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Cultivating Ecological Literacy and Rethinking Our Connections to Nature

Sean Fretwell

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CULTIVATING ECOLOGICAL LITERACY AND RETHINKING OUR
CONNECTIONS TO NATURE

by

SEAN FRETWELL

(Under the Direction of John A. Weaver)

ABSTRACT

In this dissertation I explore the complex, often contested, relationships between humankind and nature. I consider the changing state of these relationships as they are influenced by factors rooted in science, technology, and economics. I also examine these relationships as they relate to human activities with agriculture. Considering the present state of environmental crisis and the abundance of evidence indicating the deleterious activities of humankind as primary causes for the many global calamities, I argue for revising industrially-driven ideologies; particularly those driven by the economic paradigm of capitalism and self-interest. Additionally, I submit that a return to kinship with nature will be most effective with educational strategies that break from the routines and curricular focus ingrained within mainstream public schooling institutions today.

Cultivating an ecological worldview through ecological literacy is proposed. This, I believe, can form the foundation for effective, sustained, and meaningful change towards (re)connecting to nature and healing by reversing environmentally-degrading industrial practices.

INDEX WORDS: Nature, Ecological literacy, Industrialism, Science and technology, Ecology, Environmental education, Capitalism, Agriculture

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by

SEAN FRETWELL

B.A., Armstrong Atlantic State University, 2004

M.Ed., Armstrong Atlantic State University, 2007

Ed.S., Georgia Southern University, 2009

A Dissertation Submitted to the Graduate Faculty of Georgia Southern University in

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SEAN FRETWELL

Major Professor: John Weaver
Committee: Daniel Chapman
Ming Fang He
Janisse Ray

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DEDICATION

To my loving wife, Kristan, who has supported me in every possible way throughout this project. Many years from now we will look back upon this time and wonder how we made it through. As for me, I know the answer is you.

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CHAPTER 1

INDUSTRIALIZATION AND THE LAND ETHIC

A human affinity for revolution assures the notion that *change* cannot be listed among the casualties of history. Narratives of civil transformation recount the oscillating ebb and flow of power that technology has provided through a dynamic interplay of converging ideas, materials, and opportunities. Many inventions have catalyzed the formation of enduring societal changes, but none have wielded a degree of power and influence equivalent to that of industrial capitalism and its ability to transcend boundaries set by religion, culture, politics, nature, and even reason. Beneath its shadow, the development of modern society continues on a trajectory that favors economic systems that undermine both the health of the people working within it as well as the environment and natural resources used in their construction.

Compared to earlier changes in civilization's history, such as the benchmark arrival of organized agriculture, the transition from agrarian to industrial life has occurred with unprecedented speed and intensity. The details of this transformation dissolve with the passing of time and become artifacts contextualized in history we can only recreate through interpretation. One of the greatest challenges in understanding the history of systems or events – especially those connected to people and society – is that our access is limited *to* and *by* filters of recollection and interpretation; which, Nietzsche reminds us, is all we really have. To make sense of the past, it seems, is even more difficult than making sense of the present.

One particularly obvious result of the industrial transformation is the physical division between where we live and where we grow food. A true “homestead” is difficult

to locate outside of history textbooks, novels, and films. Today, the likelihood of being personally familiar with the individual people or families who have grown, picked, or processed the food we eat is reliably slim. In fact, there is little evidence to reject the argument that separation from the processes and activities involved in agriculture has become a normalized feature of modern life. Of the many conclusions that can be drawn from this observation, perhaps the most alarming are those which begin to reveal the effects of alienation between people and the land.

The emergence of organized agriculture in civilizations marked a significant turning point in the human relationship with nature. Examining the historical evolution of cultural trends and customs related to agriculture reveals certain elements that are fundamental to developing an appreciation for the potential of science and technology to impact life, experience, and the environmental context supporting them. Agricultural systems are not insulated from pressures of social movements, advances in science, and technological evolutions. In fact, agriculture's integration with society can provide a useful avenue for evaluating many dimensions of the human relationship to nature.

Monoculture and factory-style production dominates the approach to agriculture among the farmers who, collectively, account for less than 2% of the combined workforce population in the United States. Modern technologies and agricultural wonder-tools like chemical fertilizers, pesticides, growth hormones, antibiotics, and machines have given humankind an illusory sense of pardon from the limits of nature. Today we exist in a world where an extraordinarily small number of people are able to produce the food our markets need – often producing in surplus and over satisfying the demands of a number of food supply networks.

Science, technology, and the modern industrial economy converge to manufacture the goods and services available on our markets, but *convenience* is the product that underscores them all. The costs for this convenience are largely unseen; externalized, hidden, and purposely obscured. The system of modern industrial agriculture pulls each of these factors together – science, technology, and the efficiency of industrial ideals – and is a remarkable example of how convenience can transform the values and traditions of a society.

In 1840, farmers represented 69% of the total United States labor force. By 1850 this number dropped to nearly 64%. In some instances, a reduction by five percentage points can easily be written off as an insignificant fluctuation with marginal overall effects. A few key factors introduced to agriculture during this time, however, foreshadowed the revolution that would fuel this trend and change agriculture in unimaginable ways. For example, the first practical grain drill and a mowing machine received their patents in 1841 and 1844, respectively. There was good reason for farmers to be attracted to ideas of efficiency and increasing the output from their labors; especially if this could be done while saving time and energy. By 1849, the commercial availability of pre-mixed fertilizers enabled farmers to enrich their soil by importing additional nutrition rather than remain limited to the byproducts produced on their farm, alone. (Derks, 2006, p. 249)

Over the course of the next half-century, amidst growing efforts to increase the fusion between agriculture, chemistry, and mechanical technology, the total measure of farmers in the United States had dropped to around 38% of the total population. (Derks, 2006, p. 251) Today, in 2017, this number has dropped to less than 2%. The industrial

economy that developed across this timeline had little room for small, diversified family or artisanal farms. Factories and standardization replaced the demand for skilled agricultural labor. Food production became less an individual or community-based activity and more a territory for the expansion of firms in agribusiness, bioscience, and technology. The greater context of these transitions is located within movements that fostered the diffusion of industrial capitalism in the social framework. Such developments in economic practices helped spawn a consumer culture that continues to be motivated by attitudes of self-interest and individual gain. These qualities have also systematically blinded our senses to the relationships between our activities and the health of our shared environment.

Perhaps one of the most telling examples of the dissonance that was created is evident within the dissolution of community-based agriculture, small, diversified farms, and the intimate connections to the natural world that prevail within that context. As agricultural goods and practices were redefined by the expansion of industrial capitalism, food became an economic variable, a commodity, and farming became a territory for mechanization and science – bound not to the interests of communities, but to those of corporations.

With year-round availability of “seasonal” fruits, vegetables, and meats we are left without a pressing need to understand the agricultural importance of the first or last frost. When to plant, when to harvest, how to prepare, skin, or de-bone a slaughtered animal is just the tip of the iceberg when it comes to the long list of accumulated wisdom once supporting communities across the nation. All this work is still done, though largely outsourced to the agribusiness and food processing factories; yielding mostly what

Michael Pollan (2006, 2010) regards as the “edible food-like substances.” These “foods” sometimes take on the appearance of recognizable provisions; however, they bear little resemblance to anything produced in nature. Processed and fortified to make up for deficits in taste and nutrition, they constitute the bulk of what we consume in a “Western diet” characterized by the ubiquity of highly-processed foods designed to target our gustatory desires - loaded with excessive amounts of salt, refined sugars, artificial flavors, and the preservatives needed to extend shelf life and transportation across long distances. Though they are appealing in taste and convenience, the vast majority of these products are, literally, killing us. Despite living in a culture fixated on ideas of beauty, fitness, and healthy living, mortality statistics suggest a different, and certainly paradoxical, reality in America. Diet and lifestyle-related illnesses such as heart disease, cancer, and diabetes are among the top ten causes of death in America today. (National Vital Statistics Report, www.cdc.gov, Dec. 20, 2013) It does not require a long stretch of the imagination to find reason to contend that an ideology rooted within the union of science and capitalism is the real object of consumption.

Industrializing Nature: Agricultural, Capital and Technology

Increasing both the scale and efficiency of production possibilities allured the progressive stakeholders of the emerging industrial economy. The foundation for this economy developed out of the feedback from dynamic relationships between tools, machines, technology, and the ongoing desire to test the limits of nature. At the dawn of the industrial era our potential to achieve greater yields from fewer people in significantly less time was realized. As successful as this endeavor has been, many unforeseen

consequences have accompanied its development. Among these consequences, which are too many to list or even understand, perhaps the greatest have been the deleterious effects on the natural environment. In *The Omnivore's Dilemma*, Michael Pollan (2006) remarks that people living in developed industrial societies are the most productive humans in the history of all time. In expanding our capabilities through the technological and scientific advancements in the past century we have issued nature a set of challenges far beyond those it has ever faced, and perhaps well-beyond the measure of its sustainable potential.

The spread of industrial capitalism, whether by establishing new markets or else overtaking existing ones, marks a point of diffusion for such technology. The rhetoric of opportunity and equality (“free market” and competition) promoted by capitalist beneficiaries alludes to the idea that everyone participating in the market economy will come out on top. The resources of nature, however, suffer the consequence of being useful – too useful. “Through the process of modern technological transformation,” writes Michael Hardt and Antonio Negri (2000), “all of nature has become capital, or at least has become subject to capital.” (p. 272) The division of labor created by industrial capitalism fosters ignorance and complacency towards local and global environmental crises and the unseen destructive effects of widespread consumerism. Further, Hardt and Negri regard the functions of continued technological innovations in their ability to “shift the terrain of conflict and defer [environmental] crisis.” (p. 459) Yet still, each new innovation merely patches the eventual faults of its predecessor whose limits are discovered. The agricultural norm in industrial, developed societies relies upon chemical and mechanical interventions to grow food – food that is produced in unprecedented

concentrations at a net energy loss and in locations far removed from the places it will eventually be processed or consumed.

There is great value in the knowledge accompanying an informed curiosity over food. In *The Omnivore's Dilemma*, Michael Pollan (2006) documents his quest to understand the many intricate, complex pathways that food in industrial food systems must travel from the field to the plate. His investigations strongly influenced the latest resurgence in interest regarding food and the components of the industrial system that produces it. Pollan's work also helped revive a genre of literature and film media interested in food-related subjects. Much of this work is connected by themes reminding a popular audience that the "farm-as-factory" arrangement to produce *commodities* in monoculture rather than *food* in a traditional polycultural sense is a product of the demands of the industrial food system. The contemporary "omnivore's dilemma" arises, in large part, from the complexities of such a system.

Pollan (2010) followed this with his text *In Defense of Food* to address some of the questions that come to surface while searching for solutions to the problems of this dilemma. His advice, "Eat food. Not too much. Mostly plants." (p. 1), was simple and informed by considering the rich logic of food culture that endured prior to the industrial take-over. In other words, Pollan is appealing to a time when seasons mattered and food rarely traveled further than it could be taken without spoiling. In other words, to the way people understood food before it became an industrial technology.

Placed within a historical context spanning many centuries up until the onset of industrialization in Europe and the United States, our connections to food and agriculture – domestication, growth, harvest, distribution, consumption – were, I contend, far less

complicated and perhaps more easily understood than our (dis)connections with them today. "The present agricultural economy, as defined by the agribusiness corporations," writes Wendell Berry (2002), "uses farmers as expendable 'resources' in the process of production, the same way it uses the topsoil, the groundwater, and the ecological integrity of farm landscapes." (p.17) This corporatized control over agriculture, economy, and the environment defines an ethic of power and a force of cultural hegemony that nullifies a community's ability to advocate for its own interests. The industrial models that have emerged through merely a few generations of people have impacted more than just agriculture, itself, but also in ways that have separated people from themselves and their internalized sense of value, from one another in a distorted view of community, and from the physical places they inhabit and ultimately depend upon for survival and quality of life.

Given this, and bearing in mind the conditions of the relationship between humans and the environment, there are a number of critical questions we should be asking ourselves and each other. What is the human role in ecological systems? To what acceptable degree should we employ technology against nature? Organized agriculture is, after all, a technology, but at what point does it become more than a subtle interruption of ecological systems? The future of science and technology must, I believe, work to accommodate and respect nature. One place to begin addressing these and other important questions is to first decide what the priorities should be.

The Land Ethic: A Framework for Ecology

I cannot offer a parsimonious account for the origin of my interests in the subject of nature. As far as I know, the reasons are as wide and varied as the experiences I've had both *in* and *with* nature – or at least nature as I understand it – over the course of my short lifetime. It is possible to isolate a few experiences where my emotions have crested, and while these events make for good stories, they fall short in capturing any semblance of the entire narrative.

Hunting, for example, has had a remarkably strong influence on my ideas and attitudes towards nature, but it is only one of the activities connecting me to it. Prior to the age of twenty, I hadn't once set foot inside a patch of woods with a rifle; let alone with intent to shoot an animal for food. Only a few generations ago this lack of experience would be unusual, but in today's context we find the opposite to be true. Largely due to the emergence of modern industrial agriculture, it has become possible – even a matter of custom and habit – for the average person to meet every dietary and nutritional need over the course of a lifetime without growing, harvesting, or processing even a single serving of just one meal. This is a phenomenon that is readily accepted in advanced industrial societies, and, above all else, illustrates the vulnerability of meeting our basic needs for food as much as it does the level of human intimacy with the environment.

The things that I have gained through hunting have helped me to understand what has been lost because it is no longer necessary. Perhaps the most important lesson is one shared by my experiences in livestock farming – another activity I hadn't been exposed to until I reached adulthood. What I'm referencing here is an appreciation for what it takes

to bring meat to the dinner table. Behind every hamburger, steak, and chicken sandwich is an animal that has been sacrificed, a person who has done the work to grow and process it, and an environment that bears the impact of all these efforts to support an industry to grow it.

A disrupted connection to nature parallels the malignancies that have overtaken an even greater sense of what it means to exist in a community. Losing this important sense of connectedness has made it relatively easy to continue the overcapitalization of natural resources. The idea that humanity holds a dominion over Nature is, I believe, severely misguided. Rather, our responsibility to nature is management. We can do this by using technology – both in the form of physical tools and the technology of ideas.

The primary focus of this work is to examine the condition of our relationship to the natural environment, or the human (dis)connection to nature. Perspectives on this topic emerge from a wide range of disciplines. As a collective, they create an intricate, multi-dimensional constellation of ideas that captures the total essence of our relationship to nature. The limits of time and space render any chance of accessing each of them, independently or simultaneously, impossible and restrict our knowledge to a limited understanding. Further, still, our experiences are censored by the contextual elements of our environment – many of which exist beyond our control. What does this mean? It means that we are incapable of omniscience and to be wary of dogma – its mortal equivalent. It also means that *choice* is a fundamental element that influences how we *know* the world as well as how we *act* in it.

This work has been conceived with such assumptions at the forefront of my inquiry. My critiques on the human relationship and (dis)connection to nature are

grounded in a theoretical space where I consider ways in which the interactions of science, technology, and economics converge upon nature. One of the challenges of discussing nature - as a place, thing, ideal, construct, etc. – is that it is not easily grasped. Because there are so many levels to understanding involved in the construct of nature, the ecological perspective offers the advantage of being adaptable to a variety of disciplines. Additionally, as a theoretical framework, ecology emphasizes notions of connectedness, interdependency, and equilibrium both among and within systems. Curriculum scholar Marla Morris (2002) writes:

An ecological paradigm webs consciousness back into nature. Consciousness situates us into the ecosystem, embodied creatures in continuum with the world. No strict boundaries or divisions separate conscious creatures from the ecosystem. ... Ecosystems are highly complex processes that are mysterious. However, one thing is certain: human beings are part of these ecosystems, not separate from them. (p. 579)

Lisa Given (2008) describes ecological research as an approach to understand the environment that is guided by two general interests. The first of these being a concern for the environment, itself, as well as “the relationship of the environment to humans and the impact humans have on the environmental health and sustainability.” (p. 237) The second is described as the conviction that “every phenomenon of interest needs to be understood in context; that is, in relation to other actors, events, practices, and policies within the global and local settings where it occurs.” (p. 237) Working to cultivate a full-bodied understanding of environmental problems under an ecologically-oriented approach often requires a hybrid methodology that draws insight from multiple disciplines. This

adaptability is one of ecology's strengths - inquiry models can transcend restriction to intellectual or otherwise ideological boundaries of a single field. While this dissertation is theoretical in form, this does not mean that the topics I discuss only exist "theoretically." Rather, the subject of my work considers issues that are quite tangible and real. Nature – how it is defined, whether it is consumed as capital or conserved as a resource, and the relationships that emerge from these decisions – is at the core of my inquiry throughout this dissertation. In the chapters that follow I develop a perspective that seeks an understanding about these topics through ecology, farming and agriculture, science and technology, and economics. My hope for this work is to inspire others to cultivate a sense of stewardship with nature and develop a sense of ecological literacy by rethinking the myriad connections we share with the environment.

