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Ecological Literacy: Global Planetary Stewardship is Everyone's Responsibility

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ECOLOGICAL LITERACY:

Global Planetary Stewardship is Everyone's Responsibility

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By

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Attributes

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I would like to send a warm thanks to my family for their support as well. It is never easy to make collective sacrifices for the benefit of one family member. Thank you, Kurt, Candice, and Hailey from the bottom of my heart. I would also like to thank all of my classmates, friends, and neighbors who helped me in a number of ways to meet deadlines. There are simply too many to name! Your kindness and generosity will be paid forward in the work that I do with my students.

My many thanks and endless gratitude goes to my mentor, Dr. Joseph Siry, for all of his great help with this study. I want to thank him for giving me enough room to chase down ideas that intrigued me. I would also like to thank him for providing me great resources that inspired me to continue searching for knowledge. I could never bring this project together without his expertise in the area of environmental studies. Many of these ideas and sources are a result of our conversations and his class lectures. Without his

dedication to eco-awareness and education, I would never have made so many connections. I thought I knew so much about the way the world worked before coming into this program and now I realize how my knowledge was and still is lacking. One could say that the Master of Liberal Studies has changed my worldview in every way.

My goal as an educator is to inspire students to ask questions and not blindly follow the crowd when something does not make sense. Those who have shaped the modern world like Steve Jobs, Bill Gates, Charles Darwin, Martin Luther King, and John F. Kennedy did not achieve greatness by accepting mediocrity. They broke the mold and they had the courage to make radical changes, even when the rest of us did not quite understand how or why. These dynamic people upheld high standards and believed that their goals had merit. They did not give up in the face of adversity and that is a lesson from which we can all benefit. These great individuals changed the world we live in forever.

Teachers are not responsible for just teaching content, they are responsible for teaching good global citizenship as well. Teachers are partially responsible for teaching ecological literacy in the framework of their courses. Every human being needs to learn to live sustainably. To quote the amazing Dr. Adolph Brown, "You can teach anyone anything once you have their attention."[1] If I can inspire students to change the world in some way that will make human lives better, my goals as a professional educator will have been achieved. In essence, I will have been successful in my teaching if students walk away from my courses knowing and living just two things: The first is never to be ashamed when speaking the truth, even if it is not the popular idea. The second is to never stop asking questions until all doubt has been extinguished. Thank you to my

[1] Brown, 5.

students and teachers who have shared their teachable moments; this study is dedicated to all of you.

"A man who doesn't know the truth is just an idiot, but a man who knows the truth and calls it a lie is a crook." -Bertolt Brecht[2]

INTRODUCTION: One Worldview for One Human Race

When I first began this study and had to come up with a title, I liked the title Ecological Literacy because I am passionate about what each word stands for on its own. My fantastic mentor, Dr. Joe Siry of Rollins College, pointed me in the direction of David Orr as a useful scholarly source in ecological studies. I knew that Orr would be one of my primary sources for this project. However, the title of my humble project and his watershed book sharing the same name is purely a coincidence. I hope that David Orr, should he ever read this project, will not view this study as an attempt to shamelessly duplicate his work. Rather, I hope this great scholar might be flattered by my mistaken imitation of his great work bearing the same title. In fact, Orr's book, *Ecological Literacy,* has been hailed as a must-read for anyone in education. My goal is to promote ecological literacy to every member of the world community as a measure of good citizenship.

What defines a worldview is one's set of ideals and truths. Each individual's worldview defines who he is and shapes his decisions. My own personal worldview has always been simple: altruism, kindness, and ecological preservation are the keys to being part of a sustainable community. If only things were that simple! Miller's scientific

[2] From *Galileo* Scene 9 of German published version, omitted in Laughton Version.

textbook attempts to define the human struggle to ethically coexist with the scientific world around us. It states:

> There are conflicting views about how serious our environmental problems are and what we should do about them. These conflicts arise mostly out of differing environmental worldviews: how people think the world works, what they think their role in the world should be, and what they see as right and wrong environmental behavior (environmental ethics).[3]

This qualifies as a great textbook definition of the crisis that humanity is presently facing. This problem is a complex issue with no clear panacea.

Consequently, I have never considered myself to have one iota of a clue about scientific study. I used to avoid science like the plague, but after researching for this project I no longer fear science (as a discipline of study). My concern for creating awareness about sustainable living has allowed me to suspend my loathing for science. I am still certainly no expert, however, I no longer feel that my head will spontaneously combust when I look at a scientific equation! The discipline of science is - to borrow the words of the great Marie Curie - not something to be "feared but to be understood." I now see that science shares many common characteristics with literature, philosophy, and religion. The ability to make these connections took the 'scary' out of science for me. Each of use must re-examine our individual worldview in order to preserve our only home, Earth. Everyone's worldview should include the goal of good global citizenship. It is only once every seven billion of us commits to adding ecological literacy to his worldview that we will survive on this planet. In a world of seven billion, every human is required to practice sustainable behavior. Once we do this, we are ecologically literate.

The purpose of this ecological literacy study was to find out what it will take to inspire humans to behave benevolently towards the planet. Garret Hardin defines literacy

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[3] *Living in The Environment*, 32.

as "skill in either written or spoken language."[4] I define ecological literacy as the skill to ethically practice sustainable living. Once this behavior has been learned, changes in personal worldview can occur. People examine look at their behaviors and look at how their daily habits contribute to pollution or help to promote a clean and healthy environment. Those behaviors that promote pollution must be reevaluated and reduced wherever possible. Each person will be able to best assess what is right individually. Not everyone will be in the position to make large purchases, such as to retrofit their homes to solar, but every one of us can certainly take a reusable water bottle to work rather than buy a disposable plastic bottle. This is just one example of the simple choices that each of us can make to do our part.

To really gain an understanding of how people behave, I conducted a few kinesthetic field activities of my own for this project. The first was an ecological literacy survey. This is definitely not a scientific poll, but the data gathered was fantastic. Thanks to all that participated. I really enjoyed gathering data on why people behave as they do when recycling or not recycling. People seem to understand that recycling is a moral imperative. I examined their habits and disposal of post-consumer waste. There were some excellent reasons for recycling that connect to passing on a better planet to future generations. The data collected is located in Appendix A. I also worked with a few Girl Scout troops as we examined habitats, ecosystems, and sustainable behaviors at the 2012 Camporee event held April 27-29th. We looked at items found in natural habitats and discussed what is necessary to sustain those habitats. Additionally, we looked at food chains so that the girls could understand how one species dying out can affect other species and their quality of life. We examined where water comes from and the footprint

[4] Hardin, 22.

left by each business and residence in the form of waste. The girls definitely understand that their actions today will impact others tomorrow. They feel a natural compulsion to act in a manner conducive to good citizenship and ecological responsibility. Pictures and notes can be found in Appendix B. Change is possible for humans at any age: it is the motivation to change that must be brought out in each of us.

There are many reasons to be concerned for the Earth's well being. The world population surpassed 7 billion in the year 2011 and human consumption has proven to have detrimental effects upon the planet. Industrial food production is at an all time high while we still face food shortages in parts of the world. Additionally, we are looking at a myriad of modern day problems that are associated with population explosion. In pre-Industrial times, infant mortality and deaths associated with Tuberculosis kept the population in natural check. We never had a reason to fear technology as an ecological crisis. In fact, a popular worldview during Darwin's lifetime that "the diversity of organisms was created all at once and would be forever the same, gave way to another in which new kinds (species) were being continuously produced by gradual process: natural selection."[5] This natural selection allowed the population to stay organically in check. According to Thomas Malthus, "animals commonly produced many more offspring than could survive."[6] We were certainly not in any danger of the human race dying out and population growth was inching ahead at a steady rate. In fact, Darwin and Wallace promoted the conclusion that those who could make the best of and take advantage of their immediate environment would be those most likely to thrive.[7] Reasonable to assume since Darwin's time, humans have been the dominant species on the planet.

[5] Ehrlich, 12.
[6] Ibid.
[7] Ibid.

Little did those thrilled by the Industrial Revolution realize fully the ecological nightmare that would be looming in the following century.

Man has been transformed enormously through the use of reason. Thanks to modern medical advances and the applied science of the Industrial Revolution, people have been using technology to make human lives better in many ways. Unfortunately, human misery and suffering was an unwanted side effect to this zenith because ethics have not measured up to our intelligence. According to Paul Ehrlich, "Natural selection recognized that variation ordinarily exists among individuals within a natural population and as a result their interactions with the environments are likely to differ."[8] Needless to say, those who work in mills or coalmines naturally have a lower life expectancy than those who work in a stable office environment. Environmental pollution has been linked to cancers, as Rachel Carson brought to light in *Silent Spring*. As our planet's population continues to grow at an alarming rate, we are inevitably going to strangle it unless we begin to change our thinking. Recycling and responsible post consumer behaviors will not be the only solution to this problem. We must rethink our energy needs and utilize sustainable resources.

Admittedly, there are impediments to ecologically friendly behavior. Robert Costanza has coined these dilemmas as "social traps." Sometimes we see that recycling is costly to taxpayers or is not very convenient. At times, there are impediments to behaving sustainably. (For a survey sampling, please see Appendix A.) Technology, also known as applied science, has been viewed as the antithesis of ecology. It cannot be denied, as stated well by Paul Ehrlich, "the remarkable technological accomplishments

[8] Ehrlich, 11.

of modern human beings have had unfortunate, if unintended, consequences."[9] I want to dispel the myth, however, that ecologically friendly behavior cannot be adopted with little personal investment on the part of individual. The same industry and technology responsible for our planetary ills is making slow strides in helping to reduce post-consumer waste. Companies like Waste Management and BMW are great examples of industry turning trash into profits as will be discussed in Chapter III. The state of Florida now utilizes half dozen waste-to-energy plants to reduce waste. I shudder to think that these plants are only processing a small part of the waste that we, as Floridians, are generating. In fact, on my last trip to the Keys, I counted seven visible landfills on the turnpike from Orlando to Miami. Let us hope that these new technologies will continue to become standard as our population grows exponentially.

We all have social and moral obligations to our future generations. Scholars, politicians, religious organizations, and scientists have taken a very public stand against global warming. This evidence has been presented in the mainstream media and public awareness has risen. The only way that we can create long-term sustainable behavior, however, is through education and daily implementation. We have a duty to the planet. The Dalai Lama sums up this ideal beautifully:

> If we unbalance nature, humankind will suffer. Furthermore, as people alive today, we must consider future generations: a clean environment is a human right like any other. It is therefore part of our responsibility towards other to ensure that the world we pass on is as healthy, if not healthier as when we found it.[10]

We are responsible for preserving the health and beauty of the planet for our children. The United States Conference of Catholic Bishops proclaims that a great priority should be given to maintaining the Earth as well; this is a duty of us to work towards together as

[9] Ehrlich, 11.
[10] Dalai Lama, 43.

one human family.[11] The watershed moment for me personally was my viewing of Al Gore's 2006 documentary, *An Inconvenient Truth.* This documentary brought the issue of climate change front and center in the popular media culture. I am certainly not naive enough to believe that its message has no political motivations, however, what if the science is even half right? Even if that is the case, it is still frightening enough to inspire change. It was after viewing this film that I realized that every person's actions count in maintaining the health of the planet.

Finally, ecological literacy cannot be achieved without dedicated education at all levels. John Dewey believed education to be the most important gift that a society can give its members. In order to look at what is working in environmental education, I have reviewed a 2006 Green Schools Initiative Study. This will be discussed in Chapter V. The findings were not personally surprising to me as an educator. The scholars found that modeling behavior is practiced by students when they see their teachers and administrators behaving ecologically literate. The students then tend to model each other's behaviors as well. David Orr does a beautiful job outlining what the responsibilities of universities have in ecological education. He considers these institutions to be conduits for research and development of sustainable technologies. It would make perfect sense, then that education would be necessary to teach sustainable behavior. At the Florida Virtual School, we have a saying whenever we are presented with major changes – "The Why Behind the What." The why behind becoming ecologically literate is important to inform people. Everyone must understand why ecologically benevolent behavior is important so that they can practice it daily. They must also be informed so that they understand the ramifications of behaving carelessly

[11] United States Council of Catholic Bishops.

when it comes to environmental affairs. Homo sapiens will have to behave sustainably together, knowing this is the ethical thing to do for our children.

"I wish I had more confidence in our capacity to forecast the climate of 2050. I remember too well the forecasts of the present day made in the 1960's. None of them even glimpsed the climate changes that have already happened; indeed most thought an ice age more likely than global heating."[12] –James Lovelock

Chapter I: Technology vs. Ecology

According to Ralph Waldo Emerson, "Nature, in the common sense, refers to essences unchanged by man: space, the air, the river, the leaf."[13] Perhaps during the simpler times of the Transcendentalists, man could live in harmony with nature, proving no threat to the health of the ecosystem. In fact, man's life was considered good if he could achieve a hard days work with healthy exposure to the great outdoors. Things have changed quite a bit, however. No longer can the average man provide for his family by living simply off the land. Urban living is at an all time high and so is human consumption of resources that are vital for sustainability. According to the Population Reference Bureau, for the first time in 2008, urban and rural living is split evenly 50% to 50%. This is an astronomical change, considering that only about three percent of the population was living in urban areas in 1800.[14] Science, as a discipline that seeks to study characteristics and form educated hypothesis, has made man more knowledgeable. Applied science has produced technological advances that humans have grown accustomed to in our daily lives since the time of the Industrial Revolution. Therefore, applied science and technology are virtually the same thing. Science, technology, and the

[12] Lovelock. *The Vanishing Face of Gaia*, 4.
[13] Emerson, 1.
[14] Population Reference Bureau, 1.

world's booming population have created an ecological crisis because we are strangling our planet. We can and we must reduce humankind's ecological footprint or we will not survive as a species. Good global stewardship is defined as our calling to treat the planet with kindness. Our challenge in the twenty first century will be to create sustainable behavior by teaching humans to leave a zero carbon footprint upon their communities and to be good global stewards. Ecological benevolence and technological vicissitude have to balance out in order to create sustainability.

An enormous amount of information is available to the public about current environmental affairs, much of it conflicting. For example, media can easily misinform the average consumer about the harmful nature of CFC's (chlorofluorocarbons) depleting the ozone at an astounding rate, then turn around the next day and say that they are not really so bad. Admittedly, ecological literacy can be difficult to achieve. According to Garrett Hardin, "Nowhere is the need to understand our reality filters greater than in the vexed area of the environment."[15] This is really the key to dissecting the debate of ecology vs. technology. Hardin discusses three filters that are essential to our ability to process any information. These are (1) Literacy: What are the words? (2) Numeracy: What are the numbers? and (3) Ecolacy: and then what? Hardin argues that by applying these filters to our intake of information, we can remain objective and calmly solve any problem. He explains, "No one filter by itself is adequate for understanding the world and predicting the consequences of our actions."[16] Ecolacy may just be the most important filter as this is the optimal quest for corrective measures to solve our current

[15] Hardin, 12.
[16] Ibid, 25.

crisis of ecological illiteracy. To filter information and find a plausible solution, we must first consider is the written word.

Garret Hardin cites a number of examples in literature that demonstrate responsible use of our literacy, numeracy, and ecolacy filters. In *Filters Against Folly,* Hardin points out that use of these filters is important because "the greatest folly is to accept expert statements uncritically."[17] I could not agree more. We are as responsible as the evildoers when we do not become informed. In the area of ecological studies, this is especially important, according to Hardin who says, "Caution and humility are the hallmarks of the ecolate attitude toward the world."[18] The first step in all of this is becoming literate of the problems. He cites Shakespeare's King Richard II explaining that the King misuses nature as his tool of oppression in the line "Not all the water in the rough, rude sea/ Can wash the balm off from an anointed king."[19] Misuse of power also has an impact upon treatment of the land. More importantly, Hardin's point is that we must constantly use our filters to determine what is propaganda and what is truth objectively. This issue of filtering is a human problem because technology cannot filter itself. Hardin retreats saying "poetry is least dangerous when the typographical arrangement of words reveals the author's poetic intent. It is most dangerous when the typographical arrangement of words reveals the author's poetic intent."[20] Maybe what Hardin is trying to say here is that it is important to not only filter, but to also be responsible for obtaining the information in the first place. Hardin's arguments to filter the written word should be heeded.

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[17] Hardin, 11.
[18] Ibid, 23.
[19] Ibid, 34.
[20] Ibid, 35.

Nowhere is the decimation of the landscape better exemplified in Industrial American literature. Leo Marx, Kennan Professor of American Cultural History in the Program of Science, Technology, and Society at MIT, has a unique view of how science, technology, and literature fit together. He says

> Nature as a universal norm; the continuing dialogue of the political philosophers about the condition of man in a "state of nature"; and the simultaneous upsurge of radical primitivism (as expressed, for example, in the cult of the noble savage) on the one hand, and the doctrines of perfectibility and progress on the other.[21]

His idea here is that while this peaceful lifestyle is wonderful, progress always serves as its foil. Easy to see is the theme of technology's decimation of both the landscape and man. Leo Marx's zeitgeist is that America exhibits a nostalgic view of pastoral landscape caused by the destruction of industrialization. His metaphor for this is the machine. Marx makes a number of literary connections to the death of the pastoral, proving the writing has been on the wall for a long time. Marx says, "I regard those works as pastorals whose controlling theme is a variant of the conflict between art and nature."[22] He classifies the decline of the peaceful landscape as a problem caused by technology. There is clearly a correlation; "In recent years scholars have clarified the relation between the vogue for landscape as an aesthetic object and the great scientific revolution that began in the seventeenth century."[23] Marx argues that with the evolution of science, environmentalism evolved in a conscious effort to balance technology. He presents a number of interesting arguments using early America literature in this great work, *The Machine in the Garden.*

Henry David Thoreau also felt a kinship with the natural world. Professor David Kinsley of McMasters University connects man's downfall to the onslaught of

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[21] Marx, 88.
[22] Ibid, 25.
[23] Ibid, 27.

technology and industry. "Throughout his life, Thoreau was concerned about communing with nature directly and intensely."[24] In fact, Thoreau wrote, "My body is all sentient. As I go here or there, I am tickled by this or that which I come in contact with, as if I touched the wires of a battery. I keep out of doors for the sake of the mineral, vegetable, and animal in me."[25] Scientific accomplishment and technology are the antithesis of nature in the nineteenth century. In fact, "in his emphasis upon communing with nature, Thoreau was critical of the reigning scientific temper of his time, which taught a detached stance as the most appropriate manner by which to understand nature."[26] As a literary genius, Thoreau's words were relevant when written, but perhaps even more so today. The simplistic lifestyle was not only about limiting government but also limiting technology as Transcendentalist way of life, considered a huge part of Thoreau's worldview. In fact, David Orr recommends that the sciences and humanities should be synthesized for the greatest understanding of ecology and the effects that civilization has had on this planet.[27] Difficult to envision is industry and nature living together, but it must be done.

Marx also connects with the natural beauty of the American landscape. He says "for it is industrialization, represented by images of machine technology, that provides the counterforce in the American archetype of the pastoral design."[28] Marx portrays progress as the ecological destruction of the New World:

> The locomotive, associated with fire, smoke, speed, iron, and noise, is the leading symbol of the new industrial power. It appears in the woods, suddenly shattering the harmony of the green hollow.[29]

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[24] Kinsley, 142.
[25] Worster, 77.
[26] Kinsley, 145.
[27] Lemons, 709.
[28] Marx, 26.
[29] Ibid, 27.

Marx sees this industrial iron horse as a pollutant that burns hotly and noisily through the peaceful landscape, destroying that which is natural at the same time. The machine represents the consequences of applied science. Therefore, it has ruined the purity of the peaceful landscape. Mircia Eliade makes a similar argument, referencing contemporary architect Le Corbusier's view that the industrial world has ruined us; our world is now merely a desacralized house to live in.[30] If we look as our planet as our home, the pollution and dehumanization that is associated with industry has made our house filthy and polluted. But is there a way to live in harmony with ecology and technology? Marx presents a unique classification of the drawbacks that progress has brought by examining modern literature. This is a fabulous study using the literate filter.

Another literary great, Mark Twain, portrays the birth of technology as the death of the rural charm once found in early America. In *The Adventures of Huckleberry Finn*, progress is seen as the enemy of man in his state of nature. According to Marx, Huck Finn's struggle is one where "the hero gives up his place in society and withdraws toward nature."[31] Huck and Jim are almost killed when the steam ship destroys their simple raft, their lifeline. This occurrence serves as a metaphor painting progress as the evil monster that crushes simple man who lives off the land. This rugged noble savage, Huck Finn, resists all efforts to be domesticated. Huck just wants to live freely as Jim, his runaway slave companion, does: "But I reckon I got to light out for the territory ahead of the rest, because Aunt Sally she's going to adopt me and sivilize me, and I can't stand it. I been there before."[32] Because society has been so cruel to Huck, he has no reason to believe

[30] Eliade, 50.
[31] Marx, 69.
[32] Twain, 285.

or trust that he can live the urban life, which is being imposed upon him by others. Ironically, Huck as the white man is enslaved by society whereas Jim, the escaped slave, finds freedom by going of the grid in his escape. This is truly a complicated piece of situational irony to consider in literature.

A similar theme is found in Herman Melville's *Moby Dick.* Ishmael changes as he witnesses Captain Ahab's rage and downward spiral spawned by his hatred of the great white whale Moby Dick. Ahab believes, and tries to convince his crew, that Moby Dick is evil and needs to be killed for the benefit of humanity:

> All that most maddens and torments; all that stirs up the lees of things; all truth with malice in it; all that cracks the sinews and cakes the brain; all the subtle demonisms of life and thought; all evil, to crazy Ahab, were visibly personified, and made practically assailable in Moby Dick. He piled upon the whale's white hump the sum of all the general rage and hate felt by his whole race from Adam down; and then, as if his chest had been a mortar, he burst his hot heart's shell upon it.[33]

By ridding the world of Moby Dick, Ahab's worldview that evil will be abolished is thrust upon his unfortunate crew. Ahab is a tool of progress that refuses to accept his fate. He is sucked into the dark side of the whaling industry and becomes infected by the progress that powers the industry. Quite a contributor to progress, successful whaling could yield large profits. Whale blubber was used to light the streetlamps and was quite a precious commodity in the urban setting. In a sense, this whale product powered the increasing technology at the hands of men like Ahab. Ishmael's return to nature in witnessing a baby whale birth reminds him that the commodity he seeks for profit is also life form – natural in its' "state of nature." It is only through Ishmael's admiration of nature that he is able to free himself of Captain Ahab's dark grasp. This novel clearly portrays human motivations as cruel and nature as a helpless victim of the dominant animal.

