank Herbert*. New York: Frederick Ungar, 1981.
- Orr, David W. *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany: State U of New York P, 1992.
- . "Transformation or Irrelevance: The Challenge of Academic Planning for Environmental Education in the 21st Century." *Academic Planning in College and University Environmental Programs: Proceedings of the 1998 Sanibel Symposium*. Eds. Peter Blaze Corcoran, James L. Elder, and Richard Tchen. NAAEE, 1998. 14-27.
- Owens, Derek. *Composition and Sustainability: Teaching for a Threatened Generation*. Urbana: NCTE, 2001.
- Piercy, Marge. *Woman on the Edge of Time*. New York: Fawcett, 1976.
- Robinson, Kim Stanley. *Red Mars*. New York: Bantam, 1993.
- . Interview. "A Conversation with Kim Stanley Robinson." By Bud Foote. *Science-Fiction Studies* 21.1 (1994): 51-60.
- . *Green Mars*. New York: Bantam, 1994.
- . *Blue Mars*. New York: Bantam, 1996.
- Scigaj, Leonard M. "Prana and the Presbyterian Fixation: Ecology and Technology in Frank Herbert's Dune Tetralogy." *Extrapolation* 24.4 (1983): 340-355.
- Sessions, George, ed. *Deep Ecology for the 21st Century: Readings on the Philosophy and Practice of the New Environmentalism*. Boston: Shambhala, 1995.
- Snyder, Gary. "Four Changes." Sessions 141-150.
- Stratton, Susan. "The Messiah and the Greens: The Shape of Environmental Action in Dune and Pacific Edge." *Extrapolation* 42.4 (2001): 303-316.

Todd, Nancy Jack, and John Todd. *From Eco-Cities to Living Machines: Principles of Ecological Design*. Berkeley: North Atlantic, 1993.

Touponce, William F. *Frank Herbert*. Boston: Twayne, 1988.

Wackernagel, Mathis, and William Rees. *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island: New Society.

World Commission on Environment and Development. *Our Common Future*. New York: Oxford UP, 1987.

Yanarella, Ernest J. *The Cross, the Plow, and the Skyline: Contemporary Science Fiction and the Ecological Imagination*. Parkland: Brown Walker, 2001.

BIOGRAPHICAL SKETCH

Eric Otto graduated from Florida Gulf Coast University in May 2000 with a Bachelor of Arts in liberal studies-English. While studying there, he also worked as an undergraduate teaching assistant to Peter Blaze Corcoran in FGCU's university-wide colloquium on environmental sustainability. Currently, Eric is a graduate teaching assistant and Ph.D. candidate in English at the University of Florida, where he continues his work in American literature and ecological literacy.