Though the ecological perspective is richly diverse, it has a fundamental concern for improving the environmental conditions all future generations will inherit. There are forces that challenge our ability to "think ecologically," however. One of the lies in overcoming what some scholars have described as "Cartesian Anxiety." (Capra, 1996; Valera, et. al. 1991; Bernstein, 1983) Overcoming this condition requires we "[move] beyond objectivism and relativism, [in order] to find an alternative way of thinking and of understanding our being-in-the-world." (Bernstein, 1983, p. 165) Capra (1996) states that to overcome it we "need to think systemically, shifting our conceptual focus from objects to relationships. Only then can we realize that identity, individuality, and autonomy do not imply separateness and independence." (p. 295)

"Abstract thinking has led us to treat the natural environment – the web of life – as if it consisted of separate parts, to be exploited by different interest groups.

Moreover, we have extended this fragmented view to our human society, dividing it into different nations, races, religious and political groups. The belief that all these fragments – in ourselves, in our environment, and in our society – are really separate has alienated us from nature and from our fellow human beings and thus has diminished us. To regain our full humanity, we have to regain our experience of connectedness with the entire web of life.” (p. 296)

How have our ideas and attitudes toward nature been impacted by the economics of industrial capitalism and advances in science and technology? The convergence of these factors has guided the activities of developing societies in a number of ways. It is difficult, perhaps impossible, to isolate one from the other and rank them by degree of impact because each system is connected. Where are the limits to our applications of science and technology, and do our efforts improve upon nature as much as we might think? Solutions to these and many other questions are not, I believe, impossible to come by. Wendell Berry’s (1990a) contention that “eating is an agricultural act,” (p. 145) I am reminded that all people are united by food systems, and that rethinking the ways in which we participate in them can lead to an empowering energy.

Advancements in science and technology throughout the Industrial Revolution have catalyzed remarkable changes in the dynamics of the human-nature relationship. The curve of progress through technological innovation has redefined the boundaries of possibility several times over in just a few short generations of human history through the Stone, Iron, and Bronze Ages, and especially today as we find ourselves in the midst of ongoing industrialization.

This work considers the consequential developments brought about by science, technology, and industrial-capitalist economic ideology. My critiques draw upon the historical and contemporary contexts of the Industrial Revolution as it continues to provide traction for technological innovation that actively “Industrial Revolution” is helpful as a rhetorical construction, but its use can be a gamble – running the risk of simplifying an otherwise eventful history. Frank Elwell (1999) notes:

The term “Industrial Revolution” is really an arbitrary construct that stands for a very complex reality. The use of the term often leads us to treat it as a singular event when, in fact, the term is only an abstraction of an ongoing social process. There is no singular event that marked its beginning or ending except as defined by social consensus – it was not a thing but rather an abstraction that we use to break the continuous world of reality into a piece that we can manipulate. (p. 33)

The unprecedented advances in science and technology that emerged at the onset of the industrial Revolution had profound and far-reaching impacts. After establishing footholds in America’s developing economy, few activities or institutions existed beyond the reach of its influence. It is difficult to imagine the pre-industrial geography of Chicago, Boston or New York. Today, however, these and other cities bear the weight of infrastructure and population that characterize industrial supercenters. Vast networks of asphalt and concrete sit atop the same pathways once outlined by horseshoes and the ruts of slender carriage wheels. Even a modest-sized building by today’s standards towers above the largest of early nineteenth-century warehouses. The rapid expansions marking the earliest beginnings of America’s Industrial Revolution initiated a massive rural-to-urban migration that would transform the fabric of community in the United States while

setting the stage for a departure from the foundational agrarian traditions that characterized much of the country. The turn of the nineteenth century also brought about “the creation of an integrated economy in the United States, an economy that bound city and country into powerful national and international markets that forever altered human relationships to the American land.” (Cronin, 1991, p. xvi)

The history of our involvement with agriculture and food production follows a somewhat congruent historical trend. Agricultural economist John Ikerd (2008) writes:

If we as a nation were to realize the emerging opportunities of the industrial revolution – to become the modern society that we are today – we had to do two things. First, we had to free people from the task of farming so that they could go to work in the factories and offices of the emerging industrial economy. Second, we had to free up some of the income and other resources being spent on food and clothing so that people could buy the new things these industries were going to produce. In short, we had to make American agriculture more efficient. We had to make it possible for fewer farmers to feed more people at a lower real cost. (p.25)

Industrial agriculture worked to change the fabric of society in many ways. Under the economic stewardship of capitalism’s “free market” competition ideology food production has become the business of just a handful of multinational corporations who have seized control of all aspects of the food system – from the seed to the plate. The many progressive advances made possible through the early industrial movement were generally welcomed in America. And why not? Machines were making short work of tedious tasks – especially in the fields and factories – travel was made faster and easier,

and the sheer abundance of raw materials needed to fuel the rapidly growing industrial economy gave little reason to consider scarcity.

My Grandmother used to remind me of her upbringing and the rare occasions in which they were able to eat meat. In her day, a family member, usually one of her brothers, would be charged with the task of hunting for rabbit, wild hog, deer, squirrel, dove or quail which would be taken from field to table in just a few short hours. Nothing was wasted, everything was used (a habit she continued throughout her life), and what could not be saved or eaten would be given as gifts or used as barter with neighbors. This was common at the turn of the century (and actually still is in some places), and the difficulty of acquiring meats (raise it or hunt it) was probably the greatest reason our diets consisted mostly of plants and breads while meat was largely a side item. The industrial production of meat would change this by engineering methods to produce and manage animals on a large scale. Sacrifices would have to be made to support the newly-created demand for animals; especially when it became possible to package and transport foods across long distances in refrigerated spaces. “Agriculture,” writes Richard Levins (2010), “is not about food, but about profit. Food is a side effect.” (para. 12) Producers would need to find ways to make animal farming profitable at any cost.

The rapid development of new technologies helped dismantle the barriers and limitations that held back the progress of science by supplying researchers with the tools they needed to expand their inquiries into new territory. The bioscience industry has flourished under the convergence of industry, science, and agriculture while giving rise to the modern industrial-agriculture complex and “factory farming” practices. Rhetorical strategies and pseudo-scientific claims promoted under their union embody a campaign

of self-serving propaganda claiming to improve agricultural practices. (Nestle, 2013; Smith, 2003) These promises include increasing food yields and growing efficiency, eliminating world hunger, and healing the environment. The question at the heart of this issue begs to understand the motivations behind corporate-sponsored claims of altruism. Further, genetic patents have enabled a handful of food, chemical, and pharmaceutical corporations to control food production as well as access to the market.

If capitalism has encouraged the development of inequalities with regard to production power and market access, modern biotechnology continues to provide leverage by extending corporate dominance in the agricultural economy. The reduction of food to a genetically-modifiable substance has corporate advantages, but the impact on the consumer and the environment has yet to be determined. To be sure, this industry has enabled humans to be more productive than ever before, yet the costs for this progress have yet to be fully measured - though connections between people, the land, and their food have been weakened by this progress. industrial-economic influence.

Social Adaptations to Industrial Diffusion

Once, the governing human metaphor was pastoral or agricultural, and it clarified, and so preserved in human care, the natural cycles of birth, growth, death, and decay. But modern humanity's governing metaphor is that of the machine. Having placed ourselves in charge of Creation, we began to mechanize both the Creation itself and our conception of it. We began to see the whole Creation merely as raw material, to be transformed by machines into a manufactured Paradise. (Wendell Berry, 1977, p. 56)

The more we succeed in turning the earth into an inexhaustible inventory for human consumption, the more we abandon the postlapsarian vocation of care that turned human beings into cultivators of the mortal earth, as well as cultivators of our moral modes of being on the earth. (Robert Pogue Harrison, 2008, p. 166)

Frank Elwell (1999) contends that the most distinguishing changes over the course of the (ongoing) industrial revolution have been made possible primarily due to “the transformation of technology based on human and animal labor to technology based on the use of inanimate energy resources.” (p. 33) Technology was at the epicenter of the changing agricultural paradigms during the late 19th to mid-20th centuries as field and factory machines gradually took on the tasks that had traditionally been carried out by manual, human labor. Tractors and other engine-driven machines became emblems of progress as farmers realized a new opportunity to work the soil in volumes greater than ever before. These new production possibilities in agriculture would alter the exchange of goods and induce profound changes in the organization of labor. Deborah Fitzgerald (2003) writes:

The physical limitations imposed by nature have been circumvented by the endless possibilities of technology and science, and these in turn have transformed both farmers’ and consumers’ experiences. That has been the paradoxical story of American food and agriculture in the twentieth century: fewer people than ever before produce all the food. (p. 11)

The industrialization of agriculture in the late 1800’s marked the beginning of agrarian society’s decline in America. Supplanted by rapid technological advances and manufacturing efficiencies, society gradually rearranged beneath the hegemony of a

rising class of social elites who, through capital power and influence, became the stewards of a new industrial economy. The resources used in developing this system relied not only on raw materials and natural resources, but also, and most critically, on recruiting the energies of human labor; a supply of which could be sourced rather abundantly from the urban-to-rural migration.

Drawn by the perceived opportunity of stable work and a steady income, perhaps even the allure of even greater success and fortune within the booming manufacturing economy, many people abandoned what would have otherwise been their certain destiny to continue agricultural work and traditions in the same succession as their parents had once done. This opened up yet another market opportunity for the early capitalists to develop a new system of agriculture that relied on relatively fewer and fewer people to direct farming operations. To continue food production at levels required to satisfy even the basic nutritional needs of a growing population, technology and mechanization would be enlisted. John Ikerd (2008) writes:

Through specialization, standardization, and consolidation of control, we bent nature to serve our material needs. We gradually harnessed the vagaries of biological processes and transformed farms into factories without roofs. Our fields and feedlots became biological assembly lines with production inputs coming in and agricultural commodities going out. We achieved the economies of large-scale specialization production as we applied the principles, strategies, and technologies of industrialization to farming. (p.25)

"We in America," Ikerd continues, "are in the midst of a great social experiment - one being carried out by nonhuman entities that we have created and let loose to plunder

the earth." (p.53) These entities are, of course, corporations. Given the license to act as an "individual" within the legal framework of American business and society, a corporation wields enormous power and influence over markets proclaimed by capitalism's foundational ideology to be "free" and "open" to all competition.

Outside the Industry: What are the alternatives?

You know what the best kind of organic certification would be? Make an unannounced visit to a farm and take a good look at the farmer's bookshelf. Because what you're feeding your emotions and thoughts is what this is really all about. The way I produce a chicken is an extension of my worldview. You can learn a lot more about that by seeing what's on my bookshelf than having me fill out a whole bunch of forms. (Joel Salatin in Pollan, 2006, p. 131-132)

Fueled partly by anxieties over climate change resulting from poor environmental stewardship as well as a growing concern for personal and public health, a dynamic movement towards alternative food markets has emerged over the past decade. Its focus is defined by "connecting people, developing communities, spurring economic growth, and helping address a mounting environmental crisis." (Mikulak, 2013, p. 5)

A popular model for reversing the toll of industrial agriculture's (un)intended consequences can be found on a small family farm in Staunton, Virginia. Under the stewardship of Joel Salatin, Polyface Farms stands as a testament to what is possible when agricultural practices take advantage of what Salatin refers to as a plant or animal's "natural proclivity" to do work. Michael Pollan (2006) remarks that the methods used at Polyface "look an awful lot like the proverbial unattainable free lunch." (p. 127)

I had an opportunity to visit Polyface Farms in the summer of 2014 with my wife and oldest son. We were joined by roughly 1,200 other visitors from across the United States, Canada, and several European countries. The presence of eager anticipation filled the air as we made our way up a narrow path feeding into a green hillside pasture where several “mobile chicken houses” sat staggered across its length. Nestled in the middle of the Shenandoah Valley, every angle of the landscape contained the iconic emblems of pastoral-agrarian conventions. A thick layer of nearly a dozen grass varieties sprouted from the dirt below; making it difficult to imagine the conditions Salatin (2011) recalls from when his family acquired the land.

When our family moved to our farm in 1961, shale bedrock exposures on the hillsides provided a natural monument to years of soil loss under grain production. And now, after fifty years on these soilless barrens, using perennials and animals, lots of compost, and patience, the soil has rebounded and those wounds are covered with several inches of fertile soil. (Salatin, 2011, p. 35)

Our entire day was spent outside trampling through pastures of tall grasses, hopping fences, and investigating many of the shade and roosting contraptions used by the livestock. It was hot, humid, partly sunny and the air held a different aroma depending on where you were and which animal you were near at the time. Rain came during the mid-afternoon lunch break just as we found a spot to sit on beneath the roof of a wooden, open-air hay-curing shelter Salatin’s father had built some fifty years prior. As we ate, Joel stood in the middle of the hay barn and took questions. Towards the end of this session my wife, Kristan, asked “*What do you think about being a celebrity farmer?*” This was a serious directional change in the mood from previous inquiries! Joel was

tickled by this, and responded by asking us all, rhetorically, “*Why don’t we have more celebrity farmers?!*” He said other things, too, but this stuck with me. It is quite peculiar that, today, our general societal conceptions of farming are informed by images and understandings rooted in the outcroppings of a monocultural ideal and factory-based processing system. Farmers like Salatin were once the agrarian community standard – today, he’s an outlier.

Increasingly, farms like Polyface have sprung into operation across America as a consumer market for foods produced within the "alternative food movement" has gained significant traction in recent years. In a later chapter, I will discuss this renewed interest in food as well as the social, political, and economic factors that challenge widespread adoption of these alternatives in America.

First-hand experience of the hard work, financial risks, and unforeseen setbacks that challenge farmers and their families on a number of levels has been (and continues to be) the source of both energy and inspiration for this project. The opportunity to be a part of the establishment of a family-run farm has given me an immense appreciation for the work it takes to produce food outside of the industrial model. In an economy where “get big or get out” remains the dominant ideological framework in American agriculture, small and diversified family-run farms face costly, uphill battles to continue their work. Government policies and legislation that regulate the production and distribution of core agricultural products (produce, livestock, dairy, poultry and eggs) are designed to favor industrial agriculture and food processing; leaving the smaller producers with very little competitive edge while tasking them to comply to the same standards as their industrial counterparts producing or processing the same products. Until I became involved with

farming I had not considered the relationships between government and food, how my choices and preferences have been shaped by the many illusions provided by the industrial food system, or even *what* can be produced, *how* it can be produced, and *who* can produce it. Farming, and the community it has connected me to, has taught me valuable lessons about the importance of knowing who grows the food I eat as well as where it was grown.

Organization of Chapters

In Chapter 2, “Constructing Meanings for Nature: Integrating Science and Technology with Agriculture,” my inquiry focuses on the ways in which culture informs human understandings about nature and the elements we use in formulating definitions for it. I discuss the notion that nature as well as the ideas we have about nature are fundamentally human constructs and reflect the condition of our relationship to the environment. Additionally, I consider the impact of modern science and technology on human interpretations of nature. I offer the idea that we may gain telling insight about the human relationships to nature by considering our connections to food and agriculture.

In Chapter 3, “Industrial Values and the Economy of Nature,” I discuss capitalism and how the emergence of an industrial economy changed our relationship to the land, to one another in communities, and ultimately to ourselves. Drawing from the critiques formulated by Karl Marx, I explore the effects of industrial capitalism on society; including the alienation of people from the products of their labor, and the consequences of assigning capital values to nature. Another issue I consider within this context is the growing divide between people and the environment. Should humankind desire progress in the direction of reestablishing a healthy relationship with nature, I submit that one

place to begin is by recognizing the human impact on the environment – coming to terms with the Anthropocene, and what this nomenclature suggests. This also includes becoming aware of the connection between economic systems that commodify nature and (re)learning how to live in a society that rejects doing so.

Chapter 4, “A Crisis of Place and Culture: (Re)Partnering With the Land” deals with the collective cultural and environmental problems we face today. I argue that our continued embrace of technological advances has compromised a healthy, sustainable understanding of place and the importance of maintaining intimacy with the land. I discuss the need to revise scientific and economic ideologies that objectify living things (including our own kind) and reduce them to sets of isolated variables in order to cultivate a lasting partnership with the land.

In the final chapter, “Ecological Literacy and the Restoration of Community” I discuss the value of ecological literacy and how an ecological orientation within education and curriculum might improve our relationship to nature. I draw from the ideas of curriculum and education scholars C.A. Bowers, David Orr and Nel Noddings to discuss a way of reimagining education under the context of ecological mindedness. Finally, I suggest that we must develop a system of environmental ethics with a foundation that incorporates Albert Schweitzer’s “*Ehrfurcht vor dem Leben*,” or “reverence for life” and Aldo Leopold’s philosophy of the Land Ethic.