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[33] Melville, 265.

Perhaps the writer who Marx, a naturalist and ecological warrior, appears to relate most closely with would be Thomas Jefferson. Jefferson does not blame the machine itself, but the consumption and dehumanization caused by the men who run the machine. "From Jefferson's perspectives, the machine is a token of liberation of the human spirit to be realized by the young American Republic; the factory system, on the other hand, is but feudal oppression in a slightly modified form."[34] Marx discusses Jefferson and his reaction to the 'Europeanizing' of his American 'Garden of Eden' as a result of industrialization. This Europeanization is not a good thing. During Jefferson's time, Europe was much more urban and the pastoral landscape found in the New World had its own charm to boast. Marx points out that Jefferson "singles out the steam mill as deserving of particular notice because, he says, it is 'simple, great, and likely to have extensive consequences."[35] Things have not really changed that much today and America continues to become more and more industrial. The peaceful landscape continues to dissolve at the cost of progress and thus "so' say the parable makers, 'is your pastoral life whirled past and away."[36]

The current population consumption threatens to strangle our Mother Earth. Compounding the problem is careless behavior. This irresponsibility has strained water supplies, food production, and natural forests all over the globe. Climate change and depletion of the ozone, as a result of greenhouse gas emission, is a real phenomenon proving to have devastating effects upon civilizations. To see this, one needs look no further than the numeracy filter, which entails examining the numbers. In this case, the numbers are in the form of scientific data. In *The Dominant Animal,* Anne and Paul

[34] Marx, 150.
[35] Ibid, 147.
[36] Ibid, 354.

Ehrlich state that "the climate is largely controlled by the heat balance of Earth - how much the sun warms the atmosphere and the surface – and human beings have been changing that balance."[37] According to the Ehrlich's, before the Industrial Revolution of the late eighteenth century the "atmospheric concentration of CO2 was about 280 parts per million. By 2007 it had risen to 383 ppm, an increase of about 37 percent, and was climbing by about 1.9 ppm per year."[38] This rate is only increasing as our demand for fossil fuels and coal burning continues to rise. As great as science has been, it has also catapulted us into a severe ecological crisis of a planet growing noticeably warmer.

Relating to science, former Vice President and senator Al Gore has made a second career out of informing he public about global warming using scientific data. In his documentary and book, *An Inconvenient Truth*, Gore gets his message out to the mainstream public in 2006. He presents solid science that this phenomenon of global warming is a direct impact of human behavior. In fact, Gore states that "we have always exploited the Earth for sustenance, utilizing relatively basic technologies for most of our existence, like plowing and irrigating and digging into the earth. But even these simple technologies have become far more powerful today."[39] Notice that the blame is attributed to human consumption and corroborates the CO2 level data stating that it be extracted from ice layers over 1000 years studied in the worlds' glaciers. He jokingly states, "The ice doesn't lie" but then seriously explains further that

> Scientists can measure the CO2 levels in snow bubbles and you can count this back over the past 1000 years. Our current CO2 level is almost at 400 parts per million and within the next 40 years, we will be well above 600 parts per million if we do not change our habits[40]

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[37] Ehrlich, 264.
[38] Ibid, 264-265.
[39] Gore, 236.
[40] Ibid, 63-67.

It is this C02 that is mostly responsible for global warming through the release of greenhouse gasses. According to the Ehrlich's, "the increase in CO2 concentration is due mainly to the burning of fossil fuels and, to a lesser extent, the clearing and burning of forests."[41] Fossil fuels are used in the production of energy to power our homes and vehicles. Even deforestation as a result of building our homes or the creation of various paper products compounds the problem. What is most frightening is the wake-up call that just "half a century ago scientists believed that climate change perceptible to human beings would take centuries to occur. The more recent view is that significant changes have started already."[42] Gore explains that with an average temperature of the globe around 50 degrees Fahrenheit, "an increase of five degrees actually means an increase of only one or two degrees at the equator, but more than 12 degrees at the North Pole."[43] This dispels the myth that one can simply burn down his house with no affect to others.

Although some may not consider Gore the ecological authority, a man that has eight years experience in the White House is certainly privy to more than the average American. This makes his opinion just as relevant as any scientist. As a matter of fact, Gore divulges some of this data, "the Navy has kept a meticulous record of ice thickness measured by upward-looking radar."[44] This data was considered classified by the Navy for many years. He says, "When I persuaded them to release it, the data told an alarming story:"[45]

> Since the 1970's, the extent and thickness of the arctic ice cap has diminished precipitously. There are now studies showing that if we continue with business as usual, the Arctic ice cap will completely disappear each year during the summertime. At present, it plays a crucial role in

[41] Ehrlich, 265.
[42] Ibid, 267.
[43] Gore, 149.
[44] Ibid,142
[45] Ibid.

> cooling the Earth….The reason this Arctic ice cap has been melting so quickly is first because it is much thinner than the Antarctic ice cap, since it floats on top of the Arctic Ocean.[46]

Now you may think 'big deal, ice melts in my drink every day!' But we have to look outside of our own window at who the immediate losers are in this scenario. Polar bears that find themselves trapped on melting icebergs far from land will tire from swimming miles and drown. Aside from the loss of life, there is the ice loss which is concerning. Gore explains further:

> As soon as a portion of the ice melts, there is a dramatic difference in the amount of heat absorbed by the sun. The ice reflects most of the incoming solar radiation, like a giant mirror, whereas the open sea waters absorbs most of that heat. As the water warms up, it puts even more melting pressure on the edge of the ice adjacent to it.[47]

When this scenario plays out, the ice melts and the increased water can cause a rise in sea levels. There is more evidence that the ice will continue to disappear. In a study of sea ice thickness published in *Environment Magazine* predicts that in the year 2050, the sea ice will be merely 54% the volume it was in 1955.[48] Even if this science is only half correct, it is cause for alarm.

Melting ice is also a sign of warming ocean temperatures. Warming of the tropical ocean waters cause coral to bleach and die out killing off species that rely upon these reefs for habitat and nourishment. Many decades are required to recreate this thriving ecosystem, if it happens at all. Clearly, many aquatic and non-aquatic species are unable to adapt quickly and begin to die off in large numbers, putting themselves at risk for extinction. According to Hardin, "Extinctions caused by human activities present a snarl of ethical, esthetic, practical, and political problems. Conflicting goals have to be

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[46] Gore, 142-143.
[47] Gore, 143-144.
[48] Corner. "Geoengineering the Climate: The social and Ethical Implications," *Environmental Magazine,* 33.

balanced against one another."[49] At first glance, melting ice does not seem to be a cause for alarm, however, when the impact is considered, there are frightening consequences to the polar caps and ocean ecosystems.

A small-scale catastrophe is the loss of species and life - simply the death of a few animals – caused by changing chemistry of oceans. Ocean thermal expansion, a condition caused by the effects of global warming, has the potential to cause coastal flooding and loss of life in low-lying areas such as the coast of Florida and New Orleans. Those are just two of the heavily populated places that are of concern. In fact, Tony Blair's advisor, David King, proclaimed at a 2004 conference in Berlin that "the maps of the world would have to be redrawn" if a landmass the size of Greenland were to fall into the sea.[50] He believes that if this were to happen we would see a rise in sea level somewhere between 18-20 feet.[51] Easy to see how incredibly bad this would be in places like Florida and New Orleans that sit at or below sea level. James Lovelock's research states that "we saw that in 2007 the Earth passed a significant milestone when the area of floating Arctic ice that melted in the summer was about 3 million square kilometers greater than usual, an area thirty times larger than England."[52] Hopefully this is not a sign of things to come, but the data does not appear promising if we remain on our current course.

An enormous culprit of global warming is CFC's, Chlorofluorocarbon compounds, which are stable, non-toxic; non-flammable compounds, were created in the

[49] Hardin, 37.
[50] Gore, 196.
[51] Ibid.
[52] Lovelock. *The Vanishing Face of Gaia*, 16.

1930's. These were hailed as a technological triumph in their heyday.[53] These refrigerant fluids, such as Freon for air conditioning, were being used freely and unregulated by the public for decades. As the Ehrlich's help to clarify, two atmospheric chemists, F. Sherwood Roland, and Mario Molina "concluded that the CFC's could destroy the stratosphere's ozone layer, a shield extending between about eight and thirty miles above Earth's surface that protects all life on land from damage or destruction by the sun's dangerous UVB radiation."[54] This UV radiation is responsible for the release of chlorine in the oxygen-balanced ozone, causing its depletion. This is oversimplified greatly, but certainly the picture becomes clearer using this analysis. There are skeptics who claim all sorts of things about CFC's - that they were not really that harmful, we were lied to, and so on. Garret Hardin addresses ecological skepticism as forgivable in popular thinking. He states, "In earlier days human beings often mistreated the world and 'got away with it.' People- some people- survived each environmental disaster, through the world as a whole was impoverished."[55] Difficult to filter what is fact and propaganda, therefore, ecological behaviors require commitment. Erring on the side of caution and suspending the use of harmful chemicals seems like a small price to pay considering the alternative.

Finally, Hardin's ecolacy filter requires Homo sapiens to ask what it is we must do now. We have continued the everlasting party for centuries celebrating our awesome applied science technological advances! But we did not understand that a bad hangover was lurking just around the corner and that is where we find ourselves now. In fact, James Lovelock believes that the earth is suffering from cold-like symptoms as we speak

[53] Ehrlich, 258.
[54] Ehrlich, 258-259.
[55] Hardin, 13.

and "in some ways human species is like a planetary disease."[56] We face an enormous ecological problem in searching for answers on how to coexist with our planet. Richard Feynman states "I believe that to solve any problem that has never been solved before, you have to leave the door to the unknown ajar."[57] With the world population having surpassed seven billion people in the year 2011, there are overwhelming problems of how to feed and house everyone. In fact, Ehrlich states that "we humans have modified almost the entire surface of the planet, demolishing forests, converting to agriculture a major fraction of the land….destroying the habitats of innumerable organisms." [58] The deforestation has occurred as a result of greater consumption needs. This is all a vicious cycle as in order to feed our booming population; we must continue to destroy land to support our population sprawl, which gives them less land upon which to live. I find it ironic that in order to sustain life for humans, other organic life must be destroyed. But this must be controlled if the planet is to remain a thriving ecosystem in balance.

The ultimate turning point in modern history, according to Harvard professor, Ernst Mayr, can be attributed to Darwin's findings. Mayr states that "the worldview formed by any thinking person in the Western world after 1859, when *On the Origin of Species* was published, was by necessity quite different from a worldview formed prior to 1859."[59] Darwin established theories of common ancestry and was the first to introduce a "sound theory of classification" as a means of organizing life forms.[60] Through his observations as a naturalist, Darwin was able to study species and their characteristics. He dispelled the myth that species are fixed with his theory that "existing species could

[56] Lovelock. *The Revenge of Gaia*, 10.
[57] Feynman, 27.
[58] Ehrlich, 44.
[59] Mayr, 1.
[60] Ibid, 2.

give rise to a new species."[61] This is important because we know that environmental factors can have an impact upon generations because an environment acts symbiotically to its inhabitants. Darwin's ideas can offer us new ways to solve old problems by changing the way we think as he did.

In fact, I see Darwin's ideas as a parable for hope for our planet. If Darwin's ideas were so offensive back in 1859 - but many revered scientists are adapting his views 150 years later - that is progress! Not only biologists like Lynn Margulis, but also physicists such as Richard Feynman and scientists like Ernest Mayr validate Darwin's ideas. Homo sapiens have not evolved that much in the 150 years since Darwin shocked the world but his theories are getting harder and harder to disprove. Pressures to use the technologies created by applied science have mounted for over a century. Humans have given in to this pressure and caused severe environmental damage. Additionally, Gore states, "we now have a much more profound ability to transform the surface of the planet. In the same way, every human activity is now pursued with much more powerful tools, which often bring unanticipated consequences."[62] We now know better and we have to anticipate the harmful consequences. Darwin states in his *On the Origin of Species*:

> It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other and depended on each other in so complex a manner, have all been produced by laws acting around us.[63]

[61] Mayr, 18.
[62] Gore, 238.
[63] Darwin, 491.

In other words, we are all in this mess together - humans, scientists, polar bears, coral reef, and so on. But humans are the only ones with the innovation to create change. Once again, the responsibility lies at the hands of the dominant animal, humans.

David Orr tells us that ecological literacy should be our goal and that government should enforce this behavior upon its citizens. In fact, he says in his article titled, *Leviathan,* "we cannot rely on individual altruism or enlightenment."[64] Although Orr believes that literacy, or what Hardin calls the ecolate, will produce a resolution, he does not have the greatest faith in humans. Since the time of the Enlightenment, man has pressed on believing that if something can be done, then we should do it. There are impediments, however, to living sustainably with this type of thinking. We have used technology to improve quality of life. I can get mass-produced tee shirts and tennis shoes at a local economy store. This saves me enough money to go to the movies or go out to eat with my kids, improving my quality of life. In the civilized and industrialized world, we have never had it so good thanks to technology! On the other hand, I have discussed the environmental damage has been inflicted in the form of greenhouse gasses. Does it sound like I am playing both sides of the fence? Well, I am. This is what Robert Constanza calls the social trap. This trap eventually gets all of us; it is inevitable. According to David Orr,

> The crisis of sustainability is in part the result of rational behavior in "situation(s) characterized by multiple but conflicting rewards….social traps draw their victims into certain patterns of behavior with promises of immediate rewards and then confront them with consequences that the victims would rather avoid.[65]

It is more desirable for most to spend one hundred dollars for ten outfits made cheaply, using harsh chemicals in China than to spend five hundred dollars on ten outfits made

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[64] Orr. "Leviathan: The Open Society and the Crisis of Ecology," *The Western Political Quarterly,* 459.
[65] Orr. *Ecological Literacy,* 5.

using sustainable organic cotton grown in the US chemical-free. The social trap coerces us to use sustainable products and goods for environmental reasons but many times the draw back is the expense of these items. This social trap will continue to be a problem that is not easily solved. The cheaper solution is not the environmentally friendly solution and that is the problem of these social traps.

The benevolence that Gaia, as the ancient Greeks called Earth, calls for is a zero carbon footprint from each of the seven billion residents of planet earth. Alas, this ecological Eden that writers like Hawthorne, Jefferson, and Twain were promoting still has not been achieved in the twenty-first century. Humans are using up resources at a faster rate than is sustainable. According to Paul and Ann Ehrlich, "forecasts of famine, climate change, resource shortages, destruction of atmospheric ozone, and irreversible damage to the oceans have been increasingly accepted as likely, if distant possibilities."[66] The causes of these phenomena are a complex panacea for which experts claim to have discovered the root causes. Lynn White, for example, points the blame at numerous sources; "Judaic-Christian values, modern science, the development of agriculture, overpopulation, the overuse of fossil fuels, and the development of advanced technology."[67] White makes a fabulous point and pinpoints our problem well. However, this just echoes the ideals set forth by writer's centuries before. We recognize the problem, but we still have not accepted the challenge that true ecological literacy requires.

If indeed the planet functions as an ecosystem that is interconnected, the Gaia Theory is a fabulous worldview. Best known for his Gaia Theory, British scientist,

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[66] Orr. "Leviathan, the Open Society, and the Crisis of Ecology," *The Western Political Quarterly,* 457.
[67] Ibid.

James Lovelock says, "I have for the past forty years looked on the Earth through Gaia theory as if, metaphorically, it were alive at least in the sense that it regulates climate and composition of the Earth's surface so as always to be fit for whatever forms of life inhabit it."[68] He has devoted his life to examining data that points to human abuse of the planet. Lovelock issues Homo sapiens a stern warning, "I have to tell you, as intimate members of the Earth's family, that civilization is in grave danger." [69] Lovelock addresses the causes of this as toxic release of greenhouse gasses and deforestation for purposes of farming. If Lovelock's theory of Gaia is fact, which makes sense if one is to consider that our ecosystem is truly a system, then mankind must do its part in ensuring the planets species interact properly.

Lynn Margulis' life's work of SET (serial endosymbiosis theory) echoes a similar sentiment using a much more biotic framework than Lovelock's. This theory attempts to explain the origin of cells. While Lovelock states that Gaia is a self-regulating entity, Margulis looks at every living thing as a series of different mergers of bacteria types.[70] The word symbiotic, according to Margulis, is "the living together in physical contact of organisms or different species."[71] It took a wisecrack of a student of hers, Greg Hinkle, to point out to her that "Gaia is just symbiosis seen from space."[72] After all symbiosis, according to Margulis, is "the system in which members of different species live in physical contact" that governs over all living things.[73] So if this is the case, why would we not want to create a society that puts priority on preserving the ecosystem, reducing

[68] Lovelock. *The Revenge of Gaia*, 1.
[69] Ibid.
[70] Margulis, 30.
[71] Ibid, 2.
[72] Ibid.
[73] Ibid, 5.

waste, and carbon emissions? We should for all living species. Hardin claims: "There are something like ten million species of plants and animals living in the world, the greatest concentration of them being in the tropics, where our knowledge is least certain."[74] There is so much that we still do not know and so many species that are dependent upon the actions of humans for survival. Anything we do to effect just one small part of our symbiotic world is only going to come back to us full circle. People will hopefully do the right thing when presented the choice and this means being ecologically literate and benevolent.

Applied science presents new possibilities if we admit what we do not know. Technology, therefore, should not be considered the enemy. With this technology, however, comes great responsibility. According to physicist, Richard Feynman, we should always doubt findings until they have been tested and proven many times over. We must suspend our hubris and be sure that our results are the rule and not merely a happy accident. When we do not, things can quickly get out of hand. According to Ann and Paul Ehrlich, "the remarkable technological accomplishments of modern human beings have had unfortunate, if unintended, consequences."[75] However, Feynman, putting his usually humorous antics aside for just a moment, cautions against putting the blame on science or technology. Feynman points out that technology can be used for good or evil but he makes clear that this is not a scientific problem. Instead these

> Are far more humanitarian problems. The fact that how to work the power is clear, but how to control it is not, is something not so scientific and is not something that the scientist knows so much about.[76]

[74] Hardin, 36.
[75] Ehrlich, 3.
[76] Feynman, 7.

Feynman clearly believes that science cannot be seen as the culprit for our human mistakes; man is the problem when he thinks too highly of himself to doubt.

Rachel Carson infuriated many with her findings about the dangers of pesticides in the hands of men. Hardin uses a fabulous example of misplaced blame in Carson's watershed book:

> The controversies that followed the publication of Rachel Carson's *Silent Spring* in 1962 more often than not sprang from a misunderstanding of the true nature of the author's concerns. Her criticisms were not so much directed at technology itself as they were at the reliability of the human beings who install and operate the technology.[77]

Science has created a pressure to succeed among humans, but at the same time applied science has left humans with a large ethical dilemma in preserving the planet.

Our ethical and scientific barometers need be much more synchronous if we are to pass on our lush planet to our children. We cannot simply blame the social traps. Ernst Mayr states

> Such social ethics exist in a rather rudimentary way in many living organisms…They are of infinitely greater importance in the human species, where every cultural group has its code of ethics which, in the long run, determines the survival and ultimate success of the group.[78]

The fall of great civilizations have proven that unethical societies are not sustainable in the end. Homo sapiens share the common goal of creating a sustainable planet. According to John Dewey, "what people must have in common in order to form a community or society are aims, beliefs, aspirations, knowledge-a common understanding-like mindedness."[79] The world has gotten smaller and now that every country contributes to global warming. We are a global community. Though our innocence has been lost at the hands of technology, it does not mean that we cannot develop further morally. If Darwin believes that adaptation is possible, we too must believe that humans can become

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[77] Hardin, 45.
[78] Mayr, 156.
[79] Dewey, 3.

better and more benevolent together as a society. According to Dewey, "the principle of continuity through renewal applies. With the renewal of physical existence goes, in the case of human beings, the recreation of beliefs, ideals, hopes, happiness, misery, and practices."[80] Hopefully we can learn to appreciate Dewey's ideas to create better communities.

Things have changed quite a bit since the Industrial Revolution, as have our consumption patterns. As Hardin points out so grotesquely, "Now there is a surplus of demanding human flesh and daily less of the unspoiled environment needed for the nourishment of that human mass."[81] Hardin also suggests that we use filters, which I interpret to be finding a way out of that social trap: "Caution and humility are the hallmarks of the ecolate attitude toward the world."[82] Excellent information is available about sustainable living standards to promote ecolacy in the works of Orr. This man has dedicated his life to Ecological Literacy in all forms. Although it may be true that we have gained a conscience arbitrarily, we must continue the fight and make ecology a priority. Hardin states, "In the second half of the twentieth century ecology entered the consciousness of the general public through the door labeled 'side effects."[83] Regardless of the reasons that we are asking, 'what now,' humans cannot continue to consider global warming to be merely a side effect. Margulis, Orr, Lovelock, and Carson are all fabulous examples of creating ecolacy in our society. It is now up to everyone to include this knowledge into our daily lives and worldviews to create change.

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[80] Dewey, 2.
[81] Hardin, 13.
[82] Ibid, 23.
[83] Ibid, 53.

Long since past are the simple days where Americans could relish in the simple, agrarian landscape. Urban sprawl and population growth create a human problem with every day that passes. The world's seven billion people have to find a way to live symbiotically with one another and share water supplies, food production, and preserve natural forests. Climate change and depletion of the ozone, as a result of greenhouse gas emission, has to be reduced. We know that these things are real and are partially responsible for the current state of the planet. But we also know, according to scientists like Lovelock, that it is not too late if we change our behaviors. For the sake of future generations, we can and we must reduce humankind's ecological footprint for our survival. Ecology and technology must learn to work together. I believe that they can act symbiotically so that they are no longer foils to one another. It is merely a matter of teaching ecological literacy at all levels of education and then putting these teachings into action. Ecological benevolence and technological vicissitude must learn to coexist and balance the effects of one another.

"When I look around for signs that we are about to change, I don't see it. If an issue is not on the tip of constituents tongues, it doesn't matter" – Al Gore

Chapter II: Ecological Leviathan or Ecological Crucible?

There are many aspects to consider when searching for the root cause of our ecological problems. David Orr and Stuart Hill call our problem an 'Ecological Leviathan.' Thomas Hobbes writes about the necessary monster, in *Leviathan*, that keeps humanity in line by threatening harsh consequences for immoral behavior. Hobbes did not personally create this term, as the Leviathan is also discussed in the bible. Personally, I do not think that Leviathan is the fitting term for the ecological problem that we are facing. Instead, I see this as a severe trial or test of humanity. Therefore, I would be more inclined to call our problem that of an "Ecological Crucible." This test can be won if the right choices are made. There is a misperception on the part of some that that eco-consciousness is a relatively recent phenomenon, let us say as recent as the past thirty years. However, Lewis Mumford's claim that the "urge to dominate nature" can be attributed to the great thinkers whose ideas founded modern science: Bacon, Galileo, Newton, and Descartes.[84] The root cause of our technological and industrialization crisis was realized at least a century ago, as was previously discussed in Chapter I. Mumford claims that each scientist "lost sight of both the significance of nature and the nature of significance."[85] These great men and their groundbreaking theories helped transform the

[84] Orr. *Ecological Literacy,* 12.
[85] Ibid.

organic worldview to the industrialized world, according to Mumford. While this may be true, these great thinkers did not single handedly bring about the Industrial Revolution and its immoral and damaging ecological effects. This was facilitated by man's quest to create a better standard of living, assisted by use of technology. The objective to mass-produce consumables has been achieved, but at an immeasurable cost to the planet's health. At this time, we are not an entirely planet-broken race. Orr knows this and he has become one of the most renowned scholars who are trying to bring our crisis of sustainability into daily dialogue. Jane Goodall, world famous primatologist, subscribes to worldview that man is responsible as well. She says, "We got too smart and left our humanity along the way. Money became a god."[86] We lost sight of what is truly important as a result of greed. The entitlement of each human that it is a right to do as we please has won out. This way of thinking must be squelched or we will fail at this crucible.

Orr states that human beings have an attraction to social traps. Actually, I would take Orr's claim a step further and say that we have a fatal attraction to social traps. We struggle daily in our choices to do the right thing only to be hindered by cost or convenience. Orr feels that the harder we work towards achieving greatness, the more we struggle to be ethical.[87] Human rights were violated daily during the heyday of the Industrial Revolution and unfortunately this is still happening in parts of the developing world. According to Aldo Leopold's *Land Ethics*, "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it

[86] Dr. Jane Goodall. "Making a Difference" (lecture Rollins College, Winter Park, FL, April 19, 2012).
[87] Orr. *Ecological Literacy,* 17.

tends otherwise."[88] Whatever a truly sustainable society may be, it must be built upon the most realistic view of the human condition as possible.[89] Social traps can no longer be an impediment to moral actions. We have to put sustainability and humanity ahead of economy and convenience. Unfortunately this is a hard sell in countries like China and India where daily survival is sometimes difficult. The problem is not easily resolved. We have to step up and find creative ways to survive this crucible.

According to Garrett Hardin, most global problems are aggregations of national or local problems.[90] He states "attempts to mimic nature and ecological processes may in time come to resemble Baconian science with its goal of total mastery."[91] Better technology brings with it human domination to the point where ethical lines are inevitably crossed, showing human arrogance and hubris. Orr states that accidents such as Chernobyl, Love Canal, Prince William Sound, The BP Gulf disaster, and Three Mile Island are 'normal accidents' in the sense that they are predictable on account of past behavior of human nature.[92] What Orr means is that these types of disasters are inevitable given our large scale mishandling of the planet. These simply should be expected. But this does not have to be the case. We simply cannot afford these types of accidents as the human and financial tolls are just too great. Maybe we should consider ourselves lucky that the damage is not worse at this time considering our careless habits and arrogance. But what if we could avoid these accidents altogether through the use of the same technology that leads humans down the dark road to doom? This will be the

[88] Leopold, 269.
[89] Orr. *Ecological Literacy,* 18.
[90] Ibid, 31.
[91] Ibid, 35.
[92] Ibid, 36.

dilemma that lawmakers and policymakers face as we transition through the twenty-first century.

Hard to believe is the fact that the global community has grown to over 7 billion. The population of the world in 1800 was about one billion, after 1900 two billion, 2.5 billion in 1950, four billion by 1975, and five billion in 1987.[93] When considering how fast we are growing in our industrialized society, it is frightening to think of how our current resources will sustain future populations. Food shortages are projected to be a major concern in the next few decades. Some areas of our global communities are already showing signs of this human tragedy. Knowing that our population has grown enormously, new methods must be developed that will allow us to sustain our present way of life while leaving no ecological footprint. According to Orr, "Present methods of agriculture, forestry, land management, and game management are jeopardizing future productivity for the sake of present consumption."[94] Our dependence on fossil fuels will be hard to shake, for it is David Orr that points out, "without fossil fuels, the present world in anything like its present form and scale simply could not have been created. The enormous increases in industrial and agricultural production are the result of our ability to substitute energy for labor."[95] James Lovelock has become an enormous supporter of nuclear energy, but the looming risk of a core meltdown and environmental radiation contamination are always present. This will be discussed further in Chapter III. Our energy problem and dependency upon fossil fuels is a very complicated ecological social trap indeed.

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[93] Orr. *Ecological Literacy,* 30.
[94] Ibid, 55.
[95] Ibid.

Industrial farming poses a great ecological threat to civilizations. Important to consider are the risks involved with sustaining livestock. According to Margulis, "one of the gaseous products of grass digestion is methane. Cows belch huge quantities of it. Bovine methane is part of the reason that Earth's air is a highly unstable chemical mixture."[96] Methane gas is responsible for an enormous portion of pollution and destruction to our atmosphere as it becomes CO2 and contributes to global warming. Margulis identifies one of the largest sources stating, "Methane is released into the air through the mouths of calves, bulls, and cows. Atmospheric methane quickly reacts with oxygen to produce carbon dioxide."[97] While it is true that not all methane gas comes from cattle, a large amount does and this is a direct result of an increased need for livestock as a food source. Margulis identifies other sources "methane gas is produced by bacteria, mainly in the methanogens that live in waterlogged soil and cattle rumen."[98] Certainly, this cycle repeats itself and air methane is renewed constantly through the bovine food cycle. Lovelock first realized that atmospheric methane concentrations must be connected with life forms as it is always present in concentrations from two to seven parts per million.[99] If this is the case, then humans are also responsible for methane gas production as well; however, if we were to cut down on the amount of bovine food production we might be able to bring methane gas release under control. This is certainly a reasonable assumption and a motivation to experiment with vegetarianism, just as Benjamin Franklin did!

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[96] Margulis, 122.
[97] Ibid, 117.
[98] Ibid.
[99] Ibid.

For just a moment, let us put the issue of methane gas production aside and look at other destructive effects that livestock can have on the land. The need for grain to feed cattle is enormous. According to Joan Dye Gussow, "thirty-eight percent of total grain production worldwide is fed to chicken, pigs, and cattle."[100] Grain that could be used to feed humans must be diverted to sustaining cattle. The problem with harvesting grain, however, does not end there. Furthermore, "intensively grown grain is monocropped, in a system that waste both topsoil and energy."[101] Fossil fuels are used to power machinery, but also usable soil becomes fallow in this process. For each pound of produced red meat, poultry, eggs, and milk our farm fields lose about five pounds of usable dirt.[102] This creates a cycle of needing to clear more forestry for planting and natural habitats disappear due to this industrial farming.

Pesticides and fertilizers are another problem with industrial farming. As outlined by Rachael Carson, "As the tide of chemicals born in the Industrial Age has arisen to engulf our environment, a drastic change has come about in the nature of the most serious public health problems."[103] Not only do the industrial pesticides remain behind as a residue on food, but also they leak into the ground soil and water table. This is of a greater concern because humans cannot live without clean water. We have not even addressed the need to provide livestock with clean drinking water. According to J. D. Gussow, "One-third of the irrigation water in California produces livestock feed largely for dairy cattle….To produce one pound of pork requires 430 gallons of water."[104] Additionally, farmers are selling off the inconsumable parts of animals (sheep's brains,

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[100] Gussow, 4.
[101] Ibid.
[102] Ibid.
[103] Carson, 187.
[104] Gussow, 4.

etc.) for livestock food sources. Therefore, we have taken a vegetarian animal, such as a cow, and turned it into a carnivore.[105] It is simply too soon to tell what the end result of all of this will be upon humans that consume meat, but all of these factors are cause for concern.

The prospect of looming food shortages is disturbing, but not to be completely unanticipated. In fact, "Reverend Thomas Malthus was among the first to recognize that population tended to increase exponentially while food supply grew only arithmetically."[106] We have not made strides to change this reality since Malthus' time. In fact, David Orr points out that

> Population growth is exerting great pressure on ecosystems nearly everywhere. In developed nations, these impacts are compounded many times over by high rates of resource consumption. In poor nations, the effects of growing population are evident in soil erosion, desertification, and deforestation. Twenty percent of the present population is malnourished.[107]

We have to solve the problems of how to feed and get clean drinking water to all people despite the population explosion; since clean water should be a human right. I could also argue that this is an ethical right, and I will discus this in more detail in Chapter IV. Aldo Leopold considers the land and waters to be part of an energy circuit, not just merely inanimate dirt. He lays out a sketch of the land as an energy circuit with his three basic ideas:

1. That land is not merely soil.
2. That the native plants and animals kept the energy circuit open; other may or may not.
3. That man-made changes are of a different order than evolutionary changes, and have effects more comprehensive than is intended or foreseen.[108]

If indeed this Land Ethic is a demonstration of how we should treat the land as something sacred, we certainly are not meeting the criteria.

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[105] Goodall.
[106] Orr. *Ecological Literacy,* 50.
[107] Ibid, 51.
[108] Leopold, 255.

Food production, although undoubtedly a necessary evil, is responsible for much of our land destruction. Orr points out that "world soil loss due to poor farm practices is now estimated to be twenty-four billion tons per year."[109] Things do not appear to be looking any better in food production forecasts. Just as we cannot control our insatiable hunger, we also cannot control the weather. In fact, "The EPA and the National Center for Atmospheric Research indication that the grain belt in the Midwest will become both hotter and drier, shifting the prime growth area northward into Canada."[110] This is not a good thing for those that rely upon food production as their livelihood, but an even worse scenario for those that rely upon this region as a food source. George Perkins Marsh said in 1864, " Man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords."[111] This is certainly true and it would prompt me to ask the question - How far have we come in the last 150 years? I am not sure that we have made things any better despite our progress in technology. In fact, I am afraid we have ignored the warnings of Marsh and others. According to Orr, "Human impacts on the biosphere have increased markedly, while our land wisdom creeps forward."[112] Humans should have become smarter about the way we use land as our needs accelerated, sadly this has not been the case. We know that the problem we are facing is that of a food crisis, however, solving this issue is another issue entirely.

[109] Orr, 51.
[110] Ibid, 52.
[111] Ibid.
[112] Ibid.

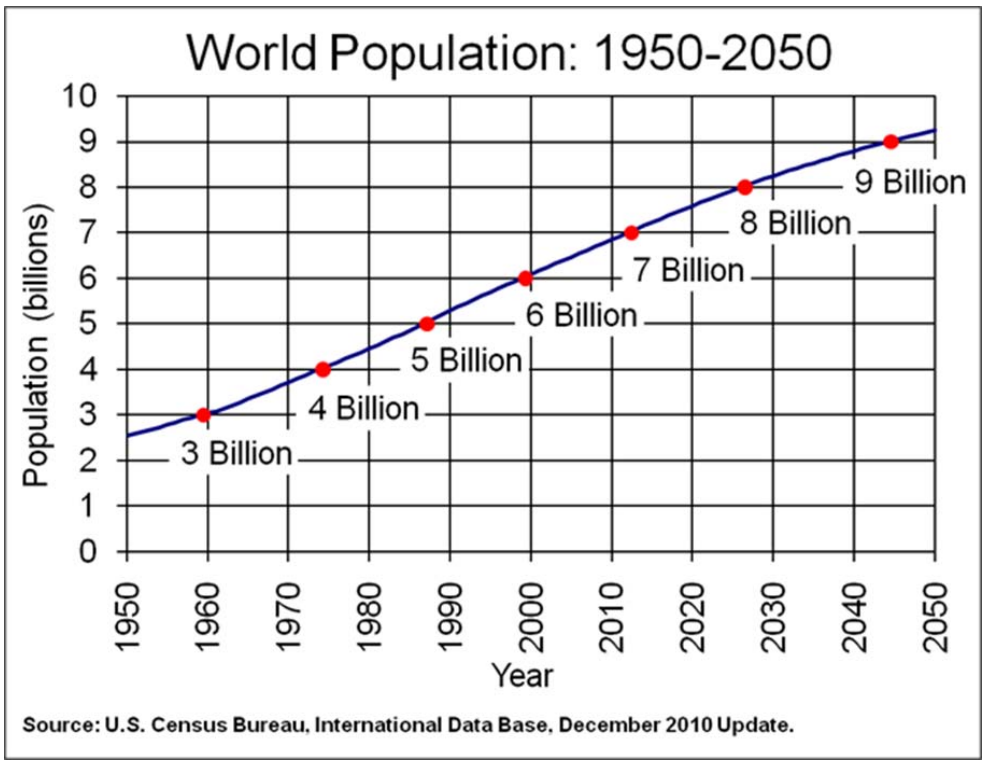

fig. 1

Our challenge over the next century will be to balance environmental demands with what can be sustained by the ecosystem in the long term. Looking at the U.S. Census Bureau's population growth expectation (fig. 1), humans are in big trouble if we do not begin to find sustainable methods of food production. The census bureau projects that the world population will grown to nine billion by 2050. We cannot even feed or house the seven billion current residents of planet Earth. Clearly scientific advances have uncovered solutions that can help to reduce our carbon footprint. This is a great first step. David Orr points out where the largest challenges lie:

> Arguments for technological sustainability rest heavily on beliefs that humans as economic maximizers are incapable of the discipline implied by limits even though they are somehow capable of the wisdom and good judgment necessary to manage all of the earth's resources in perpetuity.[113]

[113] Orr, 26.

There are economic paths that can be taken, which will lead to ecological redemption. These will be the focus of chapter III. Economic barriers do not have to prohibit eco-friendly technologies.

Lynn Margulis and James Lovelock see the Gaia hypothesis as viewing "the biosphere as an active, adaptive control system able to maintain homeostasis."[114] This homeostasis is Earth's ability to be self-regulating. In theory, the biosphere should be able to remain static; however, human impact has interrupted this stability greatly. Lovelock tells readers that "Gaia" was actually a name proposed by novelist, William Golding.[115] For a number of years, it was believed that our environment consisted of a relatively stable entity called the biosphere. The assumption that the biosphere was safe from human harm was incorrect. Humans previously thought:

1. Climate would remain stable within historic limits and the biosphere would absorb human and industrial wastes
2. Human population could be fed, housed, clothed
3. Science provided an adequate basis for managing nature
4. Energy would be cheap and abundant[116]

All four of these notions have been proven incorrect. The biosphere needs human help to remain stable. Lovelock points out:

> by adding greenhouse gasses to the air and by replacing natural ecosystems, like forests, to for farmland we are hitting the Earth with a double whammy. We are interfering with temperature regulation by turning up the heat and then simultaneously removing the natural systems which help regulate it.[117]

In the process of global warming, "Gaia enters an unstable state called and interglacial, much like a fever in one of us.[118] The Earth is sick and humans must accept the call to nurse Mother Earth back to health.

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[114] Lovelock. *The Revenge of Gaia*, 22.
[115] Lovelock. *The Vanishing Face of Gaia,* 11.
[116] Ellis. *The Encyclopedia of Earth,* "Biosphere."
[117] Lovelock. *The Revenge of Gaia,* 45.
[118] Lovelock. *The Revenge of Gaia,* 53.

David Orr points out the shortcomings of Lovelock's Gaia hypothesis. He says, "the Gaia hypothesis raises a number of questions about the micro flora and fauna in the larger biogeochemical cycles of earth."[119] Margulis is happy to answer this, stating, "if Lovelock's theory of Gaia is fact, which makes sense if one is to consider that our ecosystem is truly a system, then mankind must do its part to allow reproduction of all species to keep the symbiotic planet working properly."[120] It is our duty to be party to the symbiosis that keeps our biosphere in check. David Orr appears to know that this is the answer to the problem, despite whatever contradictions he may suggest. He warns that:

> The rate of change since 1945 is staggering and is still accelerating. Among these trends, the most serious is global warming caused by the release of heat trapping gases including CO2 from the combustion of fossil fuels and deforestation, methane from anaerobic decay, and industrial chemicals such as the CFC compounds, bromine, and halons.[121]

All small details aside, humans have to band together to create a solution to this problem of global sustainability.

David Orr states that most Homo sapiens subscribe to the view that the Earth is going to be just fine. Perhaps this is a big part of our problem, our narcissistic belief that one person cannot make a difference - so why bother? Orr points out that some still believe in the myth that the "biosphere operates independently of human volition."[122] It is no longer simply theory, rather a fact that humans are doing daily damage to the environment. Orr knows this and states, "humans are now the dominant force on the planet, equivalent to that of previous geological upheavals. Agriculture, energy use, and manufacturing lie at the heart of the human global impacts."[123] It is not simply the daily damage that we create through carbon emissions; our food production is taking a toll as

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[119] Orr. *Ecological Literacy,* 49.
[120] Margulis, 2.
[121] Orr. *Ecological Literacy,* 49.
[122] Ibid, 48.
[123] Orr. *Ecological Literacy*, 49.

well. Orr points out "since 1850, nine million square kilometers have been converted into permanent cropland. Energy use has risen by a factor of eighty, disrupting geochemical cycles of carbon, nitrogen, and sulphur."[124] Orr claims, "Humans are causing a biological holocaust that is destroying life ten thousand times more rapidly than the natural rate of extinction."[125] In fact, he points out that species loss is a tremendous concern:

> Many species around the world are now threatened by climate change, and some are becoming extinct – in part because of the climate crisis and in part because of the human encroachment into the places where they once thrived. In fact, we are facing what biologists are beginning to describe as a mass extinction crisis, with a rate of extinction now 1,000 times higher than the normal background rate.

The skeptics will say that this is simply natural selection, however, Gore does not agree:

> Many factors contributing to this wave of extinction are also contributing to the climate crisis. The two are connected. Fore example, the destruction of the Amazon rain forest drives many species to extinction and simultaneously adds more CO2 to the atmosphere.[126]

Jane Goodall sees a connection here as well. It was not enough for her to simply care for her beloved chimpanzees; she also had to care for the humans of Africa by providing them with clean drinking water and teaching preservation as well. Goodall takes the position that every person can make the world a better place. She believes that one person can make a difference by "Do(ing) something every day to make the world better."[127] I have to agree with Goodall and when all seven billion of us start to think this way, just imagine what we can do collectively.

Coastal flooding concerns were addressed in Chapter I, ironically, there are other places in the world that are faced with long-term droughts. Clean drinking water should be a basic human right for all. Unfortunately, just as there are food shortages, water

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[124] Orr, 49.
[125] Ibid.
[126] Gore, 163.
[127] Goodall.

shortages are also a reality. The picture that Gore presents showing the rapid melting of the world's glaciers is dumbfounding. These glaciers provide drinking water for humans that we would not initially think of considering their geography. For example, "the Alps provide drinking water for 40% of the world's people – through seven Asian river systems that all originate on the same plateau."[128] Easy to see how the disappearance of this water source will threaten those who depend upon it for vitality. David E. Lorey gives even more bad news connected to this tragedy:

> In Asia, water shortages-both in the form of stress and scarcity are emerging as a major social and economic threat, especially in China and India. In China, although freshwater sources are abundant, they are distributed unevenly and hence are unavailable to many regions of the country.[129]

Not surprisingly, it is China's urban areas where the crisis is most severe. Compounding the problem, "every year in China, thousands of tons of pollutants from agricultural, industrial, and municipal sources are dumped into the nation's rivers, lakes, and reservoirs, a trend that is common throughout the region."[130] For this reason, parts of China will face a severe water crisis in the years to come if the government does not begin to regulate industrial waste.

India's problems are similar to China's in that industrialization and population growth have put an incredible strain on their water resources. The problem is exacerbated by water disputes between India and Bangladesh because of severely low levels experienced in 1993 record low levels.[131] There are those that say water will become more precious than oil as we move through the twenty-first century, but I disagree. Water simply cannot be replaced by money, therefore it is invaluable.

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[128] Gore, 58.
[129] Lorey, 89.
[130] Ibid.
[131] Lorey, 97.

The conflict in Darfur has been seen as genocide for political reasons, however, water shortages in the region present another problem. According to Gore "a little discussed contributing factor is the disappearance of Lake Chad, formerly the sixth largest lake in the world over a period of only the last 40 years."[132] Lake Chad feeds Darfur and a number of other countries in the region. This problem is predicted to be life threatening for those who are already living day to day in refugee camps and struggling to survive. Hundreds of thousands are at risk of death due to dehydration, an easily solvable problem with merely fluids. In a country already enduring a humanitarian crisis, the threat of water shortages produces the threat of complete annihilation. This threat is not limited to merely Africa either. In fact, Lorey states "water security is emerging as an increasingly important and vital issue for the Asia-Pacific region. …As the population growth continues to surge, the demand for water is increasing substantially, without a concomitant increase in water sources."[133] All living things need water to survive, so naturally this presents a huge problem.

Most U.S. Cities have begun to enforce irrigation water restrictions. This shows that the problem we are facing with water shortages could become quite serious. Living without water is not an option. The issue of how best to manage water consumption has not been solved despite shrinking sources. Many people do not care where water comes from when they turn on their faucets, all they care about is that the water flows freely and this has to be rethought in each one of us. As a matter of fact, my weekend with the Girl Scouts at Camporee was a great example of the misconception of where our water comes from. When asked by our Environmental Engineer, Cammie Dewey, where water comes

[132] Gore, 116.
[133] Lorey, 87.

from, girls had comical responses. Their answers were – from the faucet, from Wal Mart, from Publix, and so on. Through the project that Ms. Dewey completed with them, they learned that water must be taken from our lakes and rivers. The girls chose what types of businesses they wanted in their created communities and then examined what type of waste these establishments created- paper, cardboard, grease, etc. They also examined how careless littering can create problems for our water sources as trash finds its way into storm-water run off. The girls definitely learned that water is precious and should never be taken for granted. Please see Appendix B for photos of this weekend.[134]

Although there is not an immediate global water shortage, about 97% of the world's water is salt water. New technologies are emerging in desalination, which is the removal of salt from water. In fact, Karen Lange states that "three hundred million people now get their water from the sea or from brackish groundwater that is too salty to drink. That's double the number a decade ago. Desalination took off in the 1970's in the Middle East and has since spread to 150 other countries."[135] This may be the wave of the future to provide water in countries that can afford the process. Fortunately, this offers hope that we will be able to use technology to weather our current crucible. However, I shudder to think of survival for those who cannot afford the process of desalination.