CHAPTER 2

CONSTRUCTING NATURE BY SCIENCE, TECHNOLOGY AND INDUSTRIALIZED SYSTEMS OF AGRICULTURE

For the better part of my life I've sought to connect with nature in one way or another. As a child, I had the privilege to play outside and explore the creek bed at the edge of my neighborhood. My friends and I lifted rocks in search of crayfish where the waters were clear and stepped cautiously along its steep, muddy banks. It's been close to three decades since I last stood in that creek or trampled through the surrounding woods. Though it's gone today – plowed through, clear cut, and paved over like so many other creeks that served as childhood venues – the memories and lessons endure within me; having cast the impressions for a mold that continues to shape my perspectives and interests today.

William Cronin's (1996) *Uncommon Ground: Rethinking the Human Place in Nature*, is one of the first, and perhaps most influential, texts I've encountered while broadening my understanding of nature. Cronin's intentions are clearly implicated in his introduction to “encourage greater reflection about the complicated and contradictory ways in which modern human beings conceive of their place in nature.” (p. 20) Cronin and the host of authors included within the edited volume would complicate my own definition of “nature,” and what is “natural” by suggesting that nature “is a profoundly human construction ... so entangled with our own values and assumptions that the two can never be fully separated.” (p. 25) In another work, *Nature's Metropolis: Chicago and the Great West* (1991), Cronin regards “nature” as a deeply problematic term, being “one of the richest, most complicated and contradictory words in the entire English language.

... The central ambiguity flows from the old dilemma about whether human beings are inside or outside of nature.” (p. xix) Both Georg Hegel and Karl Marx posited ideas of “first nature” (original, prehuman nature) and “second nature” (the artificial nature that people erect atop first nature). This dichotomy, considering whether we exist alongside (within) or outside and apart from nature, is only the beginning of conversations that complicate and challenge our ideas, attitudes, and beliefs about nature; conversations that are important to have especially within the context of today where technology leaves few assumptions unchallenged and the limits of humanity, much like nature, beg for revision.

The words *nature* or *natural* might evoke romantic imagery of pastoral landscapes filled with endless shades of green and sunshine, snow-capped mountains and undisturbed wildlife scattered throughout the diverse habitats of our planet. Perhaps warm breezes and the seductive aromas of native flowers, pine chippings, or damp, freshly-turned soil come to the forefront of imagination. What about the alternatives, though? When we envision nature do our thoughts gravitate towards tornadoes, earthquakes, wildfires, hurricanes and tsunamis? What about the acrid odor of an animal’s body during any stage of its decomposition? These qualities, and many more, are just as *natural* as any other despite the aversion we might feel towards them. Cronin (1996) contests that these slips into the idyllic representations of wilderness “tends to privilege some parts of nature at the expense of others.” (p. 86) “What we call landscapes are neither natural nor innocent; they are human constructs. How and why they were constructed (many would say “imagined,” or even “invented”) belongs to the stuff of history.” (Blackbourne, 2006, p. 15)

“Our ways of thinking about the natural world are powerfully shaped by our time, our place, and our culture. . . . Ideas of nature,” Cronin (1996) continues, “never exist outside a cultural context, and the meanings we assign to nature cannot help reflecting that context.” (p. 35) Similarly, Jennifer Price (1999) argues “nature is a place where we ground meaning about ourselves.” (p. 47) In my experiences, I’ve come to know nature as a place of refuge from the material culture of society. Nature is outside, unclaimed, honest, impartial and sovereign. Writer Bill McKibben (2004) captures one of the more elegant depictions of nature I have encountered that resonates with me and how I have come to relate to it:

What nature provides is scale and context, ways to figure out who and how big we are and what we want. It provides silence, solitude, darkness: the rarest commodities we know. It provides reality, in place of the endless electronic mirages and illusions that we consider the miracle of our moment.” (p. xix)

It is a place where time feels entirely different, and space is filled with something much older and greater than myself.

What Candice Slater (1996) terms the “Edenic narrative” probably best captures the collective preconceptions shared by others and myself who have been raised in Western culture and tradition. In the Genesis account God says to Adam and Eve, “Be fruitful and multiply and fill the earth and subdue it, and have dominion over the fish of the sea and over the birds of the heavens and over every living thing that moves on the earth.” (Genesis 1:28) In Eden there is no work, no pain, no violence or tragedy. Rather, God provides a sanctuary, a garden of ecological polyculture, where Adam and Eve exist as beneficiaries of the Creation. “This story presupposes an initial state of harmony and

perfection” with “the notion of human separability from, and potential mastery over, nature.” writes Slater. (p. 115) However, the period characterizing such a relationship is short-lived. A mere two chapters later in Genesis 3, the fall of humankind, *felix culpa*, represents humankind’s transition from beneficiary to laborer. Cast out from the Garden, to the east of Eden, God proclaims to Adam: “cursed is the ground because of you; in pain you shall eat of it all the days of your life; thorns and thistles it shall bring forth to you; and you shall eat the plants of the field.” (Genesis 3:17-18)

The first major literary work about human civilization’s destructive environmental impacts, as Roderick Nash (1989) points out, was George Perkins Marsh’s 1864 text, *Man and nature; Or, Physical Geography as Modified by Human Action*. Like many of his contemporaries, Marsh held to the conviction ascribing to the human domination over nature - provided that such domination was executed in care and with far-sighted vision. His book was produced in reaction to an overall failure to act in such manner. “Man has forgotten,” writes Marsh (2003), “that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste.” Anticipating the ecological challenges of the twentieth century, Marsh warned that the “interrelatedness of animal and vegetable life is too complicated a problem for human intelligence to solve.” Further, still, that “we can never know how wide a circle of disturbance we produce in the harmonies of nature when we throw the smallest pebble into the ocean of organic life.” Marsh proposed “geographic regeneration,” a great healing of the planet beginning with the control of technology. This, he continued would require “great political and moral revolutions.” He suggested that human custodianship of the planet was an ethical or “moral” issue, not just an economic one. It was right, in other words, to take care of

nature, wrong to abuse it.” (p.38) As agreeable as this may sound, it is problematic to assume that nature would be in perilous conditions in the absence of humankind. Further, suggesting that technological development will lead us to the solutions for ecological problems seems to ignore the fact that they are technological in origin. While I agree that science and technology are needed for restoring balance to ecological systems, it would be a great error to argue that they can accomplish this alone. Ecological problems need ecological solutions, and it will take a combined, sustained effort of a multidisciplinary approach – the sciences *and* the humanities, to speak broadly.

Perhaps inclinations to romanticize nature stem from a subconscious desire to dwell in an Edenic polyculture. In the prologue to *Biophilia*, Edward Wilson (1984) introduces the term “biophilia” (literally, “life-loving”) to suggest an explanation for “the innate tendency to focus on life and lifelike processes.” (p. 1) Biophilic attractions, Wilson (1993) argues, exist as behavioral consequences that are encoded into our collective genetic history. “For more than 99 percent of human history people have lived in hunter-gatherer bands totally and intimately involved with other organisms. . . . The brain evolved in a biocentric world, not a machine-regulated world.” (p. 32) Building on Wilson’s *biophilia hypothesis*, evolutionary biologists Judith Heerwagen and Gordon Orians (1993) contend that this affinity reaches beyond animate life forms to include the abiotic features that make up the physical landscape of our environment.

In *Gardens: An Essay on the Human Condition*, Robert Pogue Harrison (2008) employs the term “chlorophilia” (p. 43) as a nod to Edward Wilson’s biophilia hypothesis. For Harrison, gardens and the greening of industrial/urban spaces reflect special elements of human nature; emerging in all places across the history of time. “Our

human gardens,” Harrison writes, “appear to us like little openings onto paradise in the midst of the fallen world, yet the fact that we must create, maintain, and care for them is the mark of their postlapsarian provenance. History without gardens would be a wasteland. A garden severed from history would be superfluous.” (p. x) Harrison also argues the human condition might be defined by our peculiar affinity to commodify everything around ourselves. “One of the paradoxes of the present age,” writes Harrison, “is that our craving for more life is precisely what is driving us to re-Edenize the earth, to turn it into a consumerist paradise where everything is given spontaneously, without labor, suffering, or husbandry.” (p.164)

There are as many definitions for nature as there are utilitarian ends we can develop for its resources to fill. This, among other things, contributes to the wide-ranging degrees of rhetorical uncertainty in arriving at an agreeable understanding for it. At the same time, *nature* still captures enough wind in our conceptual sails to identify important common ground. One source of this uncertainty is rooted in the gradual merging of technology and society over the recent century. The resulting effects transformed humanity and nature, while simultaneously abstracting the conditions that define the relationships between them.

What, though, is nature? “In the pragmatic outlook on Nature,” writes American philosopher John Smith (1978), “there is an unmistakable duality and tension [that] manifests itself in the two faces assigned to Nature.” (p.50) The first, *nature as object*, sets aside all limits to technological control and the advancement of sciences for developing new strategies to manage environmental resources. Reduced to being

conceived of as mere *object*, nature becomes “denatured” and exploited of its materials; yielding copious amounts of pollutants and yet further environmental calamity.

The second, *nature as environment*, is constructed around a triad of conclusions. To begin with, the autonomous capacity of nature is affirmed by asserting the human role is not to assume control or transformation of nature, but rather to forge a relationship built on cooperation with it. Following this is the belief in continuity between humankind and nature – that humankind is an organic extension of it “encapsulated in a subjective tissue of experience ... where all communications take place through the medium of nature.” (p.54) The final area of this conception builds on the aforementioned belief in continuity and adds another element to its description. Experience “embraces contexts or meaning dimensions in such a way that one and the same object can be apprehended or experienced in many contexts.” (p.55) In other words, human interpretations for nature are shaped by the circumstances of our encounters with it. The influence of socialized norms as well as ideas reflecting culturally-specific values, among other factors, are homogenized as *the* lived experience in nature.

Human relationships to nature owe their salient, transitory qualities to the paradigm shifts experienced by the many fields of epistemology that inform them. In *The Structure of Scientific Revolutions*, Thomas Kuhn (1962) posited ideas to explain the process behind scientific revolutions and how the changes incurred that shape contemporary understandings, or frameworks, in the (broad) disciplines of science and philosophy. Kuhn explains that the catalyst for a revolution emerges when a paradigm is faced with anomalies existing models fail to explain or account for. The response to these situations manifests as a crisis; whereby the knowledge paradigm must adapt to the new

information – often requiring major revisions to its fundamental assumptions. “These transitions to maturity have seldom been so sudden or unequivocal,” Kuhn writes, “but neither have they been historically gradual, coextensive, that is to say, with the entire development of the fields within which they occurred.” (p. 21)

Paradigm shifts have redefined science and broadened the field of philosophy several times over since the record of Aristotle’s musing about nature in the eight books of the *Physics*. In Book II he submits that nature, or a product of and within nature is defined by the “principle or cause of being moved and of being at rest in that to which it belongs primarily, in virtue of itself and not accidentally.” (1984, p.192) In other words, nature consists of everything left untouched, or unmodified by human activity.

In the Western tradition, the word “nature” is rooted in the Latin word *nascere*, which translates “to be born, arise, and develop; come into being.” The Australian philosopher John Passmore (1974) explains this etymology suggests “the embryonic, the potential rather than the actual; an area still in something like its original condition and not yet developed.” (p.32) Drawing from this idea, Angelika Krebs (1999) submits “nature may be defined as *that part of our world which has not been made by human beings*, but comes into existence and vanishes, changes and remains constant in virtue of itself.” (p.6, emphasis in original) Further, Krebs clarifies the distinction between “artifacts” and “nature” by suggesting the following:

While there is pure nature – the moon, high mountains, desert wilderness, and the deep sea – there are no *pure artifacts*. For wherever human beings create artifacts, they depend on material they have not themselves created. In other words, they depend on nature. ... There is *pure nature*, but the amount of pure

nature is rapidly decreasing in our world. (p. 6, emphasis in original)

The connections between what we might regard as *pure nature* and what exists as *pure artifact* are anything but linear. The progression of our industrial age, accompanied by the development of global economic markets, mechanized systems of mass production, and instruments of technology, has further obscured this path. Whether or not nature is an independent, or otherwise socially constructed entity is a polarizing topic in environmental philosophy. The former situates nature outside of human ontology as an objective constellation of processes and events, while the latter maintains nature is always constructed by and through human interactions and institutions. "The practical and political implications of this question are far-reaching," writes Macauley (2010), "because they bear on whether the natural world should best be left alone, managed, reconstructed, restored, or even 'reinvented' as some writers argue." (p.84)

In *The Last Child in the Woods*, Richard Louv (2008) contends that our present cultural linkage to the land suffers from "a severance of the public and the private mind from our food's origins," as well as "a disappearing line between machines, humans, and other animals." (p.19) Life on this American "third frontier," as Louv characterizes it, is intricately woven between the fabrics of science and technology in such a way that existence beyond its obsession with "progress" has been made nearly impossible. The material infrastructure alone is inescapable - few physical things have been left untouched, and little time passes before humankind realizes another novel opportunity to render some other artifact of nature into a for-profit commodity.

Nature & Agriculture – (Re)Defined by Technology

“The Genie in the Flask”
 I opened up that magic flask,
 And *zoof*, up popped a genie.
 I thought he’d be my slave, but no –
 This genie is a *meanie*.
 Instead of filling every wish
 And doing all my bidding,
 He says that I must be *his* slave,
 And oh, he isn’t kidding.
 I sweat and cough with no days off
 From Tuesdays until Mondays.
 I cook his beans and scrub his back
 And wash his yucky undies
 And sweep *and* paint – this surely ain’t
 The magic I was hopin’.
 I guess in life it all depends
Which magic flask you open.
 (Silverstein, 2011, p.16)

As the morning sunrise began to crest the horizon over the east coast, my wife and I boarded a flight in Savannah, Georgia. Less than thirty minutes later we were securely cradled between the wings of our plane gliding effortlessly through the sky. The night’s dark shadows retreated as rays of sunshine seemed to gently pour across the landscape. Streetlights dimmed and the ground far beneath us began to take shape in clusters of houses, buildings, roads and parking lots scattered in all directions.

Our destination was Anchorage, Alaska, and the trip would take us across the entire continental U.S. – coast-to-coast (and then some) – in a little over seven hours of flying time and cover roughly 3,610 miles between the two cities. It was quite a treat to be traveling without any of our five children in tow, and instead of sleep through the flight we mostly kept our eyes glued to the window while tracking the position of our airplane on headrest video monitors. Below us, the landscape unfolded as one long, continuous display of geographic diversity. Small towns were connected by thin

highways that cut through the otherwise undisturbed ground. At our altitude, everything seemed to be still and silent beneath the cover of February winter.

Flying high above the land gives us a perspective that shrinks the measure of large cities. Their sprawl is reduced to a single image; as if the entire area has been staged beneath the lens of a microscope. The things and places we've built, the unmistakable markings of humankind were embedded with the land below. From there it is possible to see the earth that surrounds, moves under and through, all of these things; undeterred and prepared to reclaim it all should we abandon it. Moving past the edges of the metropolis, the scenery is replaced by the simplicity of pastoral landscapes associated with rural agriculture. Framed by the linear borders of fencing and harrowed soil, winter-hardy crops dress their fields in green. The tracks of irrigation pivots add to the geometry below by etching perfect circles inside some of these squares. Deep shades of brown soil, freshly tilled and primed for receiving the seeds of crops it will nurture into mature, energy-rich foods. Between the distant shorelines of the east and west, human civilizations outline an ongoing theme marked by transformation.

For the past decade farming and agriculture have become central to my life as well as a focal point of my academic interests. Between my experiences *with* farming and agriculture and my scholarly-orientations *about* farming and agriculture it has become a habit of sorts to think about almost everything in terms of its relation to these activities. During this time I have come to both know and appreciate the value of diversity and interdependence while also developing the habits of mind necessary for recognizing patterns and relationships between living things and features of the land. My attention has become oriented towards the details of nature that define my place, how it functions, and

how cycles of birth, life, and death are maintained. All of these experiences have enabled me to begin to develop an ecological literacy.

Such a perspective has informed my understanding of how agricultural practices are impacted by the adoption of science and technology in our society. Their transformative potential is remarkable; today's agriculture and food production systems bear little resemblance to earlier traditions that thrived on principles of species diversity, cooperative relationships, and the rhythmic oscillation of seasonal conditions. What was once largely a decentralized activity marked by communal responsibility and reflected knowledge accumulated by trial and error across generations has been eclipsed by decision-making logic rooted in industrial principles and economic paradigms that regard the environmental costs of production as inconvenient externalities.

Human endeavors in science and technology over the past two centuries have altered the structure of society and the condition of human relationships to nature at unprecedented speeds and scales. Improved communications and transportation speeds have created a true "global community." The pace of change and its impacts are perhaps best illustrated by practices and methods of modern agriculture. Until recently, the technologies involved in growing, harvesting, and transporting food hadn't changed in many remarkable ways except for, maybe, railroad and refrigeration. Today, *what* we grow and *how* produce it are things of modern marvel.