The shift in precipitation trends has created devastating effects with the onslaught of too much water as well. One would think that more precipitation is a good thing, but this results in larger downpours and storms in areas that cannot sustain large areas of rain. In California, mudslides can be fatal in areas where the soil is not conducive to handle large amounts of rain. At the same time, however, large shifts that create a deficit of

[134] Cammie Dewey. "Where Does Our Water Come From?" (lecture Wekiva Springs State Park, Altamonte Springs, FL, April 28, 2012).
[135] Lange, Karen. "Get the Salt Out." *National Geographic*, 33.

water can produce more deserts and destroy usable farmland. "Soil moisture evaporation also increases dramatically with higher temperatures in the United States."[136] People have typically chosen the places that they live because the climate patterns have remained relatively unchanged for years. As can be seen on any given nightly newscast, this is no longer the case. Strange weather phenomenons occur all over the globe at any given time causing destruction and human displacement. Weather patterns are shifting and this is causing a large amount of displacement. We may be looking at population migration to areas that can sustain good water resources in the coming decades.

In order to see the damage that Gaia is suffering, it is crucial to take a look at these shifting weather patterns further. Gore says, "If you look at the 21 hottest years measured, 20 of the 21 have occurred in the last 25 years."[137] However, Lovelock states "future climates are much more predictable than is future weather."[138] Although the local meteorologist may not be able to determine that it will rain on any given day, it is certain that the winter months will be colder than the summer. According to Lovelock "climate change is amenable to prediction, and this is why so many scientists are tolerably sure that a rise of carbon dioxide to 500 ppm, which is now almost inevitable, will be accompanied by profound climate change."[139] When the climate gets hotter, so do the oceans. When the ocean temperatures increase, we have stronger storms. In the year 2004, Japan set a record for number of typhoons in a year; the number was ten as opposed to the previous record of seven.[140] "In the spring of 2006, Australia was hit by several unusually strong Category 5 cyclones including Cyclone Monica, the strongest

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[136] Gore, 121.
[137] Ibid, 72.
[138] Lovelock. *The Revenge of Gaia*, 48.
[139] Lovelock. *The Revenge of Gaia, 48.*
[140] Gore, 82.

cyclone ever measured, off the cost of Australia- stronger than Hurricanes Katrina, Rita, or Wilma."[141] An MIT Study in 2005 found that "major storms spinning in both the Atlantic and the Pacific since the 1970's have increased in duration and intensity by about 50 percent."[142] How can these phenomenon be explained away as merely coincidence?

Human innovation is the key to solving our current issues. I define human innovation as the skill to combine ethics with technology to improve the quality of life. Inspired by the works of the great Albert Einstein, Michio Kaku's worldview is a unified field theory is possible using something known as the string theory, a pinnacle of human innovation. Kaku's worldview is that the four fundamental forces (anything that can move an object) being gravity, electromagnetism, and two types of nuclear forces, the weak and the strong exist.[143] His idea has shaken the world of physics and created both controversy and innovation. If Kaku's string theory, one developed by a human being, can bring pools of thought together, it is reasonable to assume that humans can endure this global crucible together. After all, there is usually calm after the storm! Kaku places great importance on classifications that astronomer, Nikolai Kardashev, creates for advanced civilizations. According to Kardashev, a type I civilization controls the resources of an entire planet, type II controls the resources of a star, and type III controls the resources of an entire galaxy.[144] Kaku estimates that our current civilization has not yet achieved type I but gives us an "A" for effort:

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[141] Gore, 82.
[142] Ibid, 92.
[143] Kaku, 8.
[144] Kaku, 198.

> Although we do not have the planetary resources of a type I civilization at our disposal to exploit the practical applications of the unified field theory fully, we certainly have the determination, intelligence, and energy to explore all the theoretical avenues of the unified field theory.[145]

Humans have a bias against anything that does not have an immediate payoff, or things we cannot see. We have become an uncurious society because there needs to be instant gratification in our pursuit. We need to get over this in the quest for new discoveries and to begin to place ecological sustainability in the forefront of our every thought. We need to strive to escalate our current civilization to type III immediately.

Many political measures have begun efforts to bring the global community together and create sustainability. In fact, the Kyoto Protocol to the United Nations Framework Convention on Climate Change of 1997 was a meeting geared at reducing the emission of greenhouse gasses. It was certainly a step in the right direction for political awareness to the global warming issues. Its aim was to reduce these gases in forty-one countries plus the European Union to 5.2 percent below 1990 levels during the 2008-12-commitment period. To date, only 2 countries- China (the world's largest emitter of greenhouse gasses) and the United States (number two in emissions) have not adopted this treaty. It has been extended by the 17th conference of the Parties (COP17) until 2017.[146] Although this was considered to be the greatest diplomatic accomplishment, its effectiveness has been greatly criticized just as the United Nations receives criticism. How do we uniformly police global ethics? This 2017 deadline is right around the corner and we are far from being where we need to be at this time. The intent to do right is there, yet the desire to close the deal is absent for some reason – this is a human problem.

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[145] Ibid, 200.
[146] The Kyoto Protocol: "A Victory for Planet Earth."

Al Gore has a great analogy to explain why we cannot seem to get to a Type I Civilization. He states that old habits + old technology = predictable consequences. Old habits + new technology mean dramatically altered consequences.[147] Gore points out that "we have always exploited the Earth for sustenance, utilizing relatively basic technologies for most of our existence like plowing and irrigating. But even these simple technologies have become far more powerful today."[148] The technology, which makes human lives better, costs the environment greatly because of the massive scale at which it is being utilized.

We have to find better methods of energy return on investment, therefore it is fitting to discuss Orr's EROI principle. This acronym, EROI, stands for Energy Return on Investment but represents the "gross amount of fuel extracted in the energy transformation process to the economic energy required to make that fuel available to society."[149] Orr calls this Net Energy. Considering all of this, Orr says that "fossil fuels have a declining return on investment."[150] This makes sense when considering the cost of refining crude oil and trucking the products; and at this point we have not even scratched the surface of the problems such as the laws of supply and demand. What is most ironic is that "fossil energy has shaped the modern world, and that fact now poses the most extreme jeopardy."[151] Our idol has become that which destroys us. Orr does not believe that nuclear power is the way either because of its low EROI. The largest factor, he points out, is the trouble with decommissioning the plants after their useful

[147] Gore, 232-233.
[148] Ibid, 236.
[149] Orr, 55.
[150] Ibid.
[151] Orr, 56.

lifespan.[152] Nuclear benefits do not outweigh the obstacle that disposal of spent fuel rods presents. Safe storage of this material for decades is required and this becomes expensive. The costs of containment for Chernobyl were astronomical both financially and ecologically. Where do we put all this radioactive waste that is deadly to human beings? Nobody wants to have a long-term relationship with radioactive waste. Paul Ehrlich states "the machinery of nature is not of course, machinery at all but a cast interconnected web of relationships, biogeochemical cycles, and energy flow."[153] The problem of how to make these relationships between humans and energy consumption is great and the solution is not an easy one.

Given the obvious impediments to creating a solution to our ecological problems, it is easy to throw up our hands and walk away. But apathy is just as dangerous as it is evil and David Orr states this beautifully:

> Evil results from ignorance of the higher good, not from malice. If we only had more complete knowledge we would act ethically. In other words, there are no real conflicts, only misunderstandings, and no evil, only the lack of information. It is possible to hear in such arguments echoes of the enlightenment faith in human reason that must reverberate oddly across the battlefields and human carnage of the twentieth century.[154]

The time has come where the only correct action is to take action. Every resident on the planet Earth must look at how he can become more sustainable on a daily basis. Gore says at the close of his documentary that future generations will ask "what were our parents thinking? Why didn't they wake up and do something?" Part of the reason that we are still not as ecologically literate as is necessary comes from our failure to take adequate action. Our ethics have not been given much consideration when it comes to environmental affairs, historically. When Gore exposed the facts about the melting arctic

[152] Ibid.
[153] Ehrlich, 266.
[154] Orr, 67.

ice caps and potential effects as well as the effects from global warming to congress, he thought they would be startled. They were not. That was, perhaps, his biggest wakeup call. He considers this call to be not one of political importance, but a moral imperative. "What we take for granted may not be here for our children."[155] Are we stealing their future? Hopefully it is not too late to make the changes that are so desperately required. A number of responses to the global crisis are already in practice due to our fabulous technology and that is the focus of Chapter III. These technologies can be part of the answer to solving this Ecological Crucible that we are currently undergoing.

[155] *An Inconvenient Truth*. Davis Guggenheim, Paramount Classics.

"We must be determined and must have an optimistic outlook; then, even if we fail, we will have no regrets." – Michael Nicoll Yahgulanaas[156]

Chapter III: Doing Our Best to Live the 3 R's

A common acronym that has been used for living sustainably in popular culture is the "3R's –Reduce, Reuse, Recycle." This will get us only halfway there, however. The biggest impediment to reducing the effects of global warming is to find a renewable energy source that does not produce CO2. The term renewable is a bit of an oxymoron. As Lovelock points out, "renewable" really has no use in science; "according to the laws of the universe, 'energy is always conserved,' but there is nothing even in the fine print about it being renewable. In this universe, energy cannot be renewed: all that you can do is take it, use it, and be grateful."[157] Therefore, perhaps it is more accurate to call these sustainable energy sources green rather than renewable. We know that gas, coal, and oil burning are responsible for a large amount of the CO2 that is released into the atmosphere. Wind and solar energy do not release harmful components but have a substantial investment in order to yield EROI. It requires many years, even decades sometimes, before these equipment costs can be recouped. What to do? How do we harvest clean energy sources that leave a zero carbon footprint while being cost effective at the same time? These questions prompt me to add a fourth "R" to the mix – lets "Rethink" the choices that we make for sustainable living. If we rethink our daily

[156] *Flight of the Hummingbird*, 48.
[157] Lovelock, *The Vanishing Face of Gaia*,125.

choices in the use of fossil fuels, we can find many ways to make even a small impact.

The most critical issue is an immediate reduction of fossil fuels. Iceland has a unique opportunity to create its own energy both geothermally and through the use of hydraulics. Iceland has this advantage because of their volcanic geography. According to Daniel Gross,

> Many U.S. states have set goals of obtaining 10 or 15 percent of their energy from renewables at some point in the distant future, and the European Union has pledged to reach 20 percent by 2020. But Iceland is already at about 80 percent. All electricity on the island is generated through geothermal or hydroelectric sources-low-emissions sources that don't use fossil fuels. Most homes are heated by water pumped from Geothermal hotspots."[158]

Landsvirkjin, the Icelandic national utility, has invested $1.5 billion in the Alcoa Fjardaal geothermal plant. They built the 690-megawatt hydroelectric plant in 2004. This project has proven to be not only environmentally friendly, but a big boost to the economy by employing 650 people in Iceland and 250 through Alcoa itself.[159] Icelanders use twice the amount of home energy per capita as does the average American citizen, but this energy is both cheap and non-carbon emitting. "In the interconnected global economy, Iceland is discovering new ways to export renewable energy-whether it is building geothermal-powered tourist attractions or using hydroelectric power as an inducement for industrial companies like Alcoa."[160] This technology has empowered Iceland to deploy hydrogen-powered busses and rental cars onto their roads. "If we can convert geothermal electricity into fuel, we can be a 100 percent sustainable society," says Icelandic New Energy's general manager, Jon Bjorn Skulason.[161] Iceland is helping other countries to look at their energy crises as well. "Enex, an Icelandic firm backed by Geyser Green Energy, is in a joint venture with Chinese energy company Sinopec to build and manage

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[158] Gross, Daniel. *Newsweek.* "Iceland has Power to Burn*," 58.*
[159] Ibid, 60.
[160] Ibid.
[161] Ibid, 62.

a geothermal district heating system in Xianyan."[162] China is in a desperate search to solve their pollution and energy problems due to their population explosion. Similar plants are also being developed in Southern California. Iceland can be seen as a role model in developing energy even if they are not yet quite there in their conservation efforts.

Nuclear Energy has been on the forefront since the culmination of the Manhattan Project. The immense power that nuclear can supply was seen with the explosions of the atomic bomb at Nagasaki and Hiroshima, which ended World War II. But this awesome power also presents numerous challenges. Physicist, Michio Kaku explains how nuclear energy is created:

> when the uranium nucleus in an atomic bomb is split deliberately, the enormous energies locked within the nucleus are released explosively in the form of a nuclear detonation. Punt for pound, the nuclear bomb releases over a million times the energy contained in dynamite.[163]

Nuclear energy use presents the nightmare of what to do with waste. There is also the looming threat of an accident, but there is hope for harnessing forms of this energy outside of Earth. The only challenge is HOW to harvest the energy of a star for the purpose of creating energy. Kaku states that

> A star is basically a huge nuclear furnace in which the strong force within the nucleus is unleashed. If burning coal instead of nuclear fuel created the sun's energy, for example,, only a minuscule fraction of the sun's light would be produced. The sun would rapidly fizzle and turn into a cinder. Without sunlight, the earth would turn cold and life on it would eventually die.[164]

He paints a clear portrait of just how much energy is available out there in the universe if we can develop a way to capture it. Recognizably, this is a large impediment, but with the right technology, we might find ways to harness this goldmine of energy someday.

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[162] Gross, Daniel. *Newsweek.* "Iceland has Power to Burn," 62-64.
[163] Kaku, 8.
[164] Ibid.

James Lovelock has been a supporter of developing more nuclear technologies for immediate use. The most obvious way out of our current debacle is more nuclear energy, according to Lovelock. He says

> I am not recommending nuclear fission energy as the long-term panacea for our ailing planet or as the answer to all our problems. I see it as the only effective medicine that we have now….Nuclear energy is merely there medicine that sustains a steady secure source of electricity to keep the lights of civilization burning until clean and everlasting fusion, the energy that empowers the sun, and renewable energy are available…..We must conquer our fears and accept nuclear energy as the one safe and proven energy source that has minimal global consequences.[165]

This may appear to be a good solution, however, on the flip side of the debate is the threat of another nuclear accident like Chernobyl or the Fukishima Daiichi disaster in 2011. Entire villages and towns in Russia are still uninhabitable more than thirty years after Chernobyl and the same is predicted in the Fukishima prefecture of Japan. Entire villages and small towns are ghost towns. The radiation level is too high to sustain safe living conditions for humans or livestock in these parts of Japan. To date, nobody has offered a good solution to cleaning up nuclear contamination. Lovelock is a brilliant scientist, but he has not offered any plausible solutions for this issue - We cannot take the position that we should not make it a problem until it becomes a problem. We have to be proactive in preventing these types of disasters for the health and safety of humans.

Nuclear energy does have some proven benefits. The immediate power production cost is pretty cheap whereas wind and solar are not. Lovelock points out that "according to the Royal Society of Engineers 2004 report, onshore European wind energy is two and a half times, and offshore wind energy over three times, more expensive per kilowatt hour than gas or nuclear energy."[166] Lovelock explains the power of nuclear energy: "We know from experience that certain nuclei (such as uranium, with ninety-two

[165] Lovelock. *The Revenge of Gaia*, 11.
[166] Ibid, 83.

protons) are so massive that they automatically break apart, releasing smaller fragments and debris, which we call radioactivity.[167] Nuclear energy has the potential to ease some of our fossil fuel dependency, but there is an ecological cost. So the social trap rears its ugly head again. The problem is that the radioactive spent nuclear rods must be cooled and housed for a length of time until they can be safely decommissioned. This is not a quick process. Failure to provide for adequate cooling rod housing can become a huge problem quickly. The world watched as the Japanese struggled to prevent a core meltdown. Chernobyl experienced this catastrophe in 1986. There are benefits to nuclear energy production when things are good, but when things go wrong, nuclear is vilified. The answer is just not a simple one when it comes to nuclear energy debates.

Garrett Hardin sees nuclear as a non-solution. He disputes a claim made by a 1949 issue of *Popular Mechanics* seeing nuclear energy as our savior and cure for all social ills as mere propaganda. He laughs at the argument "All social evils-poverty, famine, crime, social disorder, and the like-are caused by resource shortages; Atomic energy will put an end to all resource shortages; Therefore atomic energy will put an end to all social evils."[168] Of course thinking such as these caused politicians to jump quickly onto the bandwagon in support of atomic energy. Harding calls this the "propaganda for a peaceful atom – splendid in its literacy, excellent in its numeracy, and abysmal in its ecolacy."[169] When it was first realized that atomic energy could be used for other purposes than building bombs, the hope was that this energy would become the technology to save the human race. He says, "The theoretically small size of a reactor considered by itself led enthusiasts to foresee the day when nuclear reactors could power

[167] Kaku, 8.
[168] Hardin. *Living Within Limits*, 148.
[169] Ibid, 149.

trains, commercial ships, rockets for peaceful uses, aircraft, and even automobiles."[170] What was missing from this newfound optimism, Hardin points out, is the outcome of a collision scenario. Each moving vehicle would be essentially strapped with a tiny little bomb that made the likelihood of powering cars not so plausible.

Hardin calls nuclear an "unforgiving technology." He references an account from Otto Frisch's investigation at Los Alamos in 1974 in "Somebody Turned on the Sun with a Switch." Here Frisch retells his nightmare where he learned firsthand how deadly uranium could be. While working on an assembly line, nicknamed Lady Godiva:

> I saw the neon lamps on the scaler had stopped flickering and seemed to glow continually. Hastily I removed a few pieces of uranium-235, and the lamps returned to their flickering. Obviously, the assembly had briefly become critical because my body- as I leaned over-reflected neutrons back into it. By measuring the radioactivity of some of the uranium-235 bricks afterwards, we could calculate that the reaction had been growing by a factor of 100 every second! As it happened I had received only about one standard daily dose in those two seconds; but it would have been a lethal dose if I had hesitated for two seconds longer. There were others less lucky….one of the students who helped me with the critical assemblies dropped a heavy block of reflector material at the wrong moment, and although he instantly swept it aside her received enough radiation so that two weeks later he died.[171]

The rapidity with which his colleague died is staggering. This is an example of the dark side of nuclear energy. Philip R. Morse also describes the problems with the typical nuclear reactor:

> The huge amounts of heat evolved are to be carried away by air-flow, nearly half a million cubic feet per minute, an amount requiring careful aerodynamic design to avoid large pressure drops, requiring super-blowers to drive. All this, of course, must be accomplished without any leaks in the whole system, from intake to the top of the 300-foot stack. The control rods which regulate the intensity of the nuclear reaction, must be able to move five feet in a tenth of a second, and must be controllable within fractions of a millimeter. An inkling of the problems involved may be obtained from the simple statement that once the pile is in full operation no one can ever to inside the shield thereafter, to repair, or lubricate or adjust any of the reloading or control equipment inside. If an important part of it becomes inoperable, we shut the reactor down and build another one.[172]

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[170] Hardin. *Living Within Limits*, 149.
[171] Ibid, 150.
[172] Ibid, 150-151.

Hardin expresses that the largest impediment to widespread nuclear plants is the problem of what to do with the waste. He also raises serious questions as to the safety of nuclear reactors: "we still don't know. We will probably never know."[173] Nuclear energy could be the solution if these large issues could be solved.

On the internet, one can find all sorts of green items for sale that boast to help reduce our carbon footprint. Break room supplies, cleaning supplies, disposable plates and cutlery, even programs that allow for toothbrush exchanges in order to repurpose old plastic toothbrushes can be discovered. Companies boast that their water bottles are created using 30% less plastic to ease our guilt. They all claim to be the answer to the average American reducing his carbon footprint. Let us return to Hardin's ecolacy filter for a moment and remember that the best solution is reduce the source of the waste in the first place. However, there are times when paper products are a necessary evil in life such as birthday parties, weddings, etc. I thought I would have a bit of fun and conduct a little experiment with one of these products that I used during my last overnight stay for work. I always hate the waste created whenever I travel, but like the convenience of not having to carry my reusable water bottle and coffee mug everywhere. At the breakfast buffet of this particular hotel, there was a stack of the usual plates and silverware. I noticed a logo in the center, 'taterware.com.' The claim on the product itself is that it is a sustainable table wear. So I decided to research the company's website and I found that their products are compostable. I thought this was interesting so I decided to take a plate and fork to conduct my own experiment. Their website claims

> TaterWare is a biodegradable food service tableware line made with potato starch, an annually renewable and GM-free (genetically-modified-free) material. TaterWare is made with a B-grade potato that is typically used for cattle and hog feed or the manufacturing of commercial products

[173] Hardin. *Living Within Limits*, 238.

> such as paper. Since we do not use human food-grade starch, the manufacturing of our product does not affect the human food supply. All TaterWare products are either thermo-formed or injection-moulded in a manufacturing process that is very similar to the formation of most plastics, except that we use only bio-based resins.[174]

Naturally, being the pessimist I can be, I thought that this was a bunch of nonsense. In my not-so-scientific experiment, I cut a piece of the TaterWare plate and used the entire fork as compost in my garden box on January 16th, 2012. I did not check it again until April 21, 2012. To my surprise, the piece of plate was crumbling like chalk and would probably have broken up into many pieces and dissolved into the soil soon if it were left undisturbed. The fork was still in tact, but was showing visible signs of decomposing as layers of the material could be flaked off like cheese through a grater. The TaterWare Company claims that

> All of the TaterWare products will break down into water and carbon dioxide, given heat, moisture and microbes. Cutlery degrades differently than plates, bowls, clamshells, and other disposable containers because the pressure used to compound the resin into a sturdy piece of useful cutlery makes it much more dense than the other products. For this reason, all cutlery must be shredded into smaller pieces in order to degrade more quickly and to meet most compost facility degradation timelines. [175]

I think that the company held up its end of the bargain and I would definitely purchase their products at my next birthday party or events. Technology such as TaterWare has the potential to take billions of pieces of plastic out of the landfills, therefore, I view this product as a great success. Using TaterWare products would be just one way to make my next party ecol-friendly Even though my experiment was not conducted in the scientifically controlled lab environment, it was fun and I learned some great information about what to look for next time I go shopping for a party.

Perhaps one of the most innovative ideas is Klaus Lackner's proposal to supplement barren land with artificial trees. The material used for these trees "involves

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[174] TaterWare and Earth Cup.
[175] Ibid.

the use of readily available rock or soil to react directly either chemically or biochemically with atmospheric carbon dioxide and have as a product an easily disposable or, even better, usable material."[176] These rock and soil products contain up to fifty percent magnesium oxide. This serpentine rock compound is highly stable and has both health benefits as well as industrial uses. In fact, according to a website that outlines the health benefits of magnesium oxide, "also called magnesia, is a colorless, amorphous powder which occurs in nature as periclase. It is also a source of magnesium."[177] Magnesium oxide is necessary for the majority of bodily functions, including the heart. Magnesium oxide also can be used in several other consumer applications including pulp and paper, fertilizers, sugar refining, rubber and plastics, animal feed, boiler and water-cooling treatment and power generation.[178] Additionally, magnesium oxide is a detoxifying agent in the human body. Although these trees may not be the answer to all green energy sources, there are obvious benefits and the innovation is genius. There is no replacement for planting real trees that provide us with the necessary oxygen supply, however, in dry desert areas where this is not possible these artificial trees can help.

Another way that humans are rethinking our energy needs and sustainability is by turning trash into cash. Hardin describes in his Commonized Costs-Privatized Profits (or CC-PP game for short) a few concerns over this practice.[179] He says, in *Filters Against Folly,* "self interest and general principles are often at war. Inconsistencies are endemic in long-established societies. To say that an entire society follows the path of democracy,

[176] Lovelock. *The Vanishing Face of Gaia*, 146.
[177] *Magnesium Oxide Benefits*, 1.
[178] Ibid.
[179] Hardin. *Living Within Limits*, 238.

socialism, or communism is to gloss over much variety in economic arrangements."[180] Our system of free enterprise has brought on both competition in the marketplace and entrepreneurship. Based on Adam Smith's theory that competition in the marketplace is healthy, the consumer should be the winner as more competition creates better prices and quality, right? In the CC-PP game, this is not always the case, Hardin argues. He uses as an example a coal miner who has spent his life mining for coal and now has serious health problems. The miner's ethic was great as they performed their jobs for the purpose of providing an energy source, but at great detriment to personal health. Who pays the costs of long-term healthcare as a result of putting these men and women at risk? The worker does. Not only that, but now there is a shorter life expectancy as a result as well as a diminished quality of life. While the owners of the coalmine are getting rich off the backs of their workers, they are also slowly killing the men for the sake of a profit.[181] This is the basis of what Hardin calls the CC-PP game. What does this have to do with producing renewable or zero carbon footprint energy? Hardin warns:

> The profit motive is not the only force that leads to demands for subsidy. In recent years, the idealism of environmentalists has been a major force. The pollution caused by the burning of fossil fuels could be avoided by going to solar power. But the cost of capturing the energy of the sun is, at present, greater than the cost of power from coal or oil. With enough experience the comparative advantage may be reversed.

He believes that environmentalists are partially responsible for this issue:

> Therefore, say environmentalists, let us subsidize solar power now; lets give 'tax breaks' to the householder who installs a system that is, in the strict economic sense, wasteful of present resources.[182]

This is the slippery slope that the environmentalists have been made to walk, making them just as guilty as the greedy businessmen of the CC-PP game.

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[180] Hardin. *Filters Against Folly*, 104.
[181] Ibid, 108.
[182] Ibid, 109.

Some companies are developing alternate energy by turning garbage into profits. Does this fall under the category of the CC-PP game like coal mining? Time will be the judge, however, at first glance these technologies look grand. In CNBC's documentary, *Trash Inc: The Secret Life of Garbage*, Carl Quintanilla examines some of these new energy sources. BMW has invested two billion dollars in its Spartanburg, South Carolina factory, which operates on power created by garbage. In partnership with Waste Management, the Palmetto Landfill uses extracted methane gas from garbage buried in landfills and stored in wells. Through an intricate series of underground pipes, landfill natural gas is cleaned and transported to the plant for energy creation. This process is saving BMW seven million dollars each year in energy costs and BMW is not the only company using this technology. Many states, including Florida, have done the same. Florida has a half dozen operating waste-to-energy plants. According to Broward County's website:

> In 1991, two state-of-the-art plants opened with three primary functions: (1) to provide environmentally safe and cost-effective solid waste disposal solution; (2) to recover energy and recyclable ferrous metals; and (3) to reduce the amount of waste subject to land filling. Each year, the plants generate enough electricity to service about 75,000 households in our community at an energy savings of 2.8 million barrels of oil.[183]

The county's focus in making this economic investment was to help transition the state's largest metropolitan area into the next century. They are doing just this by meeting Broward County's solid waste management needs in an eco-friendly way. Just to give an idea of the solid waste produced by Broward County residents in one year, it is estimated that the trash these plants process in one year could fill the area of a football field up to 3 ½ miles high.[184] The three plants work together in an intricate system including

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[183] Waste to Energy Plants, http://www.broward.org/WasteAndRecycling/SolidWaste/Pages/wastetoenergy.aspx

[184] Ibid.

recycling, waste-to-energy, and land filling.[185] None of the plants could work as a standalone, making them what Margulis might call symbiotic, but not in the biological sense! Broward County is not alone in using this technology; Lake County, Lee County, Palm Beach County and Pinellas County also operate similar facilities in Florida.

Other profit-oriented companies are doing well re-using trash as well. One of the largest solid waste companies in America, Waste Management has found a way do make trash profitable as well. According to David Steiner, CEO of WM, the company has earned ten billion dollars in profits from selling what they call 'raw materials."' These raw materials are nothing more than discarded plastic bottles. The bottles are ground into a plastic dust and used to create fibers for clothing and carpets. It is estimated that the U. S. goes through 51 billion bottles per year and only 1/5th of the plastic water bottles are actually recycled.[186] Foss Manufacturing is a New Hampshire company that also harvests plastic raw material and turns into what they call polyester flake. This flake is then spun into filaments that serve a similar purpose to Waste Management. Interestingly enough, they tell Quintanilla that 70% of their bottles come from countries such as Canada, Argentina, Chile and Mexico.[187] Surprisingly, the bulk is not coming from the U. S. and this raises very alarming questions about the general public's apathy to adopt the habit of recycling. It is estimated that some 80% of what we through away is recyclable, but only 28% of this is actually recycled.[188] What does this say about the ethics of the average American? Ethical obligations to ecological behavior will be further explored in Chapter IV. However, my survey data, included in Appendix A, provides

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[185] Waste to Energy Plants, http://www.broward.org/WasteAndRecycling/SolidWaste/Pages/wastetoenergy.aspx
[186] CNBC. *Trash, Inc: The Secret Life of Garbage.*
[187] Ibid.
[188] Ibid.

more evidence that not everyone is doing his part just yet. The efforts, however, cannot end with curbside recycling.

Not only is the growing garbage problem an ethical concern, but also it is an environmental nightmare. On Kamilo Beach, located on the big Island of Hawaii, there is a patch of beach that is littered with debris where ocean researcher, Charles Moore, has tirelessly attempted to clean up and track the source of garbage.[189] He finds that much of this garbage originates in the roads in Asia and U.S. and brought to Hawaii through the current. The trash travels by way of the 'Great Pacific Garbage Patch,' which is two times the size of the U. S. comprised of a garbage flotilla in the Pacific Ocean.[190] Everything from water bottles to toothbrushes finds their way to decimate Kamilo Beach. Not only is the trash ugly, but it is causing problems with wildlife as well. Fish and birds are eating the plastic and it is proving to be lethal. Tragically, this could seriously affect the balance of the ecosystem as species are threatened with extinction. Even in the best-case scenario plastic left uncollected or undisturbed by wildlife will not decompose in the average human being's lifetime, if ever. This will prove to be an ecological nightmare if not cleaned up; however, cleaning up an area as large as the ocean, or one third of the Earth's surface, is an overwhelming task. The only logical solution to this particular problem is source reduction.

The best ideas out of this crisis are simple if everyone does his part to rethink choices. For instance, these questions should be asked - Is there a time when you can ride your bike short distances instead of driving? One can refill a reusable water bottle and refuse to purchase the plastic water bottles at school and work. This one would seem

[189] CNBC. *Trash, Inc: The Secret Life of Garbage.*
[190] Ibid.

to be a no brainer - turn off the lights when are not in the room – but is still not practiced in every home. Leave t he household thermostat at a sensible temperature, such as 78 degrees, and turn off the water while brushing your teeth or take shorter showers! These are just a few ideas that reduce waste and many of them call for minimum investment, if any at all. Each individual knows what he can do to make the world better. This commitment calls for the rethinking habits and changing to practice sustainable behaviors. If every member of this global society could live these 4 R's, we might get to a place where we see reversible effects within this decade. However, ethical behavior is going to be essential in finding our way out of this social trap.

"Human use, population, and technology have reached that certain stage where Mother Earth no longer accepts our presence with silence"

- The Dalai Lama

Chapter IV: Global Citizenship and Morality

William Ophuls states "liberal democracy as we know it …is doomed by ecological scarcity."[191] This is an incredibly powerful statement about the way that we have shaped the world around us. Yet there are those, such as Robert Paehlke, who propose "that environmentalism be seen as a third wave of progressivism."[192] I do not care so much for this analogy as the word progressive has a negative connotation. ecological literacy will hopefully do away with thinking such as this. Are we ready to accept the challenge to become global stewards of the planet? Wendell Barry argues "we are not smart enough or conscious enough or alert enough to work responsible on a gigantic scale."[193] While Barry may not trust the "mob mentality" of the general public, I have to remain optimistic that people will ultimately do the right thing when presented with the challenge. But my optimism should not be confused with stupidity. In David Orr's Words, "no longer can the assumption be made that the ecological and biospheric foundations of political, social, and economic systems (are)secure."[194]

There is merit in learning how to deal with unintended consequences and therefore I cannot ignore the ethical reasons to treat the planet as a sacred entity. In order

[191] Orr. *Ecological Literacy*, 68.
[192] Ibid.
[193] Ibid.
[194] Ibid, 48.

to live ethically, one must do what is right not only for himself, but for the greatest number of humans possible. Human beings possess this potential but we must commit to living sustainably in order to live ethically. This makes an ethical decision somewhat subjective, however, an ethical decision would never be one that deliberately causes harm to the environment or another human. According to David Orr, citizenship and democracy are closely linked.[195] In fact, those who decide to make a career of sustainably behavior "must buy into a particular world view congenial to professionalized, disciplinary knowledge and institutionalized science," according to Orr.[196] Every human is called to practice sustainable behavior. Once we achieve this we are ecologically literate. We must reduce humankind's ecological footprint or no species will survive on Earth and that is an ethical dilemma.

I do not believe that it is possible to talk of ecological literacy without promoting it as part of every human being's worldview. Commonly, a worldview is shaped through worship and religion. Please do not misconstrue my discussion of ecological literacy, ethics, and various religions to mean that I am forcing religious views upon readers. I simply believe that ecology must be in the forefront of every human being's daily lives in order to truly make a difference. A number of religions are now promoting ecology as an ethical responsibility, and many times humans develop their worldview largely in their religious beliefs. Therefore religion is relevant in this discussion of Ecological Literacy.

Buddhist philosophy is founded in meditation and suffering as an accepted part of this life. David Kinsley of McMasters University calls upon Buddhist writings as an important link between ecology and religion:

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[195] Lemons, 709.
[196] Orr. "Education, Careers, and Callings," 1243.

> We are burning up ourselves and our world in out intense quest to satisfy unnecessary desires. This is destructive behavior, Buddhists say, and does not lead to peace, contentment, or liberation. Restraint, not indulgence, is the way to peace, and also the way to act towards the environment so as not to ravage it.[197]

Many scientific views also take this approach. This gives me great confidence that the Buddhist philosophy is an Ecologically literate one. The Dalia Lama poses an important question in *The Universe in a Single Atom*. "Do Ethics have a place in science? I believe they do…. Like any instrument, science can be put to good use or bad. It is the state of mind of the person wielding the instrument that determines to what end it will be put."[198] He is not alone in this thinking. Richard Feynman states that it is not science at fault, but those who use science incorrectly. I have to agree that this worldview is relevant and therefore that ethics is incredibly important in the crisis of ecological sustainability. Humans have the capability to use science ethically. Unfortunately, man sometimes uses his free will unethically for personal gain. According to his holiness, the Dalai Lama "Our planet is our house, and we must keep it in order and take care of it if we are genuinely concerned about happiness for ourselves, our children, our friends, and other sentient beings who share this great house with us."[199] This statement is the quintessential thesis for the human race to behave sustainably, Buddhist or not. Anyone who considers himself to be ethical surely must admire the Buddhist philosophy on ecology.

Religion and science have not always coexisted well and nowhere is this more evident than in the case of the mathematician, known as the Father of Modern Science, Galileo Galilei. According to Maurice Finocchiaro, "Galileo is a cultural icon and a symbol because he was tried and condemned as a suspected heretic by the Catholic

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[197] Kinsley, 87-88.
[198] Dalia Lama, 1.
[199] Ibid, 78.

Church through its institution of the Inquisition."[200] In the seventeenth century, Galileo's teaching that God is not at the center of the universe was so controversial and threatening to the Church that he was put on trial for heresy. Galileo believed, through the use of reason, man could deduce that other theories of the universe were possible. Pre-trial documents show that that followers of Galileo were speaking all sorts of 'heretical' statements. Lorini's complaint states that "Galileists affirm that the earth moves and the heavens stand still."[201] This was not an acceptable worldview, according to the Church. Lorini declared that these same Galieists were men of "goodwill and good Christians, (they are) a little conceited and fixed in their opinions."[202] It was not only the teachings of Galileo that posed a threat to the Church, but also the use of reason. The church liked it when the people remained illiterate and non-informed. Bertolt Brecht mocks this in several scenes of his play, *Galileo,* where Church leaders are seen laughing about their efforts to stifle individual thinking of the stupid parishioners. In order to keep the peasants in line, they certainly could not have people thinking independent thoughts! The use of reason, as has been chronicled many times in Christian history, has been the Church's biggest impediment to keeping their congregation blindly following church teachings. Science has been the greatest threat to Christianity for this reason. However, science should not be viewed as anti-church. On March 12th 2000, Pope John Paul issued an apology for, among many other things, the trial of Galileo. The modern Catholic Church has also made great strides in creating global awareness of our ecological responsibility, a step in the right direction.

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[200] Finocchiaro, 1.
[201] Ibid, 168.
[202] Ibid, 169.

Today in the Catholic Church, there is a particular and pressing responsibility to examine and act upon the growing challenge of global climate change. Their reasoning is that all citizens have a responsibility for God's creation and for the poor and vulnerable. I see this as progress in an institution that has not supported such thinking in past centuries. In fact, during his angelus address on August 27, 2006, Pope Benedict XVI calls for a commitment to care for creation. He said creation is "exposed to serious risks by life choices and lifestyles that can degrade it."[203] In particular, he states that "environmental degradation makes the lives of the poor especially unbearable."[204] The U.S. Catholic bishops have declared, "At its core, global climate change is not about economic theory or political platforms, nor about partisan advantage or interest group pressures. It is about the future of God's creation and the one human family. It is about protecting both 'the human environment' and the natural environment."[205] This about face by church leaders is a promising advancement in ecological ethics.

To take action in our state, the USCCB suggests the following:

1. Encourage lawmakers to improve and update public transportation – when effective and far-reaching public transportation systems are in place, fewer cars clog the roads to emit greenhouse gases and air-polluting contaminants.
2. Join local efforts of groups working with the mayor or other city officials to explore ways your city or municipality can do business and reduce harmful emissions.
3. Organize or participate in city- and state-wide Earth Day celebrations to raise awareness of the challenges of global climate change.
4. Pay attention to bills going before the state legislature that concern climate, emissions, or energy policies. Urge legislators to remember that poor people in your state may suffer the most from climate change and legislative measures should include provisions that address disproportionate economic impacts, i.e. in heating and transportation costs.[206]

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[203] United States Conference of Catholic Bishops, 1.
[204] Ibid.
[205] *Global Climate Change: A Plea for Dialogue, Prudence and the Common Good. USCCB 2001, 1.*
[206] United States Conference of Catholic Bishops, 1.

These are things that everyone can do to think globally and act locally. I believe that if the Catholic Church can make this much progress with ecological literacy, anything is possible in creating a plan for ecological living.

Pope Benedict XVI calls us to defend and safeguard creation. "In dialogue with Christians of various churches, we need to commit ourselves to caring for the created world, without squandering its resources, and sharing them in a cooperative way," he insists.[207] I believe that joining this with Gore's words is appropriate. Gore states that what is at stake is "our ability to live on planet Earth - to have a future as a civilization. I believe this is a moral issue."[208] If church leaders and politicians could join forces to solve this problem there would be a noticeable impact. Marx states that

> Nature as a universal norm; the continuing dialogue of the political philosophers about the condition of man in a 'state of nature'; and the simultaneous upsurge of radical primitivism (as expressed, for example, in the cult of the noble savage) on the one hand, and the doctrines of perfectibility and progress on the other.[209]

The best way to cause those around us to act ethically is to create a global effort using every resource possible. In order to have an impact, we have to change the way that we think. Lovelock points out that our priorities are all wrong:

> I suspect that we worry less about global heating than about a global economic crash, and forget that we could make both events happen together if we implemented an immediate, global 60 percent reduction in emissions. This would cause a rapid fall in fossil fuel consumption, and most of the particles that make the atmospheric aerosol would within weeks fall from the air.[210]

Again we are caught in a social trap. People are simply more concerned about the highs and lows of the stock market than they are the level of greenhouse gas emissions on any given day.

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[207] Faithful Stewards of God's Creation: *A Catholic Resource for Environmental Justice.* USCCB website.
[208] Gore, 298.
[209] Marx, 88.
[210] Lovelock. *The Vanishing Face of Gaia*, 55.

Lovelock points out that the IPCC, a consortium of the world's climate professionals, recommends reducing emissions by 60 percent no later than the year 2050 to avoid dangerous climate change.[211] This is a massive reduction and the question becomes whether or not apathetic humans are willing to make a commitment to this effort. Yet there is not much of a choice, as humans must repair the damage that has been done or face drastic consequences. Lovelock warns

> By assuming that the climate is mainly a physical property of the Earth's surface environment we leave out the important consideration of living organisms, including humans and their dependent species of crops and livestock, as an integral and interactive part of the climate system.[212]

In other words, this is not a problem that is limited simply to humans. There are many other species counting on us to act ethically. The Dalai Lama points out that "of all the various species of animals on the planet, human beings are the biggest troublemakers."[213] No disagreement on that statement, but again we face the impossible task of who will become the moral police. Lawrence Johnson of Flinders University in South Australia points out in *A Morally Deep World,*

> Although we are not morally obliged to police the biosphere, everything we do nevertheless affects the biosphere. If we chop a tree for firewood, if we clear a field for plowing, if we merely gather nuts from under a tree, we can never avoid affecting our environment in some way, and any course of action is bound to be injurious in some way.[214]

This clearly reinforces Margulis' idea that the ecosystem is symbiotic. Now if we can only behave morally and act symbiotically we might have a chance to save our imperiled planet.

To Ernst Mayr, Darwin's work on species defined the planetary worldview. Darwin's ideas helped develop the modern view that evolution is not a religious experience, but a biological one. Darwin, however, held ethics to be incredibly important:

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[211] Lovelock. *The Vanishing Face of Gaia*, 61.
[212] Ibid, 63.
[213] Dalai Lama, 17.
[214] Johnson, 223.

> Social ethics exist in a rather rudimentary way in many living organisms…They are of infinitely greater importance in the human species, where every cultural group has its code of ethics which, in the long run, determines the survival and ultimate success of the group.[215]

Darwin warns of extinction and how the elimination of a species could occur through natural selection. Not too outrageous to believe is that the human race could some day be extinct and not necessarily at the hands of an angry God. Yet some might argue that Darwin's findings gave humans the green light to take control of the land. Kinsley believes that "Darwin's view of nature as violent and morally blind strongly reinforced the campaign to bring nature under human control."[216] Mayr is also careful to point out that extinction is a human problem: "Extinctions caused by human activities present a snarl of ethical, esthetic, practical, and political problems. Conflicting goals must be balanced one against another. There is no royal road to rationality."[217] As extinction is a problem created by man, so is the problem of how to ethically treat the land.

Church leaders were threatened by Darwin's worldview because negated the foundation of creationism in the bible. No longer is man created in God's image, but merely the result of a lot of cellular evolution. The Earth is not the center of the universe, according to Darwin (and subsequently Margulis). These ideas continue wreaking havoc today through the controversy caused by outcries of conservative Christians and the teaching of evolution in our schools. They interpret the words in Genesis to be literally true, "God said, "Let the water under the sky be gathered into a single basin, so that dry land may appear."[218] Darwin's ideas of natural selection and origin of species literally scares conservatives to death.

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[215] Mayr, 156.
[216] Kinsley, 138.
[217] Hardin, 37.
[218] Genesis ch. 1.

Ethics in ecology and religion should not be seen as a new age fad. Protecting our environment is a consciousness, which has been present for a long time. In fact, Kinsley points out that "according to Thomas Aquinas, the creation of the world is intended to mirror God's goodness."[219] The book of Genesis presents the human world as an extension of God as well. Alasdair MacIntyre states in his Augustinian chapter of *Three Rival Versions of Moral Enquiry:*

> In learning we move towards and not from first principles and we discover truth only insofar as we discover the conformity of particulars to the forms in relation to which those particulars become intelligible, a relationship apprehended only by the mind illuminated by God.[220]

His argument is that humility is necessary in all aspects of life, ecology is no exception. In contrast to Marx's belief that man has exploited the land through the development of technology, Kinsley says "among all creatures living in the world, a human being is the most spiritual and rational and so is seen by Aquinas as the most sublime."[221] Man is basically good, according to this passage. Marx, I think, would disagree stating that man has destroyed the sublime altogether.

Instead of labeling ecology as a religious issue, I prefer to define scientific study relating to ecology as sacred. In fact, Mircea Eliade explains that there was an order to the world before scientific study was even around. He makes clear the distinction between that which is sacred and profane; however, he points out that these things are subjective to one's worldview. What is sacred is not necessarily religious, according to Eliade

> Modern nonreligious man assumes a new existential situation; he regards himself solely as the subject and agent of history, and he refuses all appeal to transcendence…..Man only makes

[219] Kinsley, 109.
[220] MacIntyre, 84.
[221] Kinsley, 109.

> himself completely in proportion as he desacralizes himself and the world. The sacred is the prime obstacle to his freedom.[222]

Eliade questions just exactly what is considered sacred and implies that the sacredness of something can be subjective to one's weltanschauung. Eliade clearly points to the dichotomy between science and ecology in *The Sacred and The Profane*. Eliade is critical of the industrial world stating that it has desacralized the planet through a "sensational discovery of physics and chemistry."[223] Through the evolution of scientific advancement, technology has improved the quality of life at great cost to the land. Eliade suggests that only spiritual worldviews are good for society, a sentiment that Rousseau would most certainly share as his worldview was that man is greatest in the state of nature. I never thought of technology as a destroyer of the sacred, but I now adopt this worldview because industry has been the largest foe to the planet's health.