The success of every effort throughout the history of agriculture has been to subdue nature and develop a system where it is possible to manage the growing stages of living things. The strategies we use to achieve this have changed under the direction of technology (tools) and science (the ability to develop the tools) in a long march towards

achieving greater efficiency in our efforts. The transformation of agriculture into an industrial enterprise is a great example of our affinity for remarkable production ratios. Fewer farmers exist today than ever before in human history prior the onset of the Industrial Revolution, and still the capacity for growth continues to expand. Farming is an activity of balance that is intimately connected to as well as dependent upon the overall health of the land. The cultivation of nature as organized agriculture is both an invention and hallmark occupation of developed civilizations – their scale and complexity strongly correlated by degrees of economic and technological scaffolding erected beneath them. The emergence of agriculture marks a truly significant turning point in human history as it represents, among many things, our submission to exist and subsist on the rhythmic patterns of nature.

Haber-Bosch

In 1840, German chemist Justus von Liebig demonstrated that plant growth is essentially limited by the element that is present in the soil in the least adequate amount. In other words, the growing potential of a particular area depends on the availability of the scarcest resource - the limiting factor - and not the total amount of resources available. Referred to as “Liebig’s Law of the Minimum,” or “Liebig’s Law,” it served to outline the limits of agricultural productivity.

The solution to this problem would arguably be the 20th century’s single greatest advance in science and technology and support an unprecedented rise in population the world over. Leading scientists today estimate that by the year 2025 more than one-half of the world’s total food production will come to rely on it: fertilizer. (Smil, 2011) By 1909,

after years of experimentation, Fritz Haber and Carl Bosch, of German-based chemical company BASF successfully demonstrated a reliable and effective process capable of producing ammonia by combining the atmospheric elements of nitrogen (N) and hydrogen (H) under high temperature and pressure. In this way, the Haber-Bosch process could synthesize ammonia out of thin air for fertilizer production. It was the catalyst needed in order for industrial-scale agriculture to develop. Nitrogen, a critical element in soil fertility, could now be readily supplemented to the land; granting new potential for growth and abolishing the restrictions outlined by Liebig's Law.

The new edge provided by the Haber-Bosch process and manufactured synthetic fertilizers made industrial-scale agriculture a real possibility. Prior to the widespread availability of synthetic fertilizers, organic wastes such as urea and manure from livestock, as well as unusable remains from the previous season's crop, were virtually the only fertilizing options available to farmers. Gathering, storing, and spreading the nutrient-rich matter required a great deal of time and energy. Additionally, farmlands were periodically laid fallow, or given a season of rest and left unplanted in order to naturally regain precious elements and minerals needed to support future crops or livestock. Unplanted fields, however, were of little use to farmers who depended on a seasonal harvest for income.

The rapid growth of human populations over the past three centuries is a directly related to advances in science and technology – specifically, in their outcomes being applied to agriculture. We live in remarkable times where technology underscores nearly every activity, and perhaps to the point where our separation from it becomes more unimaginable by the day. We are both enamored by and dependent on the technological

as it surrounds us in scales big and small, visible and hidden, and on levels both conscious and imperceptible.

Wes Jackson (2011), agronomist and founder of The Land Institute, describes modern industrial agriculture as a “failure of success;” whereby an array of negative, unforeseen consequences, have grown out of our efforts to develop a seamless connection between agriculture and technological capabilities. This nature of this connection, however, is extremely problematic. Having developed an agricultural system whose success depends on our continued ability to supply artificial fertility to the soil, it appears that we have painted ourselves into a corner with our own ingenuity. “Synthetic nitrogenous fertilisers now provide just over half of the nutrients received by the world’s crops,” writes Vaclav Smil (2011) “... [and] without the use of nitrogen fertilisers we could not secure enough food for the prevailing diets of nearly 45% of the world’s population, or roughly three billion people.” (p. 12)

In addition to the dependence on synthetic fertilizers to support today’s crop yields, the monoculture-based planting system employed in industrial agriculture also demands the application of yet more chemicals such as insecticides and herbicides to combat unwanted weeds and aggressive attacks from insects lured in by the promise of a great meal. Industrial agriculture is a highly evolved network of interrelated systems capable of producing an immense amount of food. However, it is a system entirely dependent upon fossil carbon resources, and when they are gone, so are the living beings who are supported by it. Jackson (2011) remarks, “We need food, yet the way we are producing it today undermines the basis of our very existence.” (p. 54) This dependency on unsustainable, artificial means reminds me of Henry Thoreau’s (2004) declaration in

Walden that “men have become tools of their tools.” (p. 34) I doubt that Thoreau could have imagined his observations would endure such a long history; a critique that maintains a remarkable degree of accuracy even today.

Both the modern agricultural system and the industrial food system are proxies that help position a critical study surveying the relationships between people, industry, environment, and education. These relationships, I contend, suffer from the obscurity that has been brought about during the long march towards agricultural industrialization in America. This has created a void separating us in a physical and spiritual sense from the land, as well as each other through community.

Journalist and food writer Mark Bittman reminds us that up until around 1900 – prior to the meteoric rise of industrial food and growing popularity of factory farming principles – everyone’s eating habits reflected “locavore” principles. People didn’t call themselves that because they didn’t know any different. In the absence of packaged snacks, vending machines, frozen and microwavable meals, boxed dinners, etc., more people cooked and prepared what they ate. There was no “omnivore’s dilemma.” There was just food. The social fabric was generally such that every family had a cook. Today, however, adhering to the diet of a “locavore” requires a tremendous amount of time, effort, and planning in order to preserve the integrity of the title. Eating locally, despite rising trends in its popularity, has perhaps never been so difficult or expensive.

When foods began to travel across long distances in the 1930’s refrigeration and preservatives enabled producers to expand their markets, and diets gradually shifted to accommodate new types of food and products. Over the years seasons would virtually disappear and you could enjoy tomatoes, oranges, corn, and grapes (just to name a few)

all year long. Food was becoming more convenient, it was getting cheaper, and farmers began to specialize in growing fewer crops. For the first time ever, small family and community farms were beginning to disappear – giving way to larger, more efficient and centralized operations.

Fast-forward to the 1970's – an era of revolution and resistance. Movements began across the country where people really started to examine the value of food and ingredients. By then, though, any battle to dramatically reform the food system had already become an uphill one – a David and Goliath type situation. By this time we had already settled into knowing industrial food as the norm.

Recalling, once again, Wendell Berry's (1990a) contention that “eating is an agricultural act,” (p. 145) I am reminded that we are all part of a (broken) food system. This work is offered as a defense for rethinking the value of food in our lives as much as it is a reminder that everyone has the potential to increase or revise their agricultural roles. The state of our food system is, after all, a democratic issue in desperate need of attention. In *The Seed Underground: A Growing Revolution to Save Food*, Janisse Ray (2012) writes:

[W]e are all increasingly helpless to provide food – not to mention good food – for ourselves. We are like infants needing to suckle at the bottles of corporations, which makes us dependent. And oppressed. ... If corporations own our food supply, then they own us. The ability to feed ourselves ensures our freedom.

(p.43-44)

Few people today, I believe, have a genuine sense of the feelings tied to this measure of freedom. Lacking the knowledge to experience it, however, is a small barrier to overcome

when introducing people to the idea of taking an active role in either producing their own food, or working closely with someone who can. Abandoning all of the technologies that have enabled us to reach extraordinary levels of productivity would be as irresponsible as choosing to develop them towards unsustainable ends. Instead, blending available technology with goals focused on incentives to increase community engagement and local economy can serve as a starting point to build upon. Pre-industrial agrarian traditions such as those that worked *with* seasonal rhythms instead of disregarding them can serve as a guide to “re-discover” practices that were “sustainable” before sustainable became a political buzzword or commercial trend. Additionally, agricultural strategies utilizing naturally-occurring or selectively bred biological traits to and solar power to produce a polyculture of nutrient-dense, regionally and seasonally-available foods have the added benefit of simultaneously improving soil quality.

CHAPTER 3

THE ECONOMY OF NATURE: CAPITALISM AND THE DEVELOPMENT OF INDUSTRY AND TECHNOLOGY

The next time you find yourself in a room filled with awkward silence and in the company of other quiet intellectual-types, try breaking the ice with a statement like this: “Which is the biggest killer, capitalism or organized religion?” If it doesn’t catch on after about ten seconds, press your new audience with the question again, but this time add a little more inflection and some eye contact to nudge them along. Results will vary.

I haven’t actually tried this, but in my head I’ve imagined dozens of these blitzkrieg social experiments. In the scenario just mentioned, economics and religion are squared off against one another to see which of the two harbors the deadliest force. When we trim away the details, however, it might become clear that their impacts are one and the same – united within the greater context that defines our history. Economics has been a factor in shaping the context of life long before we began to conceptualize things or events as “economic.” Every decision we make, in fact, can be understood as an outcome we negotiate under the pressure of resource scarcity.

Economic forces play an important role in determining the relationships between humans and technology. Similarly, examining these relationships with a perspective oriented by economics highlights these dynamics in ways that might otherwise be overlooked. Applied to the previous discussion about technology and agriculture, for example, and the current industrial system is understood to be an outcome of managing resources more effectively, or otherwise a process by which capital owners seek maximum gain from minimal resource input.

The condition of human-nature relationships is an undertone I wish to preserve throughout this dissertation, and in this chapter I want to broaden the scope of my inquiry regarding relationships between humankind and nature as influenced by economic forces and industrial-technological development. Additionally, I examine the dangerous environmental consequences of industrialization as functions of self-interest, profit-motivated economic systems. Norman Wirzba (2002) poignantly articulated, “the intimate and concrete knowledge of our dependence on others, human and nonhuman, has been usurped by the industrial practice of human control and self-interest” (p.ix)

The economies of today’s advanced industrial societies have long outgrown the local markets they began in. Instead, economies have evolved a dependence on global systems of networking between resources and exchanges with other economies. This expansion has brought wealth and prosperity to some areas, but I believe its shortcomings far outweigh the benefits. Perhaps this is most obvious when considering environmental costs and the failure of modern economic systems to develop strategies that resolve the deleterious environmental impacts of its own activities. It might be the case, though, that economics is simply unable to provide solutions to the problems it helped create. The late economist John McMurtry (1999) warned against the influence of corporations as yet another factor to overcome:

And so we will be wrong if we attempt to correct what we perceive as ‘environmental’ problems without correcting the influence of corporate behavior. This is sufficiently clear to many of us. What is not sufficiently clear, perhaps to any of us, is the extent of our complicity, as individuals and especially as individual consumers, in the behavior of the corporations. (p. 250)

McMurtry advocated an economic system which embraced what he termed *life sequence of value*, “the ultimate reference body of any economic organization which produces and distributes for its human members’ continued and improved existence, rather than against it.” (p.151) Guided by such principles, McMurtry believed humanity would improve quality of life for all of its kind while, at the same time, act as responsible stewards of nature and the resources within.

Marx on the Economy of Nature

Human existence has always been defined under a context framed by the intersection of natural laws, environmental conditions, and the perspectives from which our relationships to them are interpreted. It is a difficult task to make sense and track the details of all this change given the limits of memory and general disagreement among narratives to recall and interpret the past. Perhaps the most unreliable narratives are those that privilege humankind with ultimate control and dominion over nature. The industrial transformation that emerged in Western Europe during the late 1700’s and breathed life into economic possibilities on a scale which had yet to be witnessed by any civilization. The untapped, seemingly endless supply of raw materials and natural resources were the catalysts that enabled industrial development in America.

The present conditions of our relationship to nature are heavily influenced by science and technology. But not *just* science and technology because what matters most is exactly *how* they are used, *who* gains, and *who* loses. Karl Marx’s critiques of capitalism came during industrialization’s infancy. Though his predictions for a proletariat uprising have failed to materialize, his analyses continue to serve as a framework to conceptualize

relationships in many capitalist market societies. In *Das Kapital*, Marx's (1952) thoughts were ahead of their time as he discussed the effects of capitalist economics on the environment. He writes,

Capitalist production, by collecting the population in great centres and causing an ever-increasing preponderance of town population, on the one hand concentrates the historical motive-power of society; on the other hand, it disturbs the circulation of matter between man and the soil (i.e., prevents the return to the soil of its elements consumed by man and the form of food and clothing); it therefore violates the conditions necessary to lasting fertility of the soil. By this action, it destroys at the same time the health of the town and the labourer and the intellectual life of the rural labourer. (p. 249)

Throughout the American Industrial Revolution, rapid and sustained economic growth became the foundation of a number of social and environmental changes. At the turn of the nineteenth century the spatial distribution of human populations in the United States began to shift as the rural-to-urban migration initiated a trend in the country's de-agrarianization. According to the U.S. Census Bureau's (2002) report on demographic trends, 28.4% of the U.S. population in 1910 resided in metropolitan areas. By 2000, this estimate had increased to 80.3%. (np) Perhaps the most discomforting transformation can be described in the paradoxical character of contemporary social relationships and interpersonal connectedness. Social critics have observed that despite widespread increases in population density, a common sense of *community* continues to erode. (Marx predicted the alienation of workers from their work and from each other.) Additionally, industrial capitalism has effectively released modern society from pre-industrial

inconveniences while simultaneously disengaging people from nature – rendering it as yet another platform from which production of goods and services can take place. As Neil Smith (2008) observed, “in its constant drive to accumulate larger quantities of social wealth under its control, capital transforms the shape of the entire world. No God-given stone is left unturned, no original relation with nature unaltered, no living thing unaffected.” (p. 7-8)

In developed parts of the world where neither our needs nor our wants seem to have any form of exhaustible limit, the satisfaction of one desire only makes way for another. Consumption is as much a part of life as anything else we do, and to an extent always has been. In times where people had little more to do than fulfill life’s basic needs, the range of consumptive activities was quite limited. However, in the relatively short period of time since the forces of industrialization transformed societies the world over, the possibilities for what things might be consumed has surpassed all conceivable limits. We are so accustomed to living in the midst of consumption that it is difficult to identify any pattern of human life not connected to it. The term *consumer* is as synonymous to *citizen* as it is *person*.

The early industrial economy flourished under the increased centralization of manufacturing and production powers while effectively widening the gap between social and economic classes. For Marx, one problematic result emerging from this movement was the dehumanization of workers and reduction of people into mere economic variables and manufacturing resources that served the productive aspirations of the *bourgeois capitalist*. Marx argued that social and economic inequalities were inevitable byproducts of capitalism, with power always skewed away from the *proletarian* masses selling their

labor. Additionally, the “free market” ideology provided the conditions necessary to promote the growth of firms beyond the immediate community. Marx was equally troubled by the industrial movement’s rapidly increasing pressure to environmental and ecological systems. The procurement of raw materials needed to support the development of industry and early capitalism in America placed a tremendous tax on the land’s natural resources to manufacture goods – the vast majority of these goods being of *manufactured want*, themselves. The environmental exploitation fueling this rapid growth provided significant leverage in its drive towards becoming a global industrial power.

The environmental crisis we face today is arguably rooted in the cumulative effects of human interactions with nature through the development and spread of capitalism. As Neil Smith (2008) observed “with the development of capitalism, human society has put itself at the center of nature.” (p. 8) We live, literally, on land and in spaces that have been transformed into sites of excavation - where environmental stewardship is (mis)guided beneath hegemonic principles defined by capitalism. Transportation technologies and the expansion of the capitalist marketplace further exacerbated the environmental impacts of the Industrial Revolution. In *The Grundrisse*, Marx (1971) provided untimely insight and recognition of industrial capitalism’s reckless environmental aggression, observing that it must “seek to pull down every local barrier to commerce in order to capture the whole world as its market,” as well as “destroy space by means of time, [restricting] to a minimum the time required for movement from one place to another.” (p. 119)

In a capitalist economy, commodities exist as either goods or services that are produced for sale in order to make a profit. The important thing about commodity

production is that there is no necessary relation between the usefulness of something and its economic value or profitability. Marx (1952) explains, “The wealth of those societies in which the capitalist mode of production prevails, presents itself as ‘an immense accumulation of commodities,’” which are singularly defined as “an object outside us, a thing that by its properties satisfies human wants of some sort of another.” (p. 13)

Marx’s critique of economy lends a perspective I believe is useful for highlighting certain dimensions of the human relationship to the economy of nature; namely the processes that render nature into a source for capital commodities, and our connections to the ecology of the environment’s biotic and abiotic features.

As a source for commodity production, nature is cultivated for extracting materials that provide energy and raw materials. These activities establish the value of natural resources in relation to their use and potential for returning a surplus of capital beyond the original investment. In other words, utilitarian principles become the foundation for human relationships with nature; our estimations of value are restricted to the potential for economic gains. Beyond material resources, nature might also be cultivated for its metaphysical appeal through elements constructed by culture. In this sense, idealized forms of nature are developed through images or narratives. This strategy has been widely adopted by product labels that incorporate images of pastoral landscapes and agrarian simplicity. Packaging that suggests rural or wilderness-origins, in particular, often accompany food products.

Under capitalism, and especially within the context of its practices in the industrial West, commodification is a strategy used to reduce things to a *value* representable by or as *currency*. People, according to Marx, by providing the “*labor*

power or capacity for labor” (p. 79) are also resources in possession of a useful marketplace commodity. “On this assumption,” writes Marx, “labor power can appear on the market as a commodity only if, and so far as, its possessor, the individual whose labour power it is, offers it for sale, or sells it, as a commodity.”

The demand for production efficiency and the factory assembly-line has had lasting impacts on our attitudes towards labor, itself. Specifically, the tools and skills that accompany what we know as craftsmanship. When labor is a commodity, and the things we produce are of little value or interest to ourselves – the art or creation is lost. Our efforts leave us not only alienated from the things we do and make in labor, but also from the very nature of ourselves. Marx (1952) wrote that alienation of labor consists of

work that is *external* to the worker, that is not a part of his nature, that consequently he does not fulfill himself in his work but denies himself, has a feeling of misery, not of well-being, does not develop freely a physical and mental energy, but is physically exhausted and debased. (p. 169)

Though Marx’s critiques in *Capital* were formulated to address social consciousness and being in the context of 19th century Europe, his ideas continue to highlight conditions in modern industrial-capitalist societies. In Marx’s time, factory labor and commodity production was on the rise, and industrial forces were actively transforming relationships between people, the work they were doing, the objects and ideas they valued, and, ultimately, one another. These conditions gave way to Marx’s idea for “commodity fetishism” whereby commodities are perceived to enact a strong degree of influence on the development of social relationships. Marx (1952) writes:

The mysterious character of the commodity-form consists therefore simply in the fact that the commodity reflects the social characteristics of man's own labour as objective characteristics of the products of labour themselves ... it also reflects the social relation of the producers to the sum total of labour as a social relation between objects, a relation which exists apart from and outside the producers. (p. 14)

These factors significantly influenced remarkable social changes – commodity fetishism encouraged people to develop stronger relationships to objects than to one another. Industrial-capitalism escalated the consumption of natural resources to unprecedented levels. The demands for natural resources remain endemic to capitalism's growth, posing even greater challenges to future generations in all realms of ecological existence.

Ecology: Western Science and Environmental Crisis

Ecology is a diverse paradigm of study that analyzes interactions between organisms and the environment. The scope and nature of inquiry within the field is broad, ranging from microscopic to planetary-level systems. Ecology is a dynamic field, as well, that must adapt its methods to the currents of change that permeate all networks of living things. Technology, especially that which has improved the speed of transportation and communication, has strengthened the degree of connectedness and accessibility between people and places. Measuring the effect of one event on another as a function of distance has, in many instances, become obsolete. The perspective offered to us by ecology can provide feedback that is useful in developing practices for the future.

Ecology, though, is not immune to the dangers of misinterpretation or inability to predict unforeseen consequences of events. Donald Wooster (1994) reminds us that ecology, like all science, is “rooted in their cultural subsoil ... validated by personal as well as social needs.” p.(xi) Contemporary practices in ecological research originates from the same opposing ideologies regarding the relationship between humankind and nature. The Arcadian tradition argues for a peaceful co-existence between humankind and all other forms of life. Nature, this view holds, is not *outside* of us, but *part* of us, and a responsible approach to nature is thus one that follows the path of least destruction. On the other hand, the Imperial position contends for humankind’s dominion *over* and *above* nature. With science and reason, mankind is charged with subduing nature into both artifact and resource for his own benefit.

In his famous essay *The Historical Roots of our Ecological Crisis*, historian Lynn White (1967) observed that “all forms of life modify their contexts.” (p.1203) The difference with humans, though, is the remarkable scale of environmental modifications and the lasting impacts wrought through them. White’s essay critiques the Western influence of an “arranged marriage between science and technology,” which marked a “union of the theoretical and the empirical approaches to our natural environment.” (p.1203) The implications of this relationship are profound – especially with regard to the development of industrial society. White asserts that our acceptance of it marks “the greatest event in human history since the invention of agriculture.” (p.1203)

As the title suggests, White’s essay argues the historical roots of our ecological crisis. He credits these as being located within the influence of Western Christianity. “What,” he asks, “did Christianity tell people about their relations with the

environment?” While exegetical commentary on the creation narrative in the book of Genesis identifies various conclusions, perspectives favoring humankind’s dominion *over* nature appear to prevail. White writes “in its Western form, Christianity is the most Anthropocentric religion the world has seen.” (p.1205) He continues,

Man shares, in great measure, God’s transcendence of nature. Christianity, in absolute contrast to paganism and Asia’s religions, not only established a dualism of man and nature, but also insisted that it is God’s will that man exploit nature for his proper ends. (p. 1205)

According to White’s analysis, the task and reward that motivated scientists across the long timeline of formative years marking the establishment Western science was “to think God’s thoughts after him.” As such, White concludes “modern Western science was cast in a matrix of Christian theology. The dynamism of religious devotion, shaped by the Judeo-Christian dogma of creation, gave it impetus.” (p.1206)

I must clarify that White’s essay is not a condescending attack on Christians. Rather, White’s historical audit is an attempt to conceptualize the influence of religious authority over science and technology and the emergent ecological relationships between humankind and nature. The spread of Western civilization has largely occurred under the context of Judeo-Christian dogma. Science and technology also being enlisted as tools during this time to aid the ideological diffusion and support “improvement” or “progress.” The extent to which they have been set about to “improve upon nature” under Christianity’s ideology that asserts transcendence and rightful mastery is the problematic feature of humankind’s bearing towards ecology.

Limits to Growth The Economics of Nature: Nature as Capital and Resource

Every environmental crisis we face today originates from human activities initiated under the bearings of our own economic reasoning. Scarcity, which is the fundamental concern of economics, is a condition that has been shared by all living beings across the history of time. The early capitalists of the industrialization movement hardly considered the possibility that the resources being extracted from nature to build their empires were subject to the issue of scarcity. The supply of raw materials – lumber, metal, minerals, freshwater, nutrient-dense soils, animal fur, oil, etc. – showed no sign of interruption. There was, after all, a vast amount of territory to the west, which had yet to be explored for what it had to offer.

The economy of today is one that continues to thrive on capital resources extracted from nature, though our methods and strategies have adapted to the acknowledgement of resource scarcity. Between then and now we have also awakened to the effects of our dependency on nature as capital and the reality that the material desires fostered by our economy outgrew the capacity of nature to provide for unsustainable human demands. Economists Edward Barbier and Anil Markandya (2013) explain that the degradation of our environment and its resources

reflects the actual value of goods and services produced by the environment.

As a consequence, when natural resources and the environment are used by the economy as sources of raw materials, energy and land or as a waste sink for pollution, it is often unclear what valuable environmental goods and services are sacrificed. (p.54)

It is also often the case that we assume use of these resources comes without a cost and the tendency to overuse the environment goes unchecked. Our tendency to assume the costs we are negligible equates to the idea that resources can be used freely and ultimately become overused.

Conventional, or neoclassical, economics is a refined view of how capitalist economies function. Though there are subtle variations between the existing frameworks of capitalism across societies, it is commonly assumed that people, acting as individuals or else collectively as part of a household, are in pursuit of circumstances that maximize their well being and comfort. To achieve this, people spend their income purchasing commodities, or goods and services, they either need or desire to have. This is an exchange referred to as consumption, and it is what sustains economies.

In *Beyond Growth, The Economics of Sustainable Development*, Herman Daly (1996) observes that the factors limiting economic growth are embedded within the frameworks of biophysical and socioethical systems. Features of the biophysical system are divided into three areas: fixed resource quantities, the principles of entropy, and the complexities arising from ecological interdependence. Accordingly, Daly explains that the economy is essentially “an open subsystem of our finite and closed ecosystem, which is both the supplier of its low-entropy raw materials and the recipient of its high-entropy wastes.” (p.33) Economic growth, then, is limited by the fixed size and resource availability within our environment, or, rather, the network of systems within our ecosystem.

The Anthropocene

Aside from the ones nature defines for us, or, rather we might define for nature, there are only a few laws to explain the order of things. Science, religion, or any one of a number of ideological frameworks gives us reference to understand this order; while at the same time flags our point of departure along the phylogenic line. In so many ways we are perhaps the most unusual form of life on the planet. Our “condition” is a thing of concern, and always has been to one extent or another. The collective of our historical narrative, however, does little to argue our ability to learn from the past. Purpose and practice, it might seem, are not meant to oscillate along the same path. This activity of self/species-evaluation in attempt to define the human condition yields an ever-changing body of polarizing speculation. No matter the conclusion, perhaps what is most telling about humankind is the willing gravitation towards cognitive dissonance.

In the last year of the 20th century, scientists Paul Crutzen and Eugene Stoermer (2000) petitioned the communities of environmental scientists, authors, activists, and politicians – everyone – to reconsider the nomenclature that defines the context of our present geological age. The *Anthropocene*, they declare, rhetorically captures the scale of influence human activities have on global environmental conditions. The growing impacts of human activities on earth and atmosphere,” write Crutzen and Stoermer, “including global scales it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing the term ‘Anthropocene’ for the current geological epoch.” (p.17)

Over the past three centuries, human populations have risen nearly tenfold to reach an estimated level of around 7.3 billion people, today. This dramatic increase is a

consequence of our evolving capacity to extract fossil fuels and convert their energy into usable forms. The evidence presented by Crutzen and Stoermer is hardly a testament to mankind's careful, well-intentioned stewardship of the Earth and her resources. Instead, the human impact on the global environment is revealed to be highly problematic. Nearly "30-50% of the planet's land surface is exploited by humans" (p. 23) for agricultural purposes such as rearing livestock, crop production, and forestry. Maintaining these agricultural practices that we have come to depend on, "more nitrogen fertilizer [must be] applied than is fixed naturally in all terrestrial ecosystems." (p. 23) In addition to this, "dam building and river diversion have become commonplace" in efforts to harness energy in ways alternative to burning fossil fuels. "More than half of all accessible fresh water is used by mankind," Crutzen and Stoermer further note, while fishing industries are responsible for removing "nearly 25% of the primary production in upwelling ocean regions and 35% in the temperate continental shelf." (p.23)

The cumulative effects of mankind's activities – arguably those primarily contextualized by efforts to expand technology and control over natural processes – have "largely been caused by only 25% of the world population." (p. 23) In their conclusion, Crutzen and Stoermer argue that unless otherwise interrupted by disaster of a global scale, "mankind will remain a major environmental factor force for many millennia." As the Anthropocene era continues to develop, it is clear that the human challenge to the health of the environment will only increase in scale and complexity.

Of all the activity that has taken place on Earth, the human presence has made itself felt like no other before in the history of the planet. Consider this within the context of time – during the nearly 4.3 billion years that Earth has existed, no single species of

life has made such an altering impression - and in such short time. Apart from the dangerous and uncertain consequences produced by this, it's hard to deny that humans have demonstrated a remarkable force of will and adaptability.

Technology has followed along a steady curve of development where major improvements in efficiency and diversity in application emerged through the Stone, Iron, and Bronze Ages. The Anthropocene, however, stands in remarkable contrast to these as a time where humans are changing the environment in profound, irreparable ways. The technology curve has accelerated at a faster rate than ever before – perhaps faster than both society and nature can reasonably adapt. The grand effect of our influence is manifest by the disruption of natural cooling cycles that had remained relatively stable over several million years. Data models indicate that our global temperature averages should reflect a gradual period of cooling; however, they indicate just the opposite to be the case. This is one reason why many scientists have proposed thinking about our place in geological history differently. That the world today is a lot different than it was before we arrived.

CHAPTER 4

CRISIS OF PLACE AND CULTURE: (RE)PARTNERING WITH THE LAND

Blueberries

Most days on the farm are greeted with a cool start to the morning. There are a few exceptions to this, though, when temperatures during the short winter season occasionally drop just enough to lay a thin coating of frost across the ground. Water in the air is crystalized and stings the lungs at first breath. A Southerner who is better adapted to the warm, usually almost unbearably-thick humidity reacts to this much differently than the folks from “up north.” It’s the same humidity that visitors from the North are glad to leave behind when their vacations come to an end. The morning twilight, though, delivers a balanced combination of temperature and humidity that suits most everybody. Our roosters call out to signal the arrival of a new day well in advance of sunrise. Their sounds interrupt the stillness that filled the air throughout the night. By first light the hens will have left their roost and made way to the pasture in search of food, leaving a network of trails behind them as their feathers brush against soft dew-covered grass.

For the majority of my life I’ve been a stranger to mornings like this. Having grown up in neighborhood subdivisions and large city apartments, the rural landscape was foreign to me. Instead, I was more accustomed to the sound of heavy traffic on the near-by interstate, the piercing shrill of emergency vehicle sirens, and helicopter blades chopping the air high above. My father’s military career took us to several bases around the United States and Europe. Our home was both everywhere and nowhere at the same time, and the future was full of uncertainty. It was not until after finishing college that I

would begin to understand what it's like to settle in one place and know that it is, indeed, home.

On the farm that I now call home my children and I often spend long stretches of time in the woods. One thing we enjoy doing together is seeking out the fruits budding from the hundreds, if not thousands, of blueberry plants. The easiest ones to grab are right along the network of trails we've carved out over the years while running, hunting, and riding horses or four-wheelers between our house and the center of the farm. As far as I know, each of them of the wild, or native, variety. When conditions are good, our woods explode with these round edible treasures in every direction. The vegetation is dense and every tree, bush, and shrub competes for its share of real estate both on the ground and in the air. Beneath my feet an intricate network of roots push deep into the ground and sprawl out in every direction. The first foot or so of this soil, referred to as "root mat," is hidden beneath a layer of brown pine straw and other leaves. It's a busy space that is filled with life – a whole dimension of our shared ecosystem. Insects, rodents, and even reptiles work along with microscopic bacteria and other single-celled life forms. Combined, their efforts provide roots with continuous supplies of vital minerals and nutrients. Soil, we must remember, is alive and forms the foundation of environmental health. Nothing grows from dead soil.

A simple lesson in plant biology taught me about the competition happening in plain view. One of the fundamental differences between plant cells and all other forms of life is that they are able to convert sunlight into usable energy. Simply understood, photosynthesis converts carbon dioxide, water, and light into oxygen and glucose, a simple sugar. In their scramble for light, plants will do their utmost to outgrow their

neighbors by reaching high above them, spreading their branches and leaves over as much surface area as they can muster while avoiding the shadows around them. The forest was revealed to me in a new way after learning about this. Sure, breaking the landscape down into discrete parts is a reductionist trend that can, for some, have a demystifying effect and eliminate the beauty of experience. In this case, though, I believe it only added to my appreciation and understanding of life.

When we moved to the land that would become our farm nearly ten years ago, one of the first things I took notice of was a single blueberry bush near the front of the property. It was remarkable to me because it stood out – oddly isolated from everything else. I cannot say how old it is, if it was set there intentionally, or if the previous owners kept it there while clearing land. Whatever its history was, one thing about this outcast bush was clear. It produced the largest, sweetest berries I'd ever tasted, and in great abundance. With a gentle tug, sometimes even with a light touch, the ripe ones come right off. I remember picking and eating from its branches for nearly a half-hour, somehow managing to save a gallon-sized bag of berries as I went.

It was only later that I would come to learn, as I mentioned earlier, that the woods were home to more of these bushes than I can count. However, because they are competing for resources with a host of other plants, their berries are significantly smaller in both size and number. The best time to pick these is immediately after a dramatic change in weather because that tends to throw the mosquitoes off a bit. Otherwise, deciding to head into the woods and collect them there becomes a lesson in opportunity cost. On many occasions I've gone out with my boys to pick in the woods and return with more itchy welts than blueberries. I can't prove it, but I think these ones might taste better

after what we've endured to get them. Even though they are smaller, dropping one of these hard-earned berries on the kitchen floor is tantamount to losing the grip of your best friend's hand while trying to rescue him from a cliff.

The simple act of picking and eating fruit from our trees is one that brings me a lot of pleasure. Since my children have grown up with experiences in eating directly from the land it's pretty much a thing of second nature to them. Life on a working farm has embedded an appreciation and understanding for partnering with the land. As they grow, so too has my interest in figuring out what this means, exactly.

Ecology and the Crisis of Culture

The epoch of man constitutes a very small period in the history of life on our planet. Within this brief period, man has made radical changes in his environment. He has abandoned the rugged individualism of life in the open country, essentially based on a natural system of diversified agriculture, and congregated into congested, polluted cities which require monoculture and chemicalized forms of agriculture. In making this shift, man has tried to create an urban environment that follows the dictates of technology and economics, but the change has been made by totally disregarding the natural laws of biochemistry that apply to the human organism as a living unit. (Lewis Herber, 1962, p.vii)

When I retrieved the copy of Lewis Herber's text *Our Synthetic Environment* (1962) from a shelf in my campus library the first thing that struck me was its distinct smell. Anyone who has spent significant time in a library knows the sweet aroma of an aging text. I describe it as a mixture of dust, smoke, vanilla, and an overall mustiness –

though not one that you want to turn your head from. The title of Herber's text coupled with its wonderful smell of maturity was, I must say, quite ironic. As it turns out, the smell of an old book is a result of acid hydrolysis reactions that take place over a long period of time. The paper, ink, and adhesives slowly begin to release volatile organic compounds into the air as they mature. Herber's critical treatise about our modern affinity for synthetics even applied to his own book.