Eliade claims that progress has cost humans a great deal. Agriculture in a desacralized society, he claims, is a "profane act, justified by the economic profit that it brings."[224] He points out that this may be a result of the corruption caused by religions, which stem from a desire for human beings to explain things. Religion, Eliade believes, is not necessary because man can render himself sacred by merely putting himself close to God and the cosmos.[225] It is for this reason that he believes anything sacred to be something symbolic that transcends beyond itself. Eliade concludes with two simple ideas:

1. Whatever "religion" seeks to do, it tries to get people to abandon the egocentric belief that "the world is just for me."[226]

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[222] Eliade, 203.
[223] Eliade, 50-51.
[224] Ibid, 97.
[225] Ibid, 202.
[226] Ibid, 209.

2. we should not excuse anyone's bad behavior just because they claim it is part of his weltanschauung.[227]

The evolution of science appears to be a rejection of religion and it is easy to see why the early Church would feel threatened by scientific discoveries.

Lynn Margulis believes that there is a great value in classifying and that nothing makes sense in biology without it. Margulis jokingly claims, "the superficially boring practice of naming and grouping has profoundly affected my life."[228] Although a monotonous task, this is an important one. She warns, "faulty taxonomics misleads with the subtlety of unstated assumptions or religious beliefs."[229] Taxonomy, Margulis defines as the "science of identifying, naming, and classifying organisms."[230] Margulis points out that her term, symbiosis, is seen as a "specialized biological term" only because of our "lack of awareness."[231] Symbiosis simply means ecosystems and life forms living together in harmony. According to Darwin's theory of common ancestry, it would make sense that "we are symbionts on a symbiotic planet, and if we care to, we can find symbiosis everywhere."[232] Margulis reinforces Darwin's idea that man is not the center of the universe. She does, however, point out that man is merely part of the universe and must work in unison with other life forms for sustenance. A concept that she calls the great chain of being "defines the venerable position of humans as the exact center of the universe in the middle of the chain of being below God and above rock." [233] In other words, humans have a tendency to think more of ourselves than we have a right to. Margulis argues that "this anthropocentric idea dominates religious thought, even that

[227] Eliade, 211.
[228] Margulis, 51.
[229] Ibid.
[230] Ibid.
[231] Ibid, 5.
[232] Ibid, 5.
[233] Ibid, 3.

of those who claim to reject religion and to replace it with a scientific worldview."[234] Margulis presents a worldview that demonstrates the importance of living things coexisting in harmony; this is one worldview that I obviously value greatly as an environmentalist.

Technology itself is not the problem for our current situation. The major problem facing our society is that the technological advances and accomplishments have not been matched by man's display of ethics. We have become so nihilistic that we only consider what is right for ourselves and no one else. This is dangerous thinking. Quoted eloquently by John Donne, "No man is an island." There are many definitions of nihilism – one viewpoint is that things have gotten so bad that we have to burn down the house to escape. Selfishness and inability to care for anyone other than ourselves is another viewpoint that defines nihilism. Belief that our traditional values are no longer correct is yet another viewpoint of nihilism. Yet, Alasdair MacIntyre, philosopher at the University of Notre Dame, makes a connection between consumption and nihilism in *Three Rival Versions of Moral Enquiry*. Our selfishness is at the heart of our nihilism and the best way to put this aside is to return to the basics. People must be disciples of their community and embrace the greatest of traditions to outlast this nihilism.[235] This is the key to becoming ethical and turning away from nihilistic behaviors. We cannot let our idols become our gods and destroy us.

Going without does not necessarily need to be seen as depravity. In fact, Marx calls on Rousseau to explain that "on a higher plane of sophistication, Jean Jacques

[234] Margulis, 3.
[235] MacIntyre, 197.

Rousseau was drawn to the spontaneity and freedom he associated with primitive life."[236] Going without the best of everything does not have to be seen as a bad thing. Anything can change when we rethink our choices. Humans are capable of wondrous things when we set our sights on being great, but we have the potential to do great harm as well. Marquis de Condorcet, a victim of the bloody French Revolution, paints an incredibly optimistic picture of mankind's potential. He says, "Nature has assigned no limit to the perfecting of the human faculties…the perfectibility of man is truly indefinite."[237] His optimism is ironic seeing as his fate lay in the hands of his unethical bloodthirsty countrymen.

Aldo Leopold makes a strong connection between ethics and the land in *A Sand County Almanac.* He states

> the extension of ethics, so far studied only by philosophers, is actually a process in ecological evolution. Its sequences may be described in ecological as well as philosophical terms. An ethic, ecologically, is a limitation on freedom of action in the struggle for existence."[238]

Something may not be convenient which is ethical, but that which is ethical is crucial to a community's ability to coexist. The extension of ethics in human environment is not only an evolutionary possibility, but also an ecological necessity.[239] He states also "all ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in the community, but his ethics prompt him also to co-operate."[240] Leopold applies this idea of ethics to govern over tangible items as well. He states, "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or

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[236] Marx, 101-102.
[237] Hardin, 65.
[238] Leopold, 238.
[239] Ibid, 239.
[240] Ibid.

collectively: the land."[241] I interpret these ideals to mean that land should always be treated ethically in all respects. How can we state that we care about the Earth if we are not recycling and driving our large gas guzzling cars one block over? Acting ethically, under Leopold, would be doing what is right not only for the land, but also for the communities that depend upon the land for vitality.

Hardin, however, warns of the importance of using our filters in ethical land situations. He says, "He who clings to any faith will be disturbed by a resolute questioning of the foundations of the faith."[242] Hardin poignantly then states, "any discussion of the proper relationship between the community and the individual sooner or later trips over the word 'responsibility."[243] What then is our responsibility? We have already addressed the fact that our largest impediment to sustainability in the twenty-first century resonates in the uncontrollable population growth and consumption of fossil fuels. According to Emilio Moran, "The first major transformation in social ecological systems, from hunter-gathering to farming, was a result of population increase, growing confrontation of HG bands over resources, and rising costs and risk of moving into marginal environments"[244] Industrial farming and destruction of natural forest lands are a necessary evil of industrialized societies.

Science and laws can only do so much to guide our actions. The Dalia Lama warns "while both science and the law can help us forecast the likely consequences of our

[241] Leopold, 239.
[242] Hardin. *Filters Against Folly,* 67.
[243] Ibid, 93.
[244] Moran, 2.

actions, neither can tell us how we ought to act in a moral sense."[245] Perhaps Hardin says it best that

> sooner or later discussions of population problems raise the issue of altruism. Why should I refrain from exploiting the environment because posterity may some day wish that I had? Or because today's poor want a larger share of the world's wealth? Is Altruism natural? Is it safe?[246]

People tend to be very egocentric and to focus on what is best only for themselves. They act nihilistically. To answer Hardin's question 'Is Altruism natural or safe?' is a difficult question to answer as altruism is defined subjectively, just as is morality. People do not appear to agree upon a universal definition of what it means to be altruistic out in the world. Can we be altruistic to one species, without being symbiotic with others? I believe that the intent is there, yet many times we find ourselves acting unethically towards one another. Hardin addresses this by stating that:

> It is altruism within a species that we are most concerned with but the first great analytical step was made by looking at altruism between species. Before Darwin, a large and sentimental literature had grown up citing instances in which Providence had designed one species to help another.[247]

Hardin, in a sense, then also believes that we must create a universal symbiosis among planet mates because we are all in this mess together;

> Principally, of course, the stories showed how other species served human beings: bees for instance were supposed to make honey for the sake of man. Darwin's theory substituted 'natural selection' for 'providence,' and then asserted that animal adaptations could not be explained as instances of altruism between species.[248]

Yet he appears to not have the greatest faith in human beings:

> It would be naive to expect a unitary explanation of so widespread a human characteristic as wooden-headedness. Bull-headedness can in fact be adaptive up to a point: in such cases we must call it 'steadfastness.' It is the excess that needs guarding against. Explaining maladaptive behavior is not enough: we also want to avoid it. We want prophylactics against folly.[249]

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[245] Dalia Lama, 190.
[246] Living within Limits, 225.
[247] Hardin. *Living within Limits*, 225.
[248] Ibid, 226
[249] Hardin. *Filters Against Folly,* 15.

It is true that we need to be able to carefully look at the ecological facts and filter the myths and misinformation. Forcing behaviors upon others cannot be seen as a plausible solution. Awareness is the first step, but ecological literacy will involve a plan of action if a true impact is to be made.

Spinoza attempted to explain and define exactly that which is ethical and it offers a nice reminder. In his *Ethics,* Spinoza states

> That thing is said to be FREE (*libera*) which exists by the mere necessity of its own nature and is determined to act by itself alone. That thing is said to be NECESSARY (*necessaria*), or rather COMPELLED (*coacta*), which is determined by something else to exist and act in a certain fixed and determinate way.[250]

Spinoza sets out to prove that "there are laws or rules governing the psychological states of human beings."[251] But as freedom has costs, the time has come to repay the debt left by generations before us. We can no longer claim ignorance nor apathy. Rachel Carson serves as an inspiration to ecologists like James Lovelock with her exposure of how harmful chemicals can be. These chemicals can be detrimental to both the ecosystem and humans alike. She stated in 1960, after a bout with cancer, that

> There is still a very limited awareness of the nature of the threat. This is an era of specialists, each of whom sees his own problem and is unaware of or intolerant of the larger frame into which it fits. It is also an era dominated by industry, in which the right to make a dollar at whatever cost is seldom challenged.

I would argue that things really have not changed more than forty years later. This fact is simply frightening.

Not a secret is the fact that we are far from being where we need to be in the ecological arena. There are still those that believe that global warming is all hype and propaganda. According to Barry Commoner,

> The environmental effort- a massive but misdirected attempt to solve a major social problem-has failed. A major cost of this failure is, of course, the still polluted environment. And perversely,

[250] Spinoza, "Ethics."
[251] Garrett, 192.

> the national campaign has created new problems instead of solving old ones- a second generation of crippling mistakes.[252]

Commoner makes a relevant point that good intentions to create awareness have caused a wave of confusion about methods and practices. It is certainly hard to separate truth from propaganda. Also, we must stop thinking that it does not matter if we do not recycle the water bottle we used at lunchtime. Although it may just be one water bottle I recycle today, my actions can become habitual proving to make an impact. One plastic bottle recycled every day over the course of a year is 365 plastic bottles out of the landfill. This is a complex issue, however, discussed by Moran

> Over the last several decades, sociologists have investigated the public's increasing concern about the environment, but they have had little success explaining attitudes toward the environment or the adoption of pro-environmental behaviors like recycling.[253]

Is it simply apathy that causes humans not to do what we know is good for us? This is certainly a plausible explanation. According to T. Dietz, five criteria should be considered when making environmental evaluations: human and environmental well being, competence about facts and values, fairness in process and outcome, a reliance on human strengths rather than weaknesses, and the opportunity to learn and act with greater efficiency.[254] These are excellent ideas to apply to our recycling and waste-reduction habits as well.

Aldo Leopold believes that land is a medium for energy and not merely an inanimate and soulless object, as discussed in Chapter II. In contrast, perhaps the greatest moment of man in his glory due to reason – the European Enlightenment - had exactly the opposite view of land:

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[252] Commoner, 56.
[253] Moran, 136.
[254] Dietz, 60.

> In the wake of the Enlightenment, nature became primarily a resource to be exploited in the human quest for progress and the regaining of Adam's dominion over the nonhuman world. The point no longer could be to gain rapport with nature in the hopes of gaining wisdom from it or being favored by it.[255]

I suppose the thinking that humans are entitled to use technology, regardless of the pollution that they cause, has been a bit part of the problem. In fact, in contrast to what Leopold is stating, the common perception was that land is just soil and has no soul. For this reason, there would be no moral or ethical dilemma in building railroads and steamships because these are merely means of human progress. The thinking was 'who cares if we have to clear more land for expansion?' They viewed

> Nature (as) lifeless; it did not contain conscious or moral dimensions. For the most part, in the Enlightenment view of thing, nature was passive, dumb, and wild. It begged for development, exploitation, and manipulation by human beings to eradicate a range of evils and to meet perennial needs such as adequate food and shelter.[256]

I find this thinking interesting that people who claimed to be at the very pinnacle of their achievement during the Enlightenment had such disregard for nature. They may have used reason to become smarter, but they certainly would not be ethical by today's standards. Ethical views of the land have changed over the past two centuries. Therefore, the thinking that ethical behaviors are a subjective way of thinking is once again reinforced.

Ecology, a term devised by Ernst Haeckel (a follower of Darwin) "refers to the totality or patter of relations between organisms and their environments."[257] This statement had common threads of symbiosis running through it from its conception. Humans are an arrogant species. David Kinsley looks at

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[255] Kinsley, 133-134.
[256] Kinsley, 133-134.
[257] Ibid, xv.

> species arrogance as a primary problem in the current environmental crisis and call for a view of nature that acknowledges that the human view of reality is only one point of view and that 'reality' is as appropriately defined or experienced by other species of beings."[258]

So again, the ecological problem is not one of science or technology, but of a flawed human worldview that says it is fine to do with the land whatever we please. Kinsley firmly believes that "What has threatened the environment, are attitudes, often religious attitudes, in fact that teach disregard for nonhuman species and that look upon the natural world as primarily, or solely, at hand for human exploitation."[259] Therefore, I must call on Eliade and feel that the land is not something religious, but instead sacred. Sacred and religious CAN be the same thing, but are not always and for this reason some religions must be filtered out of ecolacy.

Aldo Leopold describes a land ethic as something unique to which we are all bound. "A land ethic changes the role of homo sapiens from conqueror of the land-community to plain member citizen of it. It implies respect for his fellow members, and also respect for the community as such."[260] The community must share the land accordingly and this makes perfect sense. In fact, Leopold believes that "conservation is a state of harmony between men and land. Despite nearly a century of propaganda (and this was first published in 1949), conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory."[261] Leopold outlines the larger issue at hand "The usual answer to this dilemma is 'more conservation education.' No one will debate this, but is it certain that only the volume of education needs stepping up? Is something lacking in the content as well?"[262] John Dewey would say that

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[258] Kinsley, xvii.
[259] Ibid, xvi.
[260] Leopold, 240.
[261] Ibid, 243.
[262] Ibid..

education is essential, but there is more to the moral dilemma. In *Moral Principles in Education,* he states "Culture, if it is to be genuinely educative and not an external polish or factitious varnish, represents the vial union of information and discipline."[263] Therefore, we must not only educate, but educate well. Leopold's Land Ethics is a great doctrine, but leaves many questions unresolved. For example, should these ethics be applied to species that cannot benefit off the land? Flowers and songbirds, as an argument, can be used as examples as they have no economic value.[264] These species, cannot be sold as commodities to improve the land, but they are a valued piece of the ecosystem and therefore, according to Leopold, must be able to survive. Everything contributes, through food chains and symbiosis, to the energy that is the land. My first thought calling upon Margulis' symbiosis and Lovelock's a Gaia theory is yes-every living thing has a right to live in harmony on this planet.

We know what the problem is – global warming - and we know that we can solve them by reducing our use of fossil fuels. We know that recycling is important, not only at the curbside but in any way that we can. The most common thread I found in my ecological literacy survey was that people know that it is a moral imperative to care for the Earth. Their reasons were overwhelmingly stated as being that they wanted to pass along a clean planet to their children, or they know that it is the right thing to recycle and they feel guilt when they do not. This is a moral imperative that we owe to future generations to bequeath a clean planet. People who took the ecological literacy survey also wanted more education – they actually asked for more information to become available to the public to create sustainability! In fact, through education is the only way,

[263] Dewey, 19.
[264] Leopold, 246.

I believe, that we can create habits that will sustain our species and all others that depend upon us. Ethics requires learning right from wrong, but no official religion upon the part of humans. The only requirement is simply a commitment to preserving all that is sacred. I certainly hope that all seven million of us view planet Earth as something that is sacred. Humans have a greater potential than we are currently exhibiting and once we change our worldview to include living sustainably, we will transition to that next phase of civilization, which Kaku calls upon. Now we must take action and educate to inspire ecological behavior changes. We must become ecologically literate to survive on Earth, its really just that simple.

"Unless someone like you….cares a whole awful lot….nothing is going to get better….It's not." - The Lorax[265]

Chapter V: The Solution - Environmental Education

One of the greatest challenges to putting together a successful education program on ecological literacy is human apathy. Rachel Carson caused a big stir with her 1962 book, *Silent Spring.* The controversy prompted by its release caused politicians to become actively involved in environmental issues. Although her aim was taken at the harmful pesticides being used in food production and their effects upon humans, this was a defining moment in creating awareness that humans have to become more conscientious of what we are doing to the ecosystem. As an undergraduate studying media ethics, I was part of a group that surveyed college students on media effects and attitudes. Our collective effort discovered that there was a perception, as shown in 1988 popular television culture, that Generation X is lazy and apathetic. As a member of Generation X, I recall being just a bit offended at this statement at the time. With the passing of several years to process this information, I now, buy into this as fact wholeheartedly. I do not mean to pick on Generation X alone because I believe that humans as a species are lazy. We get comfortable and discern new challenges that come our way, although some of us more than others. To leave Plato's Cave, many times we must be dragged kicking and screaming from the cave into the dawn of a new day. Our

[265] Dr. Seuss. *The Lorax,* 28.

wakeup call has been received and it is now time for action. Education is only way to foster sustainable behavior. We have to be positive, we have to be focused, and we have to not waiver from this goal of creating a sustainable environment. We must reduce humankind's ecological footprint and education is the best medium through which to do this. Ecological Education is the proactive way to inform the public of how best to make green choices.

According to John Dewey, the way to change behaviors is by "teaching and learning for the continued existence of a society that we may seem to be dwelling unduly on a truism."[266] Since we have realized that moral ideas or truisms can turn out to be false, it is time to look at renewing our methods. Humans must admit that what we are not doing enough to inspire change and that through education, the great equalizer. We can produce results and change by properly educating people. Failure cannot be an option because what makes our planet special is that it is the only one found so far in the galaxy habitable for human life at this time. For me, this alone is a huge motivator to make a change - change my habits or destroy our home for future generations. David Orr argues that ecological literacy is becoming more challenging because "there is less opportunity for the direct experience of it."[267] Solving the problem of the public's ecological literacy is not a priority "since there is no particular need for an ecologically literate and ecologically competent public, environmental education is most often regarded as an extra in the curriculum, not as a core requirement or as an aspect pervading the entire educational process."[268] Orr believes that "environmental education ought to change the

[266] Dewey, 3.
[267] Orr. *Ecological Literacy,* 89.
[268] Ibid.

way we people live, not just how they talk. Environmental education can be taught both in and out of the classroom.

Curriculum integration for ecological literacy is crucial to promote sustainable behaviors. David Orr is one of the most active scholars pushing all facets of education to adopt ecological literacy into its general worldview. According to John Lemons, Orr's *Ecological Literacy* should be read by "all educators, regardless of discipline, as well as by all academic deans, university presidents, and students."[269] I agree wholeheartedly as David Orr has been my muse in creating this study. His message is simply to reduce source waste when possible but also to continue developing technologies in our higher learning institutions that can reduce post-consumer waste as well. Orr believes that universities must be "laboratories to use the creative energies of their members to find ways to shift institutional buying power and practices in ways that cause less environmental damage."[270] Think of it - as we develop compostable packaging technologies through research and development, we are able to find creative ways to solve our ecological crisis. Perhaps this is how we will find our way out of this mess altogether.

We must dispel the myth that schools cannot teach Ecological Literacy. In fact, according to Daphne Goldman, Bela Yavetz, and Sara Pe'er, authors and researchers of a 2003 ecological study in Israel, "Society believes the formal education system is responsible for environmental education."[271] This study looked at the background factors of teachers in training using three major colleges in Israel. They wanted to make connections between a teacher's level of environmental literacy by studying behaviors.

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[269] Lemons, 708.
[270] Ibid, 709.
[271] Goldman, 4.

They found that teachers were not the ecologically literate bunch that we like to think we are, unfortunately, when it comes to environmental education. The lack of adequate training is to blame for this fact. In fact, the research found that "inadequate EE training of teachers leads to problems associated with implementation of environmental education in schools."[272] Professional development in this area must be re-evaluated and environmental studies must be presented to teachers in their workshops. There is an incredible correlation between teacher and student in the field of ecological literacy.

A 2006 study of the Green Schools Initiative found that an increasing amount of North American schools are trying to expose students to complex environmental and social issues in the classroom. Extracurricular clubs and elective courses are a popular way to get students involved, but more is required to make an impact. Amy Lyon Higgs, of The University of Michigan, explains the greatest impediment: "most schools provide few role models, individual or institutional, from which students can observe and learn more sustainable behaviors."[273] Sometimes teachers do a great job of teaching students how to behave sustainably, but then do not follow up their teaching by exhibiting green behaviors and this causes students confusion. To be most effective, the entire school needs to adopt sustainable behaviors as the 'monkey see - monkey do' mentality is always present with adolescents. Higgs notes that "for schools, modeling sustainability appears to be one effective way to achieve the goals of sustainability education."[274] The 2006 study, conducted by Higgs and Victoria McMillan of White Mountain School in Bethlehem, New Hampshire, examined four North American schools to collect their data. The fours categories of focus were individual role models, school facilities and

[272] Goldman, 4.
[273] Higgs, 39.
[274] Higgs, 39.

operations, school governance, and school culture. The criteria studied included teachers and staff and their behaviors in the following categories:

> *driving a hybrid car, carpooling or biking, or walking to school
> *eating organic, local food with minimal disposable packaging
> *wearing second hand clothes
> *participating in community service
> *composting, recycling, and reusing
> *picking up litter
> *turning off lights when leaving a room.[275]

Students began modeling the behaviors of the teachers and staff, however, it did not end there. Students were also modeling behaviors of their peers! Living sustainably had become the social norm in the school environment and everyone was adopting these sustainable behaviors. The concept of modeling became part of the social norm throughout the schools and the positive impact was noticeable.

Many findings in Higgs and McMillan's study are very positive and leave the door open for further teacher-student modeling opportunities. Not that this is groundbreaking, as "researchers suggest that nurturance and perceived similarity to the learner are 2 of the strongest predictors of modeling success."[276] The students and teachers also felt comfortable speaking openly about their behaviors to both Higgs and McMillan, which shows that they were proud of these behaviors. Students and teachers could engage in meaningful dialogue with each other about what they were doing as well. A teacher of the Arthur Morgan School, located in the Black Hills of North Carolina said:

> one thing I've learned working here is how incredibly powerful modeling is as a teaching tool….the relationship we have with the kids is so strong, which makes it easier. When they see us passionate about something, it gets them so excited……And they really watch our behavior to see if they're in line with what we say.[277]

[275] Higgs, 42.
[276] Ibid, 43.
[277] Higgs, 44.