The epigraph I use in beginning this section comes from the introduction to Herber's text. Its publication happened to coincide with Rachel Carson's (1962) *Silent Spring*, and though its popularity was largely overshadowed by Carson's work, both authors had a message cut from the same piece of cloth. One of the great impacts of *Silent Spring* was the public attention it drew towards a growing environmental movement. Carson's work stands to be as much a tale of caution as it is an argument for reigning in misguided practices in the relationship between humankind and the environment. The focal point of her criticism was the widespread use of the pesticide DDT and its responsibility for causing the deaths of millions of American songbirds by weakening the outer shells of their eggs – a silent spring.

Both Herber and Carson were attuned to the compelling evidence of environmental destruction being accumulated. Their work conveyed a pressing urgency to challenge the industrial complex and the unchecked, or else undeveloped, policies governing its existence. Each advocated that, despite our ability to synthesize connections among the gaps between our desires and the capacity to which nature can meet them, desire, alone, does not issue justification. "So great is the discrepancy between our power and our needs," writes Andrew Angyal (1995), "no other creature has fouled its

environment so thoroughly as to make it unfit for other forms of life.” (p.51) Exposing the absence and need for a collective ethical framework regarding how we use science and technology was Herber and Carson’s true enduring achievement.

Significant changes in our relationship with nature have occurred through the development of industrialized agriculture. This time period also witnesses major rhetorical shifts in how people think and talk about food – changes that, I believe, reflect major disconnections between people and the environment. As Thomas Berry (2006) writes, “the industrial way of life has invaded every aspect of human existence, including its political, legal, educational, and religious functioning. So extensive is this control that we must now think of ourselves as living in industrial civilization.” (p. 107) Contesting this claim would prove to be difficult, and it is nearly impossible to point out some thing or some place that has not been impacted by the activity of industrial systems worldwide. The time period of the Industrial Revolution is not behind us – we are living it still today – and the ideology that fueled its beginning has evolved alongside our tools and machines. In *The Closing Circle*, Barry Commoner (1971) argued that one major source contributing to the development of modern environmental crises has been the movement to replace natural fibers and products with synthetic chemicals after WWII. “New production technologies have displaced old ones,” (p. 144) explains Commoner. “These primary changes,” he continues, “have led to others. To provide the raw materials needed for new synthetic fibers, pesticides, detergents, plastics, and rubber, the production of synthetic organic chemicals has grown very rapidly.” (p.145)

This pattern of economic growth is the major reason for the environmental crisis. A good deal of the mystery and confusion about the sudden emergence

of the environmental crisis can be removed by pinpointing, pollutant by pollutant, how the [post-WWII] technological transformation of the United States economy has produced rising levels of environmental pollution. ... [s]ome of the most serious environmental failures can be traced to the technological transformation of the United States farm. (p.146)

In *The Unsettling of America* (1977), Wendell Berry points out that chemical warfare research during WWII resulted in the development of the most commonly used agricultural crop pesticides. After the war, both the defense and petrochemical industries sought alternative uses for the weapon technology that had been developed. These resources were subsequently directed towards farming, which up until this time was relatively free of mechanical equipment and chemical products. Farmers were urged to adopt machinery as a way of increasing productivity and decreasing labor costs. This, in turn, led to significant increases in energy expenditures as fossil fuels powered the machines replacing the grass-growing solar power that fed horse-drawn plows. The farm as a self-sufficient operation was quickly becoming a thing of the past. Like the rest of American industries, it, too, had become energy dependent. Berry, reflecting on the nature of these changes, writes,

The ecological and agricultural crises are linked together as part of a general crisis of culture and character. If the ecological crisis is a crisis of culture, and if the agricultural crisis is an ecological crisis, then the agricultural crisis is also a crisis of culture. Over the course of roughly the past century, the traditional model of farming and agriculture has steadily succumbed to economic pressures brought on by industrialization. (p.61-62)

Today's industrial farming models are predicated on finding ways to make products and production faster, fatter, bigger, and cheaper. Agricultural and chemical corporations have gained increasing levels of authority to, as Mark Finlay (2004) describes "reshape and redesign organisms in ways that they deem appropriate for modern society." (p.237) While this strategy might increase monetary profits, it pays little attention to the long-term care and sustainability towards the very resources it depends on. No matter how you look at it, *life* is at the center of every agricultural activity. How the system handles and treats the life it touches is a telling indicator of the ethics guiding it.

Death is also a part of agricultural systems. In fact, in order for life to continue, death must occur – there are no shortcuts around it. Living things grow, in part, because they eat, and in order for food to be, well, food, something living must die. This fact is perhaps the most commonly avoided in our society, but just because we avoid it doesn't mean it doesn't exist. Now, I'm not suggesting that we carry that inevitability around in our heads and remind ourselves in every encounter with every living being. That would be a pretty morbid way to go on about things in life. However, I do believe that it is something every member of society needs to be aware of; and this is especially the case when it comes to food.

The Convergence of Farming, Economics, and Technology

Should we desire an honest appraisal of whether or not advances in technology equate to or enable progress we must first outline *what* they bring us closer to. What do we want to achieve beyond those immediate, limited goals such as achieving greater

efficiencies, decreasing financial costs, and eliminating the troublesome human element from our workplaces? Without addressing questions such as these directly, advances in technology may well end up being incompatible with the types of progress society needs. Science, too, must be evaluated in a similar fashion. To consider one without the other is akin to a jury that reaches a verdict after hearing the testimony of only one side. We are gambling against unknown odds in our decisions that assume science and technology independent from one another. One clears way for the other as they continue to evolve in theory, in practice, and as disciplines.

In our modern age, technology is seamlessly integrated into our daily lives, and because we use or benefit from technology in both direct and indirect ways, avoiding it altogether is simply not possible. “Technology is more than just machines,” observes Albert Teich (1997), “it is a pervasive, complex system whose cultural, social, political, and intellectual elements are manifest in virtually every aspect of our lives.” (p.1) Teich’s definition is appealing because it recognizes technology as something beyond, yet still including, the physical sense that emerges from human activities. Science fosters the intellectual capacity for developing technology, though it can be argued that technology began long before we developed science.

In recent times, the evolution of agriculture has been both technological and economic to a greater extent. The revolution has not necessarily been an agricultural one, because the changes that have occurred in agriculture have been primarily scientific and technological. Their efforts continue to supply a diverse array of yield-improving tools and strategies, yet simultaneously marginalize the farming class, land health, and the sustainable management of natural resources. product-specific uniformity in size, shape,

color, destroying diversity by farming in monoculture, polluting soil, air, and water with concentrations of manufactured synthetics, impoverished labor force, jeopardizing human health

Fast food restaurants and drive-thru lanes are seamlessly woven into the urban landscape today. We can rely on them for quick relatively cheap meals whether we are on the go or have just decided to eat somewhere other than home and skip all of the preparation required to cook and clean there. However, these places convey a number of values and assumptions regarding food and its worth.

To begin with, we are led to believe that food is cheap and abundant. Given that fast food has become a cultural mainstay in the lived experience of nearly everyone alive today, there is little evidence to challenge the idea that this abundance is permanent. The fact of the matter is, farmers know that soil is a valuable and precious resource. It is teeming with life and requires great care and attention to replenish the nutrients and minerals it yields to either plants or livestock grown in and on it season after season. The health of the soil determines the quality of the food. Growing food on the industrial scale to support fast food industries requires intense concentration of life on the relatively fewer acres of land than is possible without the use of synthetic fertilizers.

Recall the Haber-Bosch process discussed in a previous chapter. The development of this process is what has made industrial agriculture possible and continues to support the human population explosion it helped create. The farmers producing food for this industry must utilize every acre of land at all possible times. Allowing fields to lay fallow for a season as has been the traditional practice, does supply an income. Fertilizing the land artificially, then, is perhaps the only alternative for replacing the vital components of

the soil. Fast food is cheap for consumers because the real costs of production are greatly subsidized by government food programs. Pollution of the air, land, and water is not the only consequence of the ubiquitous fast food Industry, it is clear that there are dire human health consequences resulting from a diet processed and nutritionally depleted food. Obesity and diabetes, for example, are at higher levels than been recorded. The effects of this health crisis will continue to affect the future in ways both foreseen and unforeseen.

I don't think it's important for everybody to farm, but what is important, I believe, is that people have an understanding that they are connected to the land and are entirely dependent on it. People simply cannot live without land, and therefore they have an obligation to be concerned for its health and to be as useful to it as they can. As David Gruenewald (2003) writes, "people must be challenged to reflect on their own situationality in a way that explores the complex interrelationships between cultural and ecological environments." (p. 6)

The Economics of Agriculture and Technology

Agriculture, if it is done well and respects the ecology surrounding it, can provide us with solutions to a wide array of practical problems. Our current system, however, has been occupied with developing solutions for problems that disregard ecological feedback. Additionally, the problems we identify, as well as their proposed solutions, are dedicated to numbers, science, technology, and economic goals. If we are going to grapple with practical issues – issues that affect us locally and regionally – we cannot continue to look at agriculture in economic or technological terms.

One aim within the discipline of economics is to investigate human behavior within the context of managing the attainment of desired ends by scarce means with a variety of alternative uses. Virtually all choices become subjects of economics. This is especially true with regard to situations where time exists as a critical variable. Because resources are finite the choices that are made will determine which outcomes or objectives can be satisfied relative to all existing possibilities. In other words, economics seeks to make sense of the behavioral discourse that emerges when we are faced with the dilemma of scarcity.

This includes areas where material or financial aspects are not central to the issue – in other words, the value assigned to the factors being considered is qualitative and subjectively appraised. Outcomes resulting in states of emotional well being, environmental quality, and other constructs are difficult to measure or else establish a quantitative reference point. Additionally, resources are limited by the context of any individual's social, political, and cultural parameters. Because economics can accommodate factors situated outside the comfort of quantification its principles can be readily adapted to other disciplines and often yield insights traditional analyses might not provide.

To a growing economy, nature is a reserve of materials that must be accessed, transformed, and exchanged. Paradoxically, however, while conservation might open up the possibility for sustained growth, it is often the case that short-term desires cloud perspective – conservation is not regarded as a profitable undertaking. Robert Babe (2006) suggests that economic discourse can inform our decisions aimed at safeguarding environmental resources while improving the vitality of our shared ecosystems. To do so,

Babe argues, “economics must not simply take into account environmental matters ... but, rather, it must actually become radically transformed so as to conform to the principles of ecology.” (p. xiii) Transforming the entire economic paradigm, though, is not something that happens overnight – especially when considering the degree to which our lives are connected to a dependence on modern industry, activities, values, and habits that are profoundly anti-environmental. Under the present context, technological advancement is widely interpreted to represent progress forward; that newer, more efficient (and usually complex and highly technical) technologies always yield gains for all. Such is, however, far from the reality that plays out.

Technical changes create disturbances within and between social, economic, and ecological fabrics that inevitably favor some individuals, groups, or systems over others. Gary Comstock (2000) has observed that when new technologies enter a market, those who adopt or adapt to them first are the ones who benefit from their advantages. To this effect, Comstock writes, “either we stop technological innovation altogether, or we accept the fact that it will inevitably displace some.” (p. 179) Babe’s focus is less concerned with outcomes, *per se*, which will happen in any event, than with the actual *process* of arriving at them. Achieving a *culture of ecology*, as Babe terms it, requires cultural paradigms to shift attitudes and practices in ways that reconsider “our stance toward life generally, and to non-human life, in particular” as well as the ability to “critically appraise the content of our mass media ... from the standpoint of ecosystem vitality.” (p. xii)

In the previous chapters I drew reference to certain ideas purported by Karl Marx. My reason in doing so was not to construct my own ideas beneath a Marxist ideology or

theoretical framework, but rather to aid in highlighting aspects of capitalism I find problematic. The body of work he produced, however, does attract my interest and is certainly worthy of mentioning. For example, Marx's critiques regarding the capitalist treatment of the natural environment continue to endure and maintain relevancy perhaps more today than in the context of his time. Consider, also, his remarks on how the substances of nature become transformed into resources for capitalist production and consumption. Additionally, in the opening volume of *Das Kapital* (1952), Marx observed that "[c]apitalist production ... develops technology, and the combining together of various processes into a social whole, only by sapping the original source of wealth – the soil and the labourer." (p. 457) Here and elsewhere, Marx developed the foundations of a conceptual platform from which a critical analysis could take place regarding the interacting systems of capitalism, society, and nature. From this perspective, Marx's ideas highlight the material and ideological production of nature and the environmental crises that (continue) to emerge. As social and historical processes, these effects lend credit to a notion which holds that human ideas about nature – *how* it is defined, *who* controls and benefits from it, and *what* becomes of its future – are not eternally secured to the parameters of a single context.

Proletarian Farmers

One important point to recognize about the development of industrial agriculture is that farmers have gained few benefits from the increased ratios in scales of efficiency and production made possible by advances in science and technology. Rather, farmers have participated as subjects and consumers of industrial products and technology in

order to maintain any sort of competitive advantage in agricultural markets. Following the claim submitted by Richard Lewontin (1998), I likewise contend that capitalist agriculture has resulted in the systematic proletarianization of farmers. I will return to Lewontin at a later point in this section to discuss some unique features in the relationship between agriculture and capitalism that set it apart from other industrial operations.

Prior to the transformation of agriculture under industrial and economic influences, farmers could freely exercise discretion regarding the operation and use of their land. This included authority over deciding what and how much to grow, whether or not the soil was amended with fertilizers, whether pesticides or insecticides were used on crops, and strategies for raising various breeds of livestock. Production possibilities were essentially limited by seasonal climates, weather conditions, and the forecasted demands for farm products in nearby markets. These were the general conditions farmers had to negotiate in traditional models of agriculture.

The material changes to farming and agriculture through advances in science and technology were unprecedented, to be sure, but they alone aren't responsible for the development of modern industrial agriculture and the resulting effects on the farming class. A more complete picture emerges by considering the political and economic influences; most notably, the establishment of seed patents and the designation of genetically modified organisms (GMO's) as forms of intellectual property. Of all the events involved in the transformation of agriculture, this manner of commercialized biology nullified a source of autonomy that generations of farmers had relied upon either as a form of competitive advantage over other producers, a sure way to save money, or

else simply out of tradition or pride. Saving a portion of seed following a harvest had now become an issue of patent infringement. One instance of this is featured in the documentary film *Food, Inc.* (2008) between the Monsanto Company, a multinational firm that develops, produces, and distributes agrochemical products as well as agricultural biotechnology and Moe Parr, who provided seed cleaning services to many of the farmers in his Indiana hometown. I will return to this case in a later section of this chapter.

Evidence of proletarianization is reflected in the share value farmers receive for the food they grow. In the food commodities market, a “food dollar” provides a measure of the yearly expenditures by consumers in the United States on domestically produced food and agricultural products. According to reports filed in March of 2017 by the United States Department of Agriculture (USDA), in 2015 the *farm share*, what the farmers received in exchange for raw products, amounted to \$0.15 of every dollar consumers spent on food. The remaining \$0.85, the *market share*, was allocated among the many food supply chain industries involved with bringing the end products to market. Among these are the firms responsible for packaging, transportation, advertising, wholesale and retail trade, and food processing.

A closer look at the food dollar statistic reveals more telling details about the share farmers collect for their raw products relative to the type of industry purchasing them. The “food at home dollar” represents consumer spending on raw farm products used to produce packaged retail food goods, and the “food away from home dollar” indicates consumer spending on raw farm products for foodservices industry operations.

The split between farms and markets is as follows: For the “food at home dollar,” the *farm share* amounted to \$0.24, while the *market share* claimed the remaining \$0.76. The “food away from home dollar,” revealed that the *farm share* claimed \$0.05, and the *market share* \$0.95.

There is a strong inclination to generalize practices of farming that are definable only in terms of technology for economics. That is, to define farming in a reductionist sense according to processes that are best measured quantitatively in regards to success. I believe that farming is an art that grows out of a culture specific to places, locations, soil, and climate. The products and possibilities realized through farming are defined by natural circumstances. Farming is a partnership with nature, and that partnership is violated by our efforts to overcome these natural circumstances and limitations. Industrial agriculture, while a remarkable display of human ability, is not a partnership with nature because only one side stands to gain.

Cultivating Partnerships with the Land

I might have been standing in an inch of mud, maybe two, but that was not much of a concern. I remember the rain because it made everything slippery, but aside from that I can hardly recall much else about the weather. What was unfolding in front of me, however, consumed every bit of my attention. In fact, it demanded it. The heifer I stood behind had been laboring for some time, and it was clear that her body and the calf inside her had come to a stalemate. Two small hooves had managed to emerge, however, but the rest of her unborn calf wasn't following without some help.

Those moments when the course of your life pivots in a new direction often occur without notice. Their suddenness disables any second thoughts or hesitation, and in an instant you'll find yourself negotiating a strange new territory of existence. I slipped the looped end of a poachers knot just above those hooves and prepared to pull the calf from his mother. With the strap wrapped around my right hand several times I tugged it firmly to make sure the loops were secure. As I leaned backwards, the weight of my body helped improve what little traction I had found and set my boots a little more past the mud. Then I started pulling.

A little more than a decade has passed since that day when I found myself wedged tightly between livestock panels and tethered to the front hooves of that calf. My brother-in-law shared that space with me as we rotated around one another, passing towels between us in attempt to keep things dry, and putting our strength together when it came time to pull. While this whole scene played out, my wife and her mother frantically researched through some version of a "how to" book on raising cattle to find any information they could about this situation. My father-in-law had contacted a neighbor in the community who he knew had a long history with cows and relayed his advice in real time. Instructions came in simultaneously from both sides. The advice had given us a bit of confidence, initially, but at some point it turned to white noise and we settled into the task together almost as if by instinct, and we pulled. It wasn't easy, and it certainly wasn't pretty, but the little bull-calf made it out. Both he and his mother went on to pasture shortly afterwards and took their places together along with the rest of the herd.

This experience marked a turning point in my life – a pivot moment. I've shared the story of what took place that day with many people over the years. I admit

that before stepping in to pull that calf I could count on one hand the number of times I'd ever been within arms reach of one. I explain that this event marked the beginning of my journey into farming. More than this, though, it inspired deeper feelings of curiosity about our relationships to food and the land we use to grow it.

Mechanical vs. Biological

What does a system of agriculture that uses and respects the land look like? What kind of food does that system produce? Is there really a right for a wrong way to grow the food we feed ourselves? To answer these questions, suppose we enlisted the help of a neutral party to gather some data regarding our behaviors, habits, and everyday choices about food and farming. With our own perceptions removed from the equation, I believe the overwhelming majority of us would find it difficult to reconcile the disparities between what we say and what we do. The truth is we are all subject to levels of dissonance in this regard. It is not possible to know the full extent of how our choices influence every dimension of our environment. On average, we make nearly 228 decisions per day about food, alone (Wansink & Sobal, 2007). Consider just a few of these: what to eat, what not to eat, what's available, how much, with or without salt and pepper, is it ripe enough, cook it on the stove or in the microwave, dine in or carry-out, save the leftovers or toss them? The list could potentially be endless.

The food we eat within the context of today's industrialized system endures a long chain of custody between the field and the plate. Plants begin this journey as seedlings that pierce through the soil above and shoot upward towards the sun. Animals start either by punching a one-way ticket through the birth canal and returning back to

their mothers in search of milk, or else by pecking themselves out of their shell and into the cover of soft, warm feathers above. I'm using a touch of romantic language intentionally here because life is a beautiful thing. Life is, perhaps, the most precious event of all – having such a high value because it requires death for it to continue. Farming is, above all things, a relationship between people, the land, and the cycles of birth and death that life demands. It is a domestic activity of stewardship dedicated to care at every level. Done well, farming approaches nature without the assumption that it is broken and needs our services to repair it. Rather, good farming adapts to nature's patterns and rhythms.

There is a strong parallel between the values we have towards food and the values we place on life. As contentious as this may sound, there is plenty of evidence available from within our culture to validate the claim. Perhaps the most obvious and inclusive example is our near-total dependence upon the products of industrial agriculture and factory farms. Outsourcing the responsibilities involved in growing food is, in large part, a by-product of development into an industrial society. The knowledge about *how* to farm and produce food has been another form of cultural sacrifice. As Wendell Berry (1990b) has observed, “we have made a social ideal of minimal involvement in the growing and cooking of food.” (p.128)

These circumstances fueled the rise of agricultural industries and continued to widen the gap between the public, farming, and the realities associated with food production. Animal scientist and author Peter Cheeke (2004) suggests that maintaining the division between people and farming knowledge benefits firms invested in industrial agriculture. He explains:

For modern animal agriculture, the less the consumer knows about what's happening before the meal hits the plate, the better. ... One of the best things animal agriculture has going for it is that most people in the developed countries are several generations removed from the farm and haven't a clue how animals are raised and processed. (p. 332)

Food companies “use every means at their disposal – legal, regulatory, and societal – to create and protect an environment that is conducive to selling their products,” writes Marion Nestle (2013, p. 93) The values predicated these operations - bigger, faster, fatter, and cheaper – aim to do little more than reduce life into a set of variables. This is fundamentally problematic, yet still it is widely embraced as a normalized condition of society.

In his essay *Renegotiating the Contracts*, Barry Lopez (1991) contends that our relationships with animals “were once contractual-principled agreements, established and maintained in a spirit of reciprocity and mythic in their pervasiveness. ... these agreements derived from a sense of mutual obligation and courtesy.” (p. 381) At first glance, his use of the term “contractual” in describing human-animal relations may arouse suspicion. However, this is dispelled by Lopez as he further explains that humans “once thought of animals as not only sentient but as congruent with ourselves in a world beyond the world we can see, one structured by myth and moral obligation, and activated by spiritual power.” (p. 382) Our regard for animals is influenced by the manner in which animals are accommodated by our economic system. In the context of an advanced industrial economy, they are either commodities (as is the case with factory farming systems) or obstacles standing in the way of economic progress.

The ultimate point I submit here is this: A culture that views life as a mechanical object to be manipulated, reformed, and reprogrammed will view its people in the same way. This same logic applies to the food we consume, as well. Industrial agriculture and factory farms operate in ways that regard life to be fundamentally mechanical, rather than biological. This perspective on life has also garnered legal support under the protections outlined by patent legislations. Consider the following excerpt from the Memorandum Opinion issued by the Indiana district court (April, 2008) that presided over *Monsanto Company and Monsanto Technology, LLC vs. Maurice Parr*; the case referred to in a previous section of this chapter which is featured in the film *Food Inc.* (2008) Monsanto's grievance with Parr was that he had provided seed-cleaning services to farmers who had purchased and planted Roundup Ready® soybean seed from their company. Farmers were required to agree not to save any seed from their harvest that could be replanted. Monsanto argued that Parr's actions constituted patent infringement and theft of technology. The court's decision fell in favor of Monsanto and concluded the following:

The public interest favors the entry of an injunction so as to stop the proliferation of an illegal supply of Roundup Ready® soybeans. ... It is not in the public's best interest to have patented technology pirated in that such would discourage future investment in innovative technology. (p. 12-13)

It's important that I point out the language of this court ruling reflects the idea that food has become a form of technology. Perhaps a different interpretation would suggest that food has merely *received* the technology. In either case, however, the issue remains the same in that food, life, is regarded in a mechanistic framework.

Thinking ecologically should remind us that all living things are bound within systems of interconnectedness; that no living thing is completely whole in and of itself; that living things are bound to one another and the objects of their environments. These networks of dependency are fundamental to the ecological landscape that has existed long before the invention of agriculture.

The Space of Home and Cultivating Topophilia

There are a wide variety of interpretations regarding the concept of home. A home can be a dwelling place where we find shelter. It can be the place where a family or group of people gathers together. Geographical regions, territories, and communities are commonly cited as places we call home. We speak about “finding a home” in the workplace or amongst peer groups. In *The Poetics of Space*, French philosopher Gaston Bachelard (1964) explains that home, in its physical sense, occupies an important role for humankind as a place that “shelters daydreaming,” “protects the dreamer,” and “allows one to dream in peace. ... It is the human being’s first world.” (p. 6-7)

How we shape and tend to the spaces we occupy is important to consider. Bachelard reminds us that we are shaped by the places we live. There are implications for the future here, too, in the way we shape the environment that outlasts us. How do we act when planning for the conditions and opportunities our children will inherit? How does geography influence the lives we live and the things we do there?

The Greek word *topophilia* (from *topos* “place” and *-philia*, “love of”) describes the strong sense of affection for a place. It is a mixture between a person’s cultural identity and adoration for certain elements located within the physical landscape. This is

distinguishable from E.O. Wilson's (1984, 1993) concept of *biophilia* in that *topophilia* is a sense that emerges through filters of cultural experience.

Topophilia manifests through culture in a wide variety of ways; each one of them can be closely examined in order to gain understanding about human interactions with the environment. The human geographer Yi-Fu Tuan (1974) explores this concept at length in his classic work, *Topophilia*. Tuan argues the importance of defining our perceptions about the environment, how our actions reflect our values, and the avenues by which our lives intersect with the natural world. He remarks that “[w]ithout self-understanding we cannot hope for enduring solutions to environmental problems, which are fundamentally human problems.” (p. 1) Anne Buttimer (1980) points out that Bachelard expressed similar sentiments where he claimed that “the relationship between place and personality is so intimate that to understand oneself a *topoanalysis* – the exploration of self-identity through place - might yield more fruitful insights than *psychoanalysis*.” (p. 167, emphasis in original)

In the same essay, Buttimer suggests that one's sense of place “is a function of how well it provides a center for one's life interests.” (p. 171) I would contend that the same could be said of the home, as well. During my years on the family farm I've connected with a concept of home that had previously been absent in my life. The space it covers and the features within it accommodate my interests in distance running, hunting and fishing. My children and I are free to explore the woods just for the sake of curiosity or in search of saplings that can be easily cut down for building a lean-to shelter. I'm fortunate to know such a place as home.

It is possible for me to experience comfort in my home because my interests are compatible with the place, itself. One drawback of this, however, is that these conditions invite complacency to the doorstep of consciousness. What Buttimer goes on to describe as the “insider’s trap” is something we need to avoid in order to maintain awareness of our environment and our connections to it. As she explains, the insider’s trap arises when we become “so immersed in the particulars of everyday life and action that he or she may see no point in questioning the taken-for-granted or in seeing home in its wider spatial or social context.” (p. 171 – 172)

We should reject the idea that any living being can be represented as an object reduced to a set of mechanical parts. Rather, we must affirm life and all forms of life as biological systems; interdependent and connected to one another in an extensive number of complex relationships and dependencies. It is also imperative that we reject the anthropocentric arguments that privilege humankind above and apart from nature. At the other extreme, biocentrism does not propose a philosophy capable of replacing this viewpoint. While anthropocentrism is riddled with flaws on many levels, and on all accounts is fully incompatible with the principles of ecology we need to embrace, biocentrism oversteps any promise of ecological compatibility by denouncing human roles and participation in ecological systems. We will have to figure out a way to reconcile ourselves with nature by cultivating a deeper understanding of the dependencies we share with nature and the multitude of ways we are connected to the land, to one another, and to all members of the environment. One of the challenges we face in adjusting to a consciousness that reflects this sort of thinking is to reclaim the sensibilities needed in order to distinguish between the natural – those things and ideas that are in

accordance with supporting healthy, generative life systems and habitats – and the artificial – the things that hinder or oppose life systems and habitats.

CHAPTER 5
ECOLOGICAL LITERACY: CULTIVATING OUR RELATIONSHIPS TO
NATURE

Children are the living messages we send to a time we will not see. (Neil Postman, 1994, p. xi)

It is more important to pave the way for the child to want to know than to put him on a diet of facts he is not ready to assimilate. (Rachel Carson, 1962, p. 45)

One of the penalties of an ecological education is that one lives alone in a world of wounds. (Leopold, 1949, p. 197)

Today, it is possible to recognize a number of parallel features that exist between schools and farms. Perhaps the most striking features they share can be observed in how they are organized. The structure of each system is dominated by linear qualities that maintain order and efficiency. Crops are planted in rows, fields are squared-off at precise angles, and both livestock and animal products like eggs are processed sequentially. School buildings and their facilities are constructed in a wide variety of styles that accommodate land features or other structures like roads, houses, or utility systems. In this sense they deviate from how farms are arranged, but this is not the case when it comes to the traditional organization of students in classrooms and lunch halls. Movement between rooms or throughout the building is timed, monitored, and generally requires students to line-up on one side of the hall or another.

What can we conclude about our schools when metaphors likening them to factories are met with little resistance? This same question can be asked about our regard for nature and the resources we extract out of it. Agriculture, and the modern system of farming, as well, is also commonly referred to by features and processes embedded within descriptions of factory production. The living subjects at the center of each of these areas become defined in terms of products, or consumers; passively disconnected and continuously reproduced in mass groups or quantities.

Schools and Culture

Throughout the United States today, the school is a regular fixture embedded within society's matrix of cultural institutions and experiences. Like snowflakes and fingerprints, no two are exactly alike. During my career as an educator I have had opportunities to teach in a number of different settings – from elementary to college, in areas both urban and rural, and in classrooms serving students identified with and without disabilities. Each school I've been a part of has a history of its own that breeds a unique *feel* to the culture within it.

What are schools for? Some answers to this question are likely to be more agreeable than others. It is debatable, still, whether or not the intentions of schools are fully aligned with the outcomes they produce. Perhaps it is more sensible to approach this question without the expectation that a simple answer is possible; or even that such would be sufficient. Given that in the United States, basic schooling is considered to be one of the fundamental rights extended to the children in our society, it seems that this is an important question to ask

Elliot Eisner (2002) writes that “[schools] make possible a shared way of life, a sense of belonging and community.” (p. 3) The experiences that children have in their early stages of development influences how their concept of community is shaped. In this sense, the importance of carefully evaluating the details of the kind of education children will receive in them. It is also important to consider the values and norms that are accepted and how they contribute to the ways children perceive of their role in the community. Unfortunately, in the development of Western industrial society we have been more fixated on ourselves that with anything else. In being preoccupied with ourselves, we have overlooked or else ignored the responsibility we have for the environment. Despite what we have achieved through science and technology, the theme characterizing humankind’s relationship with nature has become the desolation of the Earth. Any chance for revising this rests within the future of our decisions and whether or not they promote a healthy concept of community – one that seeks the restorative values offered through ecological thinking and literacy.

Children + Nature

Frederick Douglass is believed to have once said: “It is easier to build strong children than to repair broken men.” Thinking about these words reminds me of the importance of dedicating time and attention towards the children of our society. The *how’s* and *what’s* that are central to our efforts should develop out of our experiences with ideas that work well and result in outcomes which support and preserve life. We have to acknowledge that all life requires some degree of suffering and the need to overcome challenges. Death, too, is inevitable – it’s what enables more life, and, in a

sense, the future. As early as possible, children should be guided into an awareness of these things. They need to encounter situations of physical as well as emotional discomfort and be allowed to work their own way through them. It should be made a habit that we not do anything for them that they can do themselves. This is, I contend, necessary for developing resiliency against many of the things that lead to brokenness. This is also the start to building strong children.

Some might appraise these ideas as neglectful and cold-hearted. The truth is, however, overcoming adversity and becoming functionally independent are inseparable from the evolutionary history all living things have in common. I have a strong conviction that it is essential for children to experience direct contact with nature. Children are innately curious about their surroundings, and they will explore any environment they find themselves in. Anyone who has spent a fair amount of time with infants and toddlers is likely to agree with this. As an educator and a father to five children, the importance of having time, space, and opportunity for engaging with the natural environment is clear. No amount of time is too much. The material that builds a foundation for knowing the world comes by feeling the warmth of sunshine and the coolness of shade, the current of moving water and being lifted by a wave, picking through soil and turning over stones in search of something new, and the changing hue of a sky in sunrise or sunset. The intimacy with nature we desperately need cannot manifest within a culture that continues to become increasingly isolated from it. “What people in advanced societies lack,” writes Yi-Fu Tuan, (1974) “is the gentle, unselfconscious involvement with the physical world that prevailed in the past when the tempo of life was slower.” (p.36) This is especially true about how our children experience the world,

today. They live in a house, a school, in a city; in places that have been manufactured by humans and separated from nature. They begin to be progressively isolated from the basic dynamics of what human life is all about. This situation is very clear today. This lack of contact leads to nature-deficit disorder. In this manner, the future of the children depends very directly on some more functional balance between the human presence and the functioning of the natural world.

The demise of the small, diversified farm that once played an important role in sustaining local communities and a shared way of life has radically changed the way we produce our food. Highly specialized fields in technology and the applied sciences have replaced the knowledge and skill accumulated across generations of people who forged relationships with the land out of sheer necessity. Joel Salatin (2010) writes that “although my parents never earned a living from the farm, they laid a foundation, an epic, indeed a vision.” (p. xvi) The vision he is talking about was built on a legacy of labor where Salatin worked alongside his family on the farm for many years composting waste, digging out ponds, strategically grazing cattle, chickens, and pigs in order to build the health of their pastures. The work they were doing together cultivated both a sense of stewardship and responsibility towards the land.

That summer when I visited Salatin’s Polyface Farm, I can remember hearing him talk about the conditions of the land as he remembers them when his family first moved there. Standing in the same grasses that he was talking about, the grasses that he and his family had cultivated over those years, the connection between knowing the land on an intimate level and being able to work with it, not against it, was clear.