This is a great sign that positive role models motivate the students. The students also appear to gravitate towards behaving sustainably because they perceive this as the ethical thing to do.

At the Island School in the Bahamas, they are also putting technology to work by creating their own green technologies. Impressively, these efforts include:

> *creating its own energy with 150 photovoltaic panels, six solar hot water heaters, and a wind generator
> *establishing a wetland garden that naturally processes all waste water, including human waste
> *collecting and storing rainwater from roofs and instituting water consumption, such as a navy shower, where the bather wets down, turns off the water, soaps up, then rinses off
> *enabling passive cooling of buildings using indoor plants and underground water piped through walls
> *creating an experimental building made of wood from invasive trees and reclaimed materials.[278]

This is a very proactive list of eco-activities that the school has adopted. Higgs found that "transparency in the school's efforts and operations is essential to making the facilities effective teaching tools."[279] She continues pointing out that "The Island School ensures that the ecological, social, and economic impacts of the facilities and operations are obvious to students and to others."[280] Through modeled and adopted behaviors, the school has had an impact upon not only the students and staff, but also the community as well. The small community grew stronger as a result of this study. The benefits were clear to teachers, students, and members of the community alike.

Unfortunately, not all of the schools involved in Higgs and McMillan's study fared as well. A teacher at the private Lakeside School, located in a suburb of Seattle, explained the impediments to their Environmental Education teachings:

> The students' consumer mentality is unbelievable. They drive here in their SUV's, live in 4,000 square feet homes, and then recycle a can. In general, the kids don't see any care for the earth

[278] Higgs, 44.
[279] Ibid.
[280] Ibid, 45.

> modeled for them. It is hard to make them see a different way of thinking when the pressure from home and peers is to do the opposite.[281]

Lakeside was not modeling their behaviors as Island School and Arthur Morgan School (both private schools as well) were doing and the difference was noticeable. Higgs points out that "modeling can help students transfer the concepts of sustainability from abstract ideas to personal and tangible applications."[282] Students can talk the talk but when forced into action kinesthetic activities, instead of simply reading from a textbook, proved to be much more effective. Overwhelming though the task may be, modeling appears to be an excellent proven method to teach environmental education effectively. It can be very difficult to employ 100% participation in a project like this with all of the other challenges that teachers currently face. However, these results, I believe, speak for themselves. Students notice gaps in participation and will tend to take the apathetic road if they see others that are doing so. If sustainable behavior is the norm, however, there is social pressure to conform. C.A. Bowers argues "What is left out of textbooks is as important as the cultural patterns of thinking that are presented to students."[283] He is critical of oversights as a result of human's anthropocentric mind set "buttressed by the myth that human decisions (particularly when based on the canons of scientific enquiry) are progressive in nature."[284] But here we come back to the quandary of who will be put in charge of policing the morals. Should one simply view ecologically promoting behaviors a waste of time or beneath him, it is very difficult to change this worldview.

Teachers, schools, and administrators are held to high standards by both states and districts and now in Florida teacher pay is associated with student success. High

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[281] Higgs, 49.
[282] Ibid, 50.
[283] Bowers, 147.
[284] Ibid.

standards are a good thing when one considers that these people are entrusted with the education of our bright young students. There is a down side to standardized testing, however. Many times the focus is so great on teaching the material that will be present in this testing that little time is available to teach anything else. Creativity and new ideas will not have the chance to surface in the curriculum with such lack of time to introduce new ideas, therefore, ecological education may fall by the wayside. Certainly, elective programs and courses can be offered in middle and high schools, as many now are. A better way, however, to integrate sustainable behavior and consequences would be using the common core standards that will eventually become Nationwide Standards in our school curriculum. Higgs and McMillan's study has proven that school wide initiatives and interdisciplinary practices are effective. In fact, according to Indira Nair, professor of the Department of Engineering and Public Policy of Carnegie Mellon University

> usually the critical judgment to consider diverse criteria and discriminate between options is a factual developed with expertise and practice in a given subject area. Yet, environmental literacy requires this evaluative faculty be developed in a 'non-expert.' These evaluative skills fit into the traditional knowledge hierarchy described by bloom as: knowledge, comprehension, application, analysis, synthesis, and evaluation.[285]

There are ways to incorporate environmental education into the humanities, sciences, math, and languages. I agree with Nair that using Bloom's model, teachers can teach sustainably and evaluate. Synthesis should be the ultimate goal with hands-on activities to involve the students. Students can see the greatest impact through synthesis. The most effective means of promoting ecological literacy would be through interdisciplinary study since the idea encompasses a symbiotic attitude.

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) became a collective effort to put together guidelines to direct methods of

[285] Nair, 60.

Environmental Education. Biologist and scientific humanist, Julian Huxley, founded this organization back in 1946. The UNESCO mission statement reads that the organization works to promote

> Understanding of the multidimensional problems of depleting resources, ever increasing populations, and longer term planning is vital to the survival of the human species. Environmental Education can lead the way to such understanding by giving people the knowledge of the universe, society and individual, and by helping them in understanding their attitudes towards each other and their biophysical and social environment.[286]

They have built a framework to design and guide environmental education in schools throughout the world. This framework was first published in 1977. It has taken four decades, but finally the benefits are making their way into classrooms today. According to UNESCO, "Environmental education is a way of implementing the goals of environmental protection. Environmental education is not a separate branch of science or subject study. It should be carried out according to the principle of lifelong integral education."[287] UNESCO found that the world was still lacking such a common framework for creating objectives to incorporate environmental education and needed to take action for change some thirty years after its inception. They believe that

> Environmental action seeks to improve all ecological relationships, including those between humanity and nature, and between peoples….in turn, it becomes the goal of environmental education to develop a world population that is aware of and concerned about the environment and its associated problems, and which ahs the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively towards the solution of current problems and the prevention of new ones.[288]

Although this was published in 1977, the objectives defined by UNESCO have not changed in the world today. Teachers and students are making great gains in the area of ecological education, but not quickly enough. Hopefully, as the common core standards are developed, more of UNESCO's framework can be actively integrated.

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[286] Bakshi, 12.
[287] UNESCO, 25.
[288] UNESCO, 26-27.

There are several reasons for which ecological literacy is a critical need area today. Citing *The Belgrade Charter,* UNESCO states that the objectives of environmental education should be:

> (1). Awareness: to help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems.
> (2). Knowledge: to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.
> (3). Attitude: to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.
> (4). Skills: to help individuals and social groups acquire the skills for solving environmental problems.
> (5). Evaluation ability: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic, and educational factors.
> (6). Participation: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems so as to ensure appropriate action to solve the problem.[289]

Implementing these goals in just about every course, regardless of the format, should be a goal of every learning institution. Legislative support is increasing for integration and this is a great victory for students. In fact, according to Trilochan Bakshi, "there is a great deal of support for interdisciplinary methods, sometimes to such an extent that traditional disciplinary methods are looked down upon."[290] Teachers and administrators cannot be afraid to try new things to help students understand the importance of living sustainably. There are a number of ways to incorporate Ecological Literacy into the curriculum.

There are a number of education models that teachers can use to help structure activities to promote Ecological Literacy in schools. Age-appropriate activities will make the greatest impact upon student learning. For primary grade students, why not capitalize on the newfound popularity of Dr. Seuss' *The Lorax?* A number of spinoff books are

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[289] *The Bellgrade Charter: A Global framework for Environmental Education.* UNESCO, 28.
[290] Bakshi, 12.

available as the 2012 film version helped to catapult ecological awareness once again back into the mainstream popular culture. Through the eyes of a grumpy little guy, the Lorax, the students are taken on an adventure and learn how exciting it can be to view the outdoors. The world of the Lorax does not have many real trees and he becomes a vigilante protector of them. The Lorax explains this as "Way back in the days when the grass was still green and the pond was still wet and the clouds were still clean, and the song of the Swomee-Swans rant out in space….one morning, I came to this glorious place. And I first saw the trees!"[291] The Lorax, although not one of Seuss' most popular characters, has presented children with a great message that explains to them why they need to care about the environment. Using Bloom's taxonomy model, students who read the book would be able to gain comprehension of the problems that exist with sustainability. Reading the book alone will provide for Bloom's knowledge and comprehension of the subject of ecological literacy. Students can then take a walking tour of their campus and examine live trees as well as tree stumps to evaluate rings and determine tree ages. For synthesis, students can plant a new tree and then evaluate as they keep a journal tree growth weekly, daily, or monthly. Trees do not grow as quickly as we would like and students will understand the importance that trees represent in our ecosystem. Students can then, with the help of their teacher, begin to discuss where these trees in *The Lorax* may have gone. Why would people cut them down? What practical uses could they have? Students would recognize that lumber is used to make houses, buildings, and furniture. Teachers and students could then discuss how these things could be conserved by reusing and recycling.

[291] Seuss, 12.

The ultimate goal in this exercise would be synthesis (discovering how to create patterns and connections that force new behaviors and perspectives). To achieve this, students could do hands on recycling project by saving their cardboard and paper containers that are sent in their lunches for one month. Sometimes when we see these items daily, it is not so painful to toss them into the trash. However, after a month of saving up paper products within and entire classroom, students might see just how much of an impact they can have in cutting down on daily waste. This is a small exercise, but can serve to help them understand how daily patterns can make a difference.

At the upper elementary level, teachers could also create great lesson plans that foster sustainability. Because teachers and reading coaches have seen a dramatic decrease in literacy of students in just the past few years, it would be appropriate at this age to use Carl Hiaasen's *Hoot* as a source. In this book, a teenage boy named Roy moves from Montana to South Florida. It is through his friendship with two ecologically conscious teens, Beatrice and her stepbrother affectionately nicknamed Mullet Fingers (a Rousseau/Huck Finn type), that he gains an appreciation for wildlife and their habitat. Mullet Fingers takes Roy to a creek and "Roy was dazzled by the wondrous quiet, the bushy old mangroves sealing off the place from the honking and hammering of civilization."[292] Even though Roy is warned of the presence of crocodiles, "the truth was that he felt totally safe. The creek was incredibly beautiful and wild; a hidden sanctuary only twenty minutes from his own backyard."[293] In the process of the story, Roy exposes a greedy land developer's corruption and saves and endangered owl's nest from destruction. In reading this story, students gain the knowledge and comprehension to

[292] Hiaasen, 176.
[293] Ibid.

understand that society can be quite harmful to natural habitats when humans act unethically. Having students read and discuss the book in a classroom setting would encompass Bloom's knowledge, comprehension, application, and analysis. The students could also analyze the protected owls by visiting a local bird sanctuary and having that kinesthetic contact with these fascinating creatures. Students then could also learn to synthesize and study the ways that environmental laws protect such endangered creatures. After the field trip, teachers can initiate more discussion for evaluation of what the students have learned from this experience. Combining reading with a kinesthetic opportunity to visit these creatures would allow students to make great connections.

At the middle and high school level, field trips can be planned by a team of teachers to give students an opportunity to see the curriculum benefits of living sustainably. Studies show that when students realize that there is a connection between subjects, they make much stronger connections to the material. In fact, Bakshi points out that "important are the relationships between the different subject matter fields, between different aspects and outlooks."[294] A simple way to show an impact across the curriculum would be to plan a field trip to view a zero impact waste facility for a physics or math class. Once they are presented with firsthand knowledge of what the facility does, they gain comprehension, see applications, and are able to analyze. Students can then look at applying this in a practical world for synthesis. After the students have looked at the processes of separating materials, the teacher could ask them to plan what their equipment or staffing needs would be to run such an organization on a weekly or monthly basis. To determine costs, the economics teacher could even look at what the yearly cost to run such a facility might be as well as the profit made when the trash is

[294] Bakshi, 20.

sold off to companies. Students can begin to synthesize not only the waste that is reduced as they see it firsthand, but the costs involved with running such an operation. Once students can synthesize the profit and offset the costs, they can evaluate the benefits of such facilities. Biology classes can visit streams, estuaries, or seashores looking at ecosystems. English teachers can work with the biology teacher to find a suitable play or novel to make connections to ecological studies in literature. Although I have presented several literary examples in Chapters I and II with the help of Leo Marx, Shakespeare was notorious for using nature as a force in his works and is therefore very relevant in ecological studies. By showing students that biology and literature have common threads they can soon begin to synthesize that there is a very real connection. A physical education course could take a canoeing trip down a local river or stream and include ecological and biological studies of habitats as well. The possibilities are endless and meaningful in promoting sustainability as a lifelong focus.

Environmental education should not end in the classroom, however. According to David Lorey, our

> experience with global environmental management has generated extraordinary interest in the theme of learning. This preoccupation reflects in part an awareness that our framing of environmental problems and related understanding of causes and effects are still embryonic and likely to change rapidly with massive new investments in knowledge creation.[295]

As interesting a connection that students can make, entire communities can get involved with ecological education as well. This can help their communities grow stronger in a common goal as they work together for beautification. In fact, UNESCO says

> School pupils are but one segment of society that is confronted by environmental problems; adults in all spheres of society have to make environmental decisions, sometimes related to themselves and sometimes affecting other people as well. Environmental education may be defined as a

[295] Lorey, 283.

> process for developing skills and attitudes necessary to understand and appreciate the interrelationships between man, his culture, and his bio-physical surroundings.[296]

To be considered successful, ecological literacy has to extend beyond our schools to the general populations. Through community meetings, responsible corporate initiatives, and by utilizing the practice of ethical, sustainable existence we can do so much more. Nair states that "environmental issues effect, and are effected by all of our activities to varying degrees. The need to have a working knowledge of environmental issues is not confined to environmentalists, environmental scientists, or environmental engineers."[297] This is correct, as all inhabitants of the planet Earth must accept the challenge of living sustainably. Orr states "the crisis of sustainability and the problems of education are in large measure a crisis of knowledge."[298] The knowledge, thanks in part by Vice President Gore, became mainstream in 2006. Unfortunately, the passion that was stirred as a result of it *An Inconvenient Truth's* box office success has died down somewhat. We have to keep ecological literacy in the forefront at all times. This is the only way to promote sustainable living on a large scale.

To change our behavior, adults must be presented with easy ways to make a difference in the community but the ideas must be presented critically. Adults must be re-educated to change our thinking. One way that Rob Larson, of The Environmental Education Association of Oregon, finds effective in adult education is by making a connection between Piaget's framework of intellectual growth to Kohlberg's stages of moral development. He points out a study conducted by R. H. Hersch that produced some interesting results stating that when people adopt the "post-conventional

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[296] UNESCO, 41.
[297] Nair, 57.
[298] Orr. *Ecological Literacy,* 17.

perspective (the highest level of moral judgment) think in the purely formal categories."[299] Why do things have to be so categorized in the adult psyche? If we try to make adult ecological literacy education too complex, we will fail for it is in the general public's nature to reject ideas that require too much work. Yet Larson goes on to state that "critical thinking skills are essential in fostering advanced moral perspectives."[300] This is incredibly important to teach this because "the capacity for critical thinking affords us the power to create and maintain our future."[301] He looks at this as not just a simple in teaching sustainability, but in teaching ethical behaviors as well.

There are many impediments to adult ecological literacy, but these problems are easily overcome with effort and perseverance. Orr states the human problem perfectly "In considering the causes of the crisis of sustainability, there is a tendency to sidestep the possibility that we are a flawed, cantankerous, willful, perhaps fallen, but certainly not entirely planet-broken race."[302] It is not easy to make changes and to step outside of that cave, but we can do it; we must for the sake of future generations. Good news, though. According to Doug-Mackenzie-Mohr, we can change with minimal commitment. Mackenzie-Mohr points out that we already have the tools for success; "these tools include such approaches as gaining commitment form an individual that they will try a new activity, such as taking household hazardous waste to a collection depot, or developing community norms that encourage people to behave more sustainably."[303] Simply piloting a new program in the community to do these things dissipates apathy and encourages a sense of community to foster involvement. Most important in this process

[299] NAAEE, 86-87.
[300] Ibid, 87.
[301] Ibid.
[302] Orr. *Ecological Literacy,* 17.
[303] Mackenzie-Mohr, 16.

is to be sure to evaluate the program once it has been implemented.[304] What worked? What did not? These questions must be answered and data gathered in order to proceed. This data is critical so that methods that failed can be removed and those that worked well can be duplicated in other ways.

Media filters must be used as well in this goal of community education. Mackenzie-Mohr states "the failure of mass media campaigns to foster sustainable behavior is due in part to the poor design of the message, but more importantly to an underestimation of the difficulty of changing behavior."[305] If it is the cool thing to do, people many times engage in a particular behavior. For this reason, "recycling, it has been suggested, is popular because it serves to alleviate our guilt for not making the more difficult and inconvenient changes toward sustainable living."[306] Recycling, however as we have seen, has become less of a social trap and can even be profitable in many cases.

Commitment is a great method of serving as a community-based social marketing tool. In a study performed by Pacific Gas and Electric, results showed "substantial increases in the likelihood that householders would retrofit their homes. In fact, using community-based social marketing methods resulted in three to four times as many people electing to retrofit their homes."[307] Just think of how social media sites like Facebook or Twitter could encourage this type of involvement! The assessors were trained to get firm commitments from homeowners on performing energy-saving improvements and they found that people adhered to these verbal commitments. Although, Mackenzie-Mohr found that written commitments were much more effective

[304] Mackenzie-Mohr, 17.
[305] Ibid, 15.
[306] Ibid, 19.
[307] Ibid, 50.

than simply verbal commitments.[308] The concept of commitment binds people to follow through. Prompts such as "Act Locally, Think Globally" have also been effective tools.[309] We have to be optimistic that as a species, we can become planet-broken and using educational tools in practice outside the traditional classroom setting can help. This is found to be just as effective in adults as it is in adolescents. This sustainable behavior must move to become our social norms to create long-term sustainable behavior collectively.

One way that Mackenzie-Mohr suggests that we can gather data is by using surveys. He suggests several great dos and don'ts in his book *Fostering Sustainable Behavior*. My ecological literacy data is available for review in Appendix B. I found that people wanted better education so that they know what can be recycled curbside. Also, they want to know where facilities will be available for items such as Styrofoam and cooking oils. I was surprised to find that we have come much further than I had originally thought when I took on my study of ecological literacy. I conducted some great ecological literacy projects at our Girl Scout 2012 Park Lakes Service Unit Camporee. I have included pictures and summaries of my activities in Appendix B. The girls were very engaged in the activities. They enjoyed learning about water sources and wildlife habitats. They want to know the right behaviors that will sustain their communities. They want to become good global citizens with purpose. We had a great time looking at tree rings, lichens, and animal habitats. We also discussed how trash impacts our ecosystem and what must be done in order to keep the planet clean for not only our use, but for our global neighbors. They really do understand that their actions

[308] Mackenzie-Mohr, 52.
[309] Ibid, 61.

impact not only themselves, but also on the entire planet. I consider our youth be a beacon of hope for the entire planet. If a group of young girls can spend a weekend getting closer to nature and understanding their impact upon the planet, why could every one of us do the same? As Jim Henson's beloved Kermit said, "Its not easy being Green!" Sometimes recycling or living sustainably is not the easy thing to do, but it is the ethical thing to do in all situations. Global citizenship should be a primary goal for all who live and interact with Gaia. Education is the vehicle that can take us there.

Conclusion

This study has been a labor of love for the past few years. I first embarked upon this challenge because I felt that there was really something missing out there in the public's perception of how important eco-awareness really and truly is to our survival. I have been pleasantly surprised to say that the majority of people care way more than I had anticipated. I also originally thought that young people cared a lot more than people of my generation. Not as many young people took my survey as I had hoped – although maybe this says something about apathy among youth! What I did find is that people thirty and older really do care a lot about our planet. The main reason stated in my survey data for recycling is that they know it is the right thing to do. They have said that they want to leave the planet in good shape for future generations and this says that sustainability is truly a moral imperative, which I have always considered to be a very important part of my worldview.

The statement that "I want to make things better for the next generation" is a bit ironic. What does "better" truly mean? This is where things get tricky because the things that we idolize are a large reason for our problems. A worldview is what defines each person and what is important to him. I believe that one's worldview must include the answer to this question - What kind of world do I want to leave to the next generation? If this question can be honestly answered in a benevolent way, then an individual can successfully be a conduit for good measure. This would be the mark of becoming a truly good global citizen. So to answer David Orr's question – Can we become a planet-broken race? Yes, I believe we can if we share one common worldview in Ecological Literacy. We just have to keep our priorities straight consistently.

Works Cited

Bakshi, Trilochan S. *Environmental Education*. New York: Plenum Press, 1978.

Bowers, C. A. *Education, Cultural Myths, and the Ecological Crisis.* Albany, NY: State University of New York Press, 1993.

Brecht, Bertolt. *Galileo.* Edited and with introduction by Eric Bentley. New York: Grove Press, 1966.

Brooks-Cole. Miller's Text *Living in the Environment: Principles, Connections, and Solutions.* 11th Edition ISBN 0-534-56270-1.

Brown, Adolph. *Real Talk: Lessons in Uncommon Sense.* Bloomington, IN: iUniverse, 2008.

Carson, Rachel. *Silent Spring.* New York: First Mariner Books, 1962.

CNBC. *Trash Inc: The Secret Life of Garbage.* Carl Quintanilla, host. NBC/Universal Media, released August 20, 2010. *www.**cnbc**.com/id/38830389*

Commoner, Barry. *Making Peace with The Planet.* New York: The New Press, 1992.

Corner, Adam and Pidgeon, Nick. "Geoengineering the Climate: The Social and Ethical Implications." *Environment: Science and Policy for Sustainable Development.* Magazine. Vol. 52, no. 1 January/February 2010.

Dalai Lama. *The Universe in a Single Atom: The Convergence of Science and Spirituality.* New York: Morgan Road Books (Kindle Edition), 2005.

Darwin, Charles. *On The Origin of Species.* www.literature.org/authors/darwin-charles/the-origin-of-species/ accessed 2/14/2012.

Demand Health. "Magnesium Oxide Benefits" eHow.com;

http://www.ehow.com/about_5527344_magnesium-oxide-benefits.html#ixzz1qQbGXwEa. Accessed March 29, 2012.

Dewey, Cammie. "Where Does Our Water Come From?" Girl Scout Camporee Workshop at Wekiva Springs State Park, Altamonte Springs, FL, April 28, 2012.

Dewey, John. *Democracy in Education: An Introduction to the Philosophy.* Transcribed by David Reed. Amazon: Kindle Edition, 2006.

Dewey, John. *Moral Principals in Education.* Cambridge, MA: The Riverside Press, 1909.

Dietz, T. "What is a Good Decision?" Criteria for Environmental Decision Making. *Human Ecology Review.* (10)1.

Ehrlich, Paul R. & Anne H. *The Dominant Animal.* Washington: Island Press, 2008.

Eliade, Mircea. *The Sacred and the Profane.* New York: Harcourt Brace & Co: 1957.

Emerson, Ralph Waldo. *American Naturalism Web.* "Nature" http://www.vcu.edu/engweb/transcendentalism/authors/emerson/nature.html Accessed 3/25/2012.

Ellis, Earle *The Encyclopedia of Earth.* "Biosphere." www.eoearth.org/article/Biosphere. Accessed 3/26/2012.

Faithful Stewards of God's Creation: A Catholic Resource for Environmental Justice. USCCB website. http://www.usccb.org/. Accessed 3/20/2012.

Feynman, Richard P. *The Meaning of It All.* New York: Perseus Publishing, 1998.

Finocchiaro, Maurice A. *The Essential Galileo.* Indianapolis: Hackett Publishing Co, 2008.

Garrett, Don. *The Cambridge Companion to Spinoza.* New York: The Cambridge

University Press: 1996.

Goldman, Daphne, Yates, Bela, and Pe'er, Sara. "*Environmental Literacy in Teacher Training in Israel: Environmental Behavior of New Students." The Journal of Environmental Education.* Fall 2006, Vol. 38, No. 1.

Geisel, Theodor Seuss. Dr. Seuss. *The Lorax.* New York: Random House, 1971.

Goodall, Jane. *"Making a Difference."* Rollins Winter Park Institute Lecture, Ideas in Residence, Winter Park, FL, April 19, 2012.

Goodall, Jane. *Jane Goodall 50 Years at Gombe.* New York: Abrams Books, 2010.

Gore, Al. *An Inconvenient Truth.* Director, Davis Guggenheim. Paramount Classics, released May 24, 2006.

Gore, Al. *An Inconvenient Truth.* New York: Rodale Books, 2005.

Goldman, Daphne, Yavetz, Bela, and Pe'er, Sara "Environmental Literacy in Teacher Training in Israel: Environmental Behavior of New Students." *The Journal of Environmental Education*. Fall 2006, Vol. 38, No. 1.

Gross, Daniel. "Iceland has Power to Burn." *Newsweek* April 14, 2008.

Gussow, J. D. (1994). Ecology and vegetarian considerations: Does environmental responsibility demand the elimination of livestock? *The American Journal of ClinicalNutrition59*(5),1110S-1110S. http://ezproxy.rollins.edu:2048/login?url=http://search.proquest.com/docview/231918046?accountid=13584

Hardin, Garrett. *Filters Against Folly.* New York: Viking Penguin, Inc, 1985.

Hardin, Garrett. *Living Within Limits.* New York: Oxford University Press, 1995.

Hiaasen, Carl. *Hoot.* New York: Alfred A. Knopf Publishing, 2002.

Higgs, Amy Lyons and McMillan, Victoria M. "*Teaching Through Modeling: Four School's Experiences in Sustainability Education" The Journal of Environmental Education.* Fall 2006, Vol. 38, No. 1.

Johnson, Lawrence E. *A Morally Deep World.* New York: Cambridge University Press, 1991.

Kaku, Michio. *Beyond Einstein.* New York: Random House, 1995.

Kinsley, David. *Ecology and Religion.* Upper Saddle River, New Jersey: Prentice Hall, 1995.

Lange, Karen E. "Get the Salt Out." *National Geographic.* April 2010. Vol. 217, No. 4.

Lemons, John. "Ecological Literacy and the University." *Bioscience.* Vol. 42, No. 9 (Oct. 1992). Pp 708-709. Published by: University of California Press on behalf of the American Institute of Biological Sciences http://www.jstor.org/stable/1312179. Accessed 3/10/2012.

Leopold, Aldo. *A Sand County Almanac.* New York: Oxford University Press, 1966.

Lovelock, James. *The Revenge of Gaia.* New York: Penguin Books, 2006.

Lovelock, James. *The Vanishing Face of Gaia.* New York: Penguin Books, 2009.

Lorey, David E. *Global Environmental Challenges of the twenty-first century.* Wilmington, DE: Scholarly Resources, 2003.

MacIntyre, Alasdair. *Three Rival Versions of Moral Enquiry.* Notre Dame, IN: University of Notre Dame Press, 1991.

Mackenzie-Mohr and Smith, William. *Fostering Sustainable Behavior*. Gabriola Island, B.C. Canada: New Society Publishers, 1999.

Margulis, Lynn. *Symbiotic Planet.* Amherst, MA: Basic Books, 1998.

Marx, Leo. *The Machine in the Garden.* New York: Oxford University press, 1964.

Mayr, Ernst. *One Long Argument.* Cambridge, MA: Harvard University Press, 1991.

Melville, Herman. *Moby Dick.* London: Collectors Library, 2004.

Moran, Emilio F. *Environmental Social Science.* Malden, MA: John Wiley & Sons, 2010.

Nair, Indira, Jones, Sharon, and White, Jennifer. "A Curriculum to Enhance Environmental Literacy," *Journal of Engineering Education.* Jan. 2002: 91: ProQuest p. 57.

North American Association for Environmental Education, edited by Stone, Jody M. *Environmental Education: Transition to an Information Age.* Troy, OH: NAEE, 1987.

Orr, David W. *Ecological Literacy.* Albany, NY: State University of New York Press, 1992.

Orr, David. "Education, Careers, and Callings: The Practice of Conservation Biology." *Conservation Biology.* Vol. 13, No. 6 (Dec., 1999), pp. 1242-1245. http://www.jstor.org/stable/2641947. Accessed 10/30/2011.

Orr, David. "Education and the Ecological Design Arts." *Conservation Biology.* Vol. 6, No. 2 (Jun., 1992), pp. 162-164. http://www.jstor.org/stable/2386235 Accessed: 10/30/2011.

Orr, David. "Educating a Constituency for the Long Haul." *Conservation Biology.* Vol. 7, No. 4 (Dec. 1993), pp. 752-754. http://www.jstor.org/stable/2386805. Accessed: 10/30/2011.

Orr, David. "Is Conservation Education an Oxymoron?" *Conservation Biology.* Vol. 4,

No. 2 (June 1990), pp. 119-121. http://www.jstor.org/stable/2385802 . Accessed 10/30/2011.

Orr, David W. & Stuart Hill. "Leviathan, the Open Society, and the Crisis of Ecology", *The Western Political Quarterly.* Vol. 31, No. 4 (Dec 1978). P. 457-469.

Orr, David. "The Effective Shape of Our Future." *Conservation Biology.* Vol. 8, No. 3 (Sep., 1994), pp.622-624. http://www.jstor.org/stable/2386502 Accessed: 10/30/2011.

Orr, David. "The Limits of Nature and the Educational Nature of Limits." *Conservation Biology.* Vol. 12, No. 4 (Aug., 1998), pp. 746-748. http://www.jstor.org/stable/2387534 Accessed 10/30/2011.

Orr, David. "The Virtue of Conservation Education." *Conservation Biology.* Vol. 4, No. 3 (Sept., 1990), pp. 219-220. http://www.jstor.org/stable/2385774 . Accessed 10/30/2011.

Population Reference Bureau. http://www.prb.org/. Accessed April 20, 2012.

Spinoza, Benedict de. The Ethics. Found on project Gutenberg website. Posting Date: May 28, 2009 [EBook #3800]

Snowman, Jack and Biehler, Robert. *Psychology Applied to Teaching.* 10th Edition. New York: Houghton Mifflin Co, 2003.

TaterWare and Earth Cup, http://earth-to-go.com/faq/taterware. Accessed 4/22/2012.

The Kyoto Protocol: Victory for Planet Earth. www.greenpeace.org/usa/en/news.../the-**kyoto-protocol**-victory-fo/. Accessed 2/28/2012.

The New American Bible. Wichita, KS: Fireside Bible Publishers, 1996.

Twain, Mark. *The Adventures of Huckleberry Finn.* Amazon.com: Kindle Edition, June 2004.

U.S. Census Bureau, International Data Base, December 2010 update. www.census.gov. Accessed April 20, 2012.

UNESCO and various authors, *Trends in Environmental Education.* Gembloux, Belgium: J. Duculot, 1977.

Waste-to-Energy-Plants. http://www.broward.org/WasteAndRecycling/SolidWaste/Pages/wastetoenergy.aspx. Accessed on March 26, 2012.

Worster, Donald. *Nature's Economy.* Garden City, N.Y.: Anchor Books, 1979.

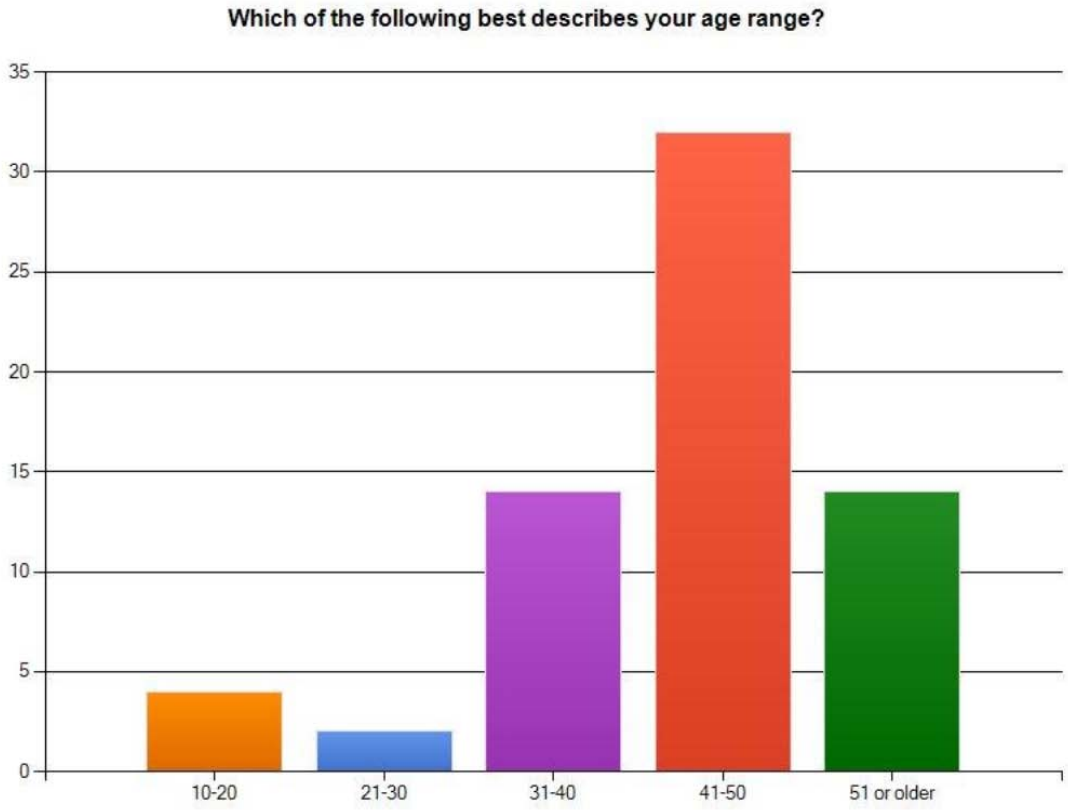
Yahgulanaas, Michael N. with Maathai, Wangari and His Holiness the Dalia Lama. *Flight of the Hummingbird.* Toronto: Greystone Books, 2008.

On my honor, I have not given, nor received, nor witnessed any unauthorized assistance on this work. – Eileen Bobeck-Thoresen

Appendix A- Ecological Literacy Survey Data

*note that no data was changed from participant open-ended questions in order to preserve the original integrity of data gathered.

Q1-



Q2-Please state the items that you recycle on a regular basis- (weekly or monthly):

1	plastic, glass, cans
2	newspapers, plastic, glass, aluminum
3	Plastic
4	we recycle all paper and plastic items weekly pick up by county
5	glass, cardboard
6	Tin cans, plastic bottles, glass bottles and jars.
7	Newspaper, aluminum, plastic, glass weekly
8	glass, aluminum, paper, cardboard, plastic [if I actually have any!], newspaper, magazines
9	Weekly , Newpaper and cans.
10	paper, glass, aluminum, plastic
11	Everything I can and that the recycling truck will pick up. Paper, plastic, cans, bottles.
12	aluminum, newspaper, cardboard, plastic, glass
13	milk bottles,water bottles,soup cans.cereal boxes
14	glass and plastic
15	Bottles, cans, cardboard boxes, plastic boxes
16	newspaper, magazines, glass, plastic, styrofoam, paper bags, cardboard
17	Plastic, paper, glass, aluminum, plastic bags.ANYTHING that my recycling facility will accept.
18	Glass, plastic, plastic grocery bags, cardboard, paper i.e magazines, empty envelopes,
19	nothing.
20	Glass bottles, glass jars, plastic cups & bottles, paper, cardboard boxes, aluminum cans, soda cans
21	All paper products, glass bottles, aluminum, plastic I also resell all our kids clothes
22	Cardboard, paper, plastic anything, glass containers
23	aluminum, glass, egg cartons and plastic
24	none I am bad
25	Glass, aluminum
26	Bottles, aluminum cans, cardboard
27	Bottles, cans, plastic containers, paper cardboard, etc.
28	Plastics, cans, aluminum, paper.
29	cans and newspapers
30	glass, plastic, paper, metal
31	Plastic, paper, alluminum, cardboard, stryrofoam
32	Recycle bottles Use paper or recyclable bags at stores
33	cooking oil, walmart bags
34	paper plastic aluminum electronics
35	Plastic glass
36	None
37	paper, plastic, glass
38	Cans, boxes, glass bottles, plastic bottles
39	cardboard, plastic, glass
40	Plastic pAoer weekly
41	All glass, plastic, paper & cardboard every week
42	bottles, cans, paper, plastic computers, computer equipment/peripherals (via non-profit)
43	cardboard, paper, plastic containers, aluminum cans, ink jet cartridges
44	aluminum and steel cans, plastic bottles and other containers, cardboard boxes, newspaper, plastic bags.
45	paper, plastic, metal, glass, yard waste, oil
46	Paper and cans

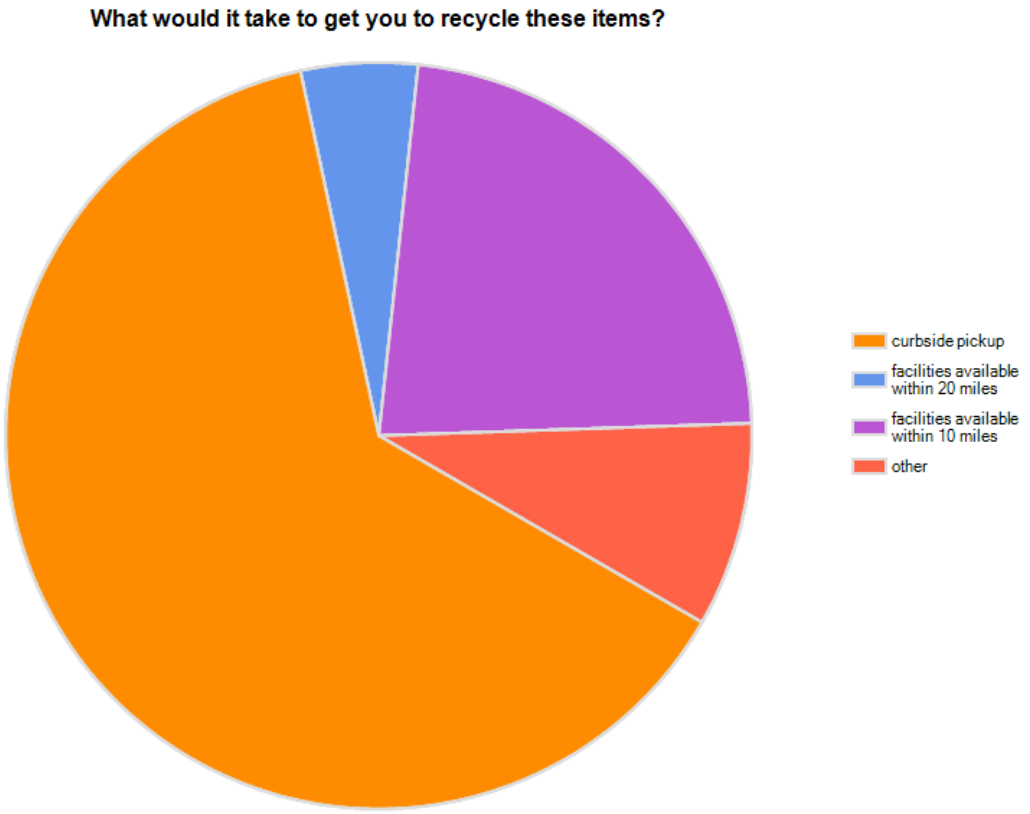
47 newspaper, cardboard, plastic, aluminum, glass, styrofoam,
48 Plastic, metal, paper, glass, batteries
49 Glass, Plastic, Paper
50 Cans and bottles
51 Cans, plastic, pater
52 Water bottles
53 Papers, batteries, lightbulbs, boxes, plastics, glass, aluminum, electronics, printer cartridges.
54 Cans, paper, plastic , compost
55 paper and plastic
56 WEEKLY: PAPER, PLASTIC, CANS, CARTON
57 paper
58 paper, glass,
59 none
60 Plastic bottles; aluminum cans; plastic bags; newspapers
61 Plastic and aluminum
62 plastic, glass, cardboard
63 Newspapers/Cardboard Boxes/Glass/Plastic
64 All paper, cardboard, tin/aluminum, glass and plastic.
65 Plastic bottle like coke, gator ade, water, milk, etc. Cardboard boxes like cereal, oatmeal, granola bar boxes. Glass jars like apple sauce. Toilet paper and paper towel rolls. I'm sure there is more, but that is all I can think of right now.
66 Cans and bottles

Q3- What items would you recycle regularly if you had access to facilities- (ex: cooking oil, styrofoam):

1 paper- I am unsure of other items
2 styrofoam - evil stuff
3 Styrofoam
4 any and all, if the county takes it
5 newspaper, tin & aluminum, table scraps, chemicals for cleaning and painting.
6 I really don't know.
7 everything!!!
8 Don't know.
9 black plastic containers that plants come in
10 Anything the weekly recycling truck does not pick up.
11 styrofoam, electronic equipment, cooking oil, paint
12 cardboard boxes, plastic
13 everything
14 styrofoam, left over paint, chemicals
15 cooking oil
16 All!
17 Styrofoam for sure. Our area has a pretty good recycling center. They also do curbside once a week
18 paper, styrofoam, plastic.
19 batteries, copper, brass, metal, steal
20 None
21 Cooking oil, styrofoam, coffee grinds, light bulbs, batteries
22 cooking oil, any others
23 everything
24 Everything I could
25 If it was convenient I would recycle anything
26 Styrofoam, batteries, etc.
27 Would recycle everything that i could!
28 anything
29 not sure
30 cooking oil, glass
31 paper, glass, plastic
32 styrofoam
33 Cardboard
34 Paper plastic
35 styrofoam
36 Anything that I could.
37 cooking oil
38 Bldng materials inc. Wood styrofoam
39 Stryrofoam for sure.....cooking oil is more of a stretch
40 ANYTHING that could be recycled, which currently is not on the "list" of collectible items by recyclers.
41 styroform, batteries, material/clothing
42 I would recycle whatever could be recycled, if it could be picked up.
43 styrofoam
44 Styrofoam
45 Foam products, poly and styrenes, wood
46 More Plastics
47 everything. it's a real pain in the ass to recycle. its a hassle, even tho its good for environment
48 ??
49 Oil, plastic bags50 Everything!
51 Cooking oil,
52 batteries

53 TRUCK OILS
54 oil styrofoam
55 oil, styrofoam, anything
56 plastic
57 Those are pretty much the recyclable products I use.
58 Styrofoam and metal
59 tires, oil
60 Batteries
61 Everything and anything else that could be recycled.
62 Any as long as it is curbside recycling and free
63 Styrofoam

Q4-



Q5-Why do you recycle?

1 because I think doing my part no matter how small will hopefully make a differenece for my childrens future
2 I believe we consume too much. It is not sustainable. It is also not necessary.
3 Enviroment
4 to lessen waste and reuse what we do use
5 So garbage can be made useful and not harmful .
6 It's participatory.
7 I believe that reusing these items will reduce landfill and conserve our resources
8 to live more sustainably.....would rather purchase things that come from recycled items so as not to use up the natural resources continually. I was brought up to recycle.....I can save money if I 'recycle' or 'reuse' things I have.....I reuse smaller bottles to put milk, water or drinks in for my daily lunch, etc.
9 To save the plant!
10 to help environment
11 I care about our environment and want for both man and animals. I want to protect our world for our children and their children. It is the right thing to do.
12 It's the right thing to do. I also hate the feeling of wasting things. Major guilt!
13 not to waste things that can be used again
14 to save the environment from toxic waste
15 Good for the environment
16 to reuse renewable materials
17 I recycle because I feel it is my small part in helping to keep the environment clean and healthy. There is so much waste on the roads and in our watersways, it is upsetting.
18 I think there is entirely to much waste in today's society. I try to do my part.
19 I don't recycle much but I know it's important for the environment.
20 I recycle because I want to make the Earth a safer and healthier place for everyone not just those in the future but those who live in the present now. To know I am trying my best and even one person could make a difference.
21 I want to leave the planet in a better position for my kids and theirs
22 Earth friendly, my kids
23 because its smart, conscious and available. I believe in not throwing things out that can be reused or recycled.
24 I don't its terrible
25 To give my kids a cleaner planet
26 I don't like waste
27 All of these things have to end up somewhere... eventually... There won't be anywhere left!
28 Is the responsible thing to do,
29 good for environment
30 environment
31 Because I took Global studies last year as a junior in highschool and realized how much recycleing helps the environment and I want to be a productive member of the world.
32 To help out
33 To save the environment
34 Help the environment
35 Don't want to leave a garbage dump to our kids.
36 don't like waste
37 I want to help the planet... make sure there are enough resources so the wold is wonderful place for my child throughout her life.
38 minimize the waste in landfills.
39 Cuz of the kids