I believe that one of the principal duties of the mature generations is to connect children with these kinds experiences. Again, I'm not suggesting that every person become a farmer, and not every important connection to the land is made through farming. Children have a natural curiosity about their surroundings. Perhaps the best way to start is by opening up more time, opportunity, and space for them to be outdoors. I cannot suggest one particular place that this should begin. What I can say, though, is that these opportunities should be frequent and the places should be varied. For the most part, their time should be unstructured, but not completely without guidance or direction. Throughout my years of teaching, perhaps one of the more troubling observations I have made is that many children have a difficult time knowing what to do in situations where they haven't been given directions or tasks to fill their time. By the time students arrive in my middle school classroom, they have already become strongly conditioned to expect me to tell them what to do, when to do it, and how to do it. On rare occasions, students might genuinely ask *why* something has to be done for the sake of understanding, rather than in an attempt to delay it.

A partnership with the land also aligns with a spirit of husbandry that embraces forgiveness and resiliency. Salatin (2010) explains, "I believe our responsibilities as stewards of the land is to build more forgiveness into the landscape. ... It's our responsibility to bring cleverness and ingenuity to the landscape so it's more resilient." (p. 62) In this case, Salatin is referring to the ability for soil to absorb and retain moisture, for it to nourish plants and welcome their roots deeply within the soil. In this way the plants can grow tall and wide with the support given to them by the soil, having a degree of "forgiveness" when conditions are unfavorable through drought or periods of extreme

heat. Building this resiliency is achieved through what Salatin (2010) refers to as the cultivation of the “biomass,” or soil, which he also describes more affectionately as our “ecological umbilical.” (p. 117) Salatin argues,

Today’s conventional farmer,” “lives in a world of fear. Indeed, perhaps we could say our entire culture lives in fear. In sharp contrast, I feel like I live in forgiveness. ... To embrace my ecological umbilical, and to appreciate that things are right in my world because I have endeavored to create forgiveness and resiliency. (p. 300-301)

Thinking about farming and agriculture in this way might be the starting point for a cultural renewal whereby caring for the soil in a manner that is nourishing, restorative, and resilient. Imagine what might come of a society who not only regards the land and food in such a way, but also one another.

Children + Community

The majority of the students I teach live in rural communities either on farmland, around farmland, or in areas that used to be farmland. Our school campus used to *be* farmland, and if you step off campus in any possible direction you’ll be standing on soil that is being farmed in peanuts, cotton, or soybeans depending on the season. Yet, despite being surrounded by agriculture (literally), the students I teach often know very little about farming. I often wonder about why this is the case, and why we tend to overlook some features of our environment while focusing on others. What influences might help explain the knowledge gap between my students and the basic principles of farming? In other words, what has jeopardized their understanding of *place* and the history uniting

them with it? Preserving our connections to food and agriculture ought to be a priority we strive to meet; and this is especially imperative with respect to the communities that were founded on the economy of farming. As Michael Pollan (2010) argues, “food is about community, about family and spirituality, about our relationship to the natural world, and about expressing our identity.” (p. 8) It would be difficult to identify all of the particular agents responsible for shifting the direction of these values. I do, however, submit that it offers meaningful insight pertaining to the influence of industrial development on culture.

I imagine communities similar to where my students live might have once been places where farming mixed evenly with routine day-to-day tasks. Where children were integrated with the maintenance of the family economy and contributed to it by filling important roles and responsibilities. This type of arrangement to family life is a rarity in the context of today’s society and modern notions surrounding childhood and adolescence. Wendell Berry (1977) comments that:

Children learned about the adult world by participating in it in a small way, by doing a little work and making a little money – a much more effective, pleasurable, and cheaper method than the present one of requiring the adult world to be learned in the abstract of school. . . . The idea of ‘consumption’ was alien to them. (p.99)

Wendell Berry has inspired many of the points I have discussed throughout this dissertation, and work speaks to be in ways that help me bridge the gaps I have discovered in my relationship to the land. David Orr (2004) explains why Berry’s philosophy is appealing to a wide range of scholars. He writes that Berry’s philosophy about nature

begins with place, soil, and farming, but is extended to include race, religion, sexuality, science, politics, wilderness, economics, world trade, food, foreign-policy, and more ... [it] doesn't end at the farm gate with a description of the bucolic pleasures of tending to the soil. He's given us a grounded philosophy of the wholeness of things with the admonition to "solve for pattern." (p. 106)

In her book, *Kinderculture*, (2011) the curriculum studies theorist Shirley Steinberg offers a critique about the experience of childhood today, and the ways in which consumption has become systematically normalized and encouraged within economic and educational systems. Steinberg writes:

Patterns of consumption shaped by corporate advertising empower commercial institutions as the teachers of the contemporary era. Corporate cultural pedagogy has "done its homework" – it has produced educational forms that are wildly successful when judged on the basis of their capitalist intent. (p.18)

She continues, by arguing "one of the most profound events of the last century in world history in general and certainly in the history of childhood involved the successful commodification of childhood." (p.19) Certainly the socio-cultural environment of today's child in America (and elsewhere) is radically different than that of only a generation earlier. Increases in technology and our access to its functions have revolutionized our experiences with nature and one another. Corporatization and commodification of childhood and everyday experiences have become the consequences of our insatiable motive to increase profits. "Since parents are no longer in control of their children's cultural experiences," writes Steinberg, "they have lost the role that parents once played in shaping their children's values and worldviews." (p.33) My

children are not immune to the tug of industry on their desires or the contents of my wallet. While we have consciously trimmed away the possibilities of their commercialization by not allowing television in our home, the occasional movie and frequent interaction with other children still leaves them vulnerable to the influences of corporations.

Steinberg's writing about childhood in *Kinderculture* is largely constructed around the idea that children are preyed upon by corporations and social agencies that define the products and experience of childhood. "Kinderculture" is best understood as the argument that "children and youth have become infantilized by popular culture, schools, and adults and while being considered "too" young for almost anything, at the same time, they are being marketed to as seasoned adults." (p.1) Further, her writing also assumes an important position about the very nature of childhood – as a social construction – and is worth recognizing here:

Childhood is a social and historical artifact – not simply a biological entity. Many argue that childhood is a natural phase of growing up, of becoming an adult. The cardinal concept here involves the format of this human phase that has been produced by social, cultural, political, and economic forces operating upon it. ...

Childhood is a creation of society that is subject to change whenever major social transformations take place. (p.2-3)

Our institutions and ultimately our realities are social constructions. Steinberg's remarks about childhood reminds me of philosopher Mark Rowlands' (2009) elegant definition of human beings. Rowlands writes, "if I wanted a one-sentence definition of human beings, this would do: humans are the animals that believe the stories they tell about themselves.

Humans are credulous animals.” (p.2) Revealing and troubling, yet accurate, critically examining the “truths” we construct around defining ideas such as *childhood* and *nature*, shows how easily they may begin to crumble. When we say “childhood” what are we referring to? Is it a biological phase of growth and development? Is it purely a social construction? Is it some alloy of both? When we speak of “nature” or what is “natural” what do we mean? Are these just labels we assign to make sense of our world?

Curriculum and Ecological Literacy

The ways we think about education – what it *is*, what it *does*, and for what *purpose* – determine, in large part, the development of methods and systems to administer it. Further, our notions about education follow an important question proposed by Herbert Spencer (1890): “What knowledge is of most worth?” As a student of curriculum studies I have learned the value of asking this question. Open-ended, and purposely vague, it is an essential tool for developing a critical inquiry into the aims and purposes of education and its content. Building on Spencer’s proclamation, curriculum theorist and historian William Schubert (1997) has proposed a more specific set of questions for curriculum studies scholars: “What knowledge is most worthwhile? Why is it worthwhile? How is it acquired or created?” (p. 1)

In the postscript, and final chapter, to *Understanding Curriculum*, Pinar et. al. (1995) suggest that curriculum is “what the older generation chooses to tell the younger generation.” (p. 847) In this chapter I want to expand the inquiry I have developed throughout this work and posit that the most worthwhile knowledge we can draw upon for educating the future should be inspired by experiences that cultivate an ecologically-

informed relationship to nature through refined ecological literacy. Developing a healthy understanding of what is meant by a “curriculum” cannot take such questions lightly. Like Pinar et. al. write, “curriculum is a highly symbolic concept.” (p. 847) Schools are institutions that transmit more than information packaged as disciplinary-specific skills or content. Beyond even the fundamentals of reading, writing, and mathematics, they are places where cultural ideologies are impressed upon children; functioning as a site for assimilating children into the wider sphere of society. While there are variances in how schools operate and certainly differences in the feel of a school’s culture or community based on relationships established within them, one general attribute shared by most is the enforcement of what many scholars refer to as a *hidden curriculum*. (Jackson, 1968) This concept has also been referred to in a number of other ways, including the unstudied curriculum, the unwritten curriculum, the null curriculum, and the out-of-school curriculum. Pinar et. al. summarize that these forms of curriculum include the “ideological and subliminal message presented within the overt curriculum.” (p. 27)

C. A. Bowers (1984) argues that curriculum reform should begin with a critical inquiry aimed towards identifying important forms and sources of knowledge that are marginalized by agencies of authority in education systems. “These reforms,” Bowers contends, “relate directly to the need to reverse the cultural patterns that contribute to the community and environmentally destructive cycle of increasing dependence on consumerism.” (p. 145) Centered beneath a framework of *environmental education*, or rather *ecojustice education*, as Bowers prefers to phrase it, curriculum reform should also emphasize the “interconnections between viable, interdependent ecosystems and viable, interdependent communities.” (p. 148) An approach towards teaching and learning

focused as such, according to Bowers, will help to preserve “the widest possible diversity in cultural approaches to sustainable living.” (p. 148)

Curriculum studies theorist Nel Noddings (2013) argues for a type of curriculum reform that “signifies deeper concern for natural resources – land, air, water, and the interdependency of all living things.” Noddings calls this a “shift toward ecological cosmopolitanism,” and recommends that educators might “stretch the disciplines from within” (p. 69) to achieve this rather than seek to influence them from the outside. I agree with Noddings’ ideas and vision. However, changes in this direction will be met with considerable challenge from the our educational system’s heavy emphasis on teaching math and reading skills. Fluency in these areas is important, for sure, but perhaps more so is being able to apply knowledge from these subjects outside of the classroom in practical ways. In the classroom, performance-based assessments are useful in this regard and, I believe, provide a more accurate representation of what students understand relative to the concepts being taught. Many of the district-level workshops and professional development conferences I’ve attended over the years have actually *encouraged* using this strategy. In my experiences, I’ve witnessed students thrive when provided opportunities to explore their potential and apply their knowledge towards making something concrete, unique, and tangible out of abstract elements.

Thinking ecologically requires a developed sensitivity for recognizing systems and patterns in the environment. Without the ability to “see” the connections between soil, woodlands and forests, bodies of water, food, air quality, and health it will not be possible to understand how an imbalance in one will affect the entire system. Schools today are not prepared to institute a curriculum that encourages this type of ecological

thinking. Instead, students are conditioned to view disciplines as discrete entities with relatively few connections between them. As a science teacher, this is something I often encounter when the content I am teaching requires solving math problems. Students will be genuinely confused as to why learning about atomic structure and the differences between hydrogen and helium, or sodium and chlorine. They have been conditioned to expect vocabulary and flash cards, maybe a sketch here and there (too many of these and I'm being asked why they are doing art instead of science), but certainly not computing numbers.

If we should desire a system of education that does incorporate ways of thinking ecologically, the first issue of reform would be to abandon a curriculum that is organized by subjects and disciplines. Aldo Leopold (1949) understood the value of connecting education with ecological thinking. In his essay about the Round River in *A Sand County Almanac* he posits the following,

In our education system, the biotic continuum is seldom pictured to us as a stream. From our tenderest years we are fed with facts about the soils, floras, and faunas that comprise the channel of Round River (biology), about their origins in time (geology and evolution), and about the technique of exploiting them (agriculture and engineering). But the concept of a current with drouths and freshets, backwaters and bars, is left to inference. To learn to the hydrology of the biotic stream we must think at right angles to evolution and examine the collective behavior of biotic materials. This calls for a reversal of specialization; instead of learning more and more about less and less, we must learn more and more about the whole biotic landscape. (p. 189)

What Leopold is calling for in suggesting that we “think at right angles” is a departure from specialization and the narrowness of thought it demands. Ecological literacy cannot be developed or improved upon when approached this way. Instead, we must cultivate a sense of ecological literacy by considering places and ideas more broadly, from wider perspectives that are able to capture more detail about the whole system, rather than individual parts isolated from the rest.

David Orr (1992) echoes these sentiments while arguing the importance of a liberal education, which will “produce whole persons with intellectual breadth, able to think at right angles to their major field.” (p. 108) Further, a liberal education will prepare students to become “ecologically literate citizens able to distinguish health from its opposite and to live accordingly.” (p. 108) I agree with Orr, and I likewise contend that the liberal arts and humanities are essential components to a genuine experience in education. However, students in our institutions today are subjected to a curriculum absent of these qualities.

I want to consider some of the recommendations Orr proposes for reviving these areas in education. To begin with, he asserts that an ecological curriculum should include “more accurate models, metaphors, and measures to describe the human enterprise relative to the biosphere.” (p. 60) Improving the knowledge base in this area is essential if we are to become more conscious of the true costs of using natural resources. These newer, updated models should be developed with a focus on local human populations and the land regions adjacent to them. These models should gear their analyses towards local decision makers and community leaders as well as the general population. The collective impact that could be realized through such efforts might also accumulate on larger scales

and perhaps disrupt ecologically unfavorable practices in industrial and agricultural economic systems.

Improved understanding of ecological systems and human-nature connections should inspire adopting what Orr describes as “strategies of resilience” (p. 62) These strategies would embrace systems that incorporate a diffused network of goods manufacturers, smaller, more diverse farming operations, and emphasis on local community economic health. Integrating and maintain these, and other qualities of social resiliency, requires “effective institutions of governance and a well-informed democratically engaged citizenry.” (p. 62)

Orr also argues that improved educational systems will support the creation of a more informed public. One that acts with careful discretion to procure standards that benefit the functioning of ecological systems. He believes that this would effectively “foster the regeneration of natural capital of soils, forests, watersheds, and wild areas ... clean up the toxic masses from [industrial expansion] ... re-learn practices of good farming; and learn the arts of powering civilization on efficiency and sunlight.” (p. 62-63) Systems ecologists Howard and Elisabeth Odum (2001) recommend organizing the school curriculum around the study of the relationships between energy, environment, and economics and how these apply to various scales of knowledge. They contend that in order to maintain a healthy, functioning and sustainable economy, society have to develop effective strategies for dealing with declines in resource availability.

The most challenging task of merging a series of ecologically-based reform initiatives within the public arena is learning how to “recognize and resolve divergent problems” (p. 63) that continue to threaten environmental health. These are, to be sure,

problems of a human origin and cannot be solved by the rationale that has caused them. E.F. Schumaker (1977) explains that divergent problems are those that are “formed out of the tensions between competing perspectives that cannot be solved but can be transcended.” (p. 120) We might begin to develop useful strategies for rethinking and realigning our environmental ethics by considering the philosophy of Albert Schweitzer, and following the path of his ethics which were anchored in preserving, promoting, and enhancing all live systems. As Roderick Nash (1989) points out, Schweitzer believed “the powerful and privileged status humans enjoy in the natural community entails ... not a right to exploit but a responsibility to protect.” (p.62-63) For Schweitzer, “*Ehrfurcht vor dem Leben*” (reverence for life) formulated the basis of his philosophy, and he declared that humankind should have respect for all living beings.

Angela Lydon (1992) is optimistic about the future and its potential for improved relationships between humankind and the environment. In her dissertation, completed under the direction of curriculum theorist William Doll at the Louisiana State University, *Cosmology and Curriculum: A Vision for an Ecozoic Age*, Lydon argues that the “Ecozoic Age” will be a time when dominance, survival, and struggle are no longer relevant in defining lived experiences. Instead, this period will be marked by creativity and the emergence of symbiotic relations between humankind and the ecological systems connected by the web of life.

The ethics we enlist for the future would be well-equipped for transforming our relationship with nature under the guidance of Aldo Leopold’s (1949) work. He was the first to develop a “land ethic,” which he outlines in *A Sand County Almanac*. Leopold contends “All ethics rest upon a single premise: that the individual is a member of a

community of interdependent parts. ... [that] a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community [and] wrong when it tends otherwise.” (p. 224-225) Leopold noted that “the complexity of the land organism” was “the outstanding scientific discovery of the twentieth century,” (p. 65) and he realized that predators were part of the whole. To Leopold, the entire idea of good and bad species was the product of anthropocentric and utilitarian bias as well as a failure to see the plant or animal as being a part of the land.

Leopold’s work offers us a reminder that using the Earth solely for economic prosperity by and through its natural resources can only have an outcome of destruction. We should seek guidance from this idea in the pursuit of improving our relationship to nature in the future, and embrace Leopold’s ideas for expanding “the boundaries of the community to include soils, waters, plants, and animals. ... [changing] the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.” (p. 239-240) His Land Ethic also “reflects the existence of an ecological conscious, and this in turn reflects a conviction of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity.” (p. 221)

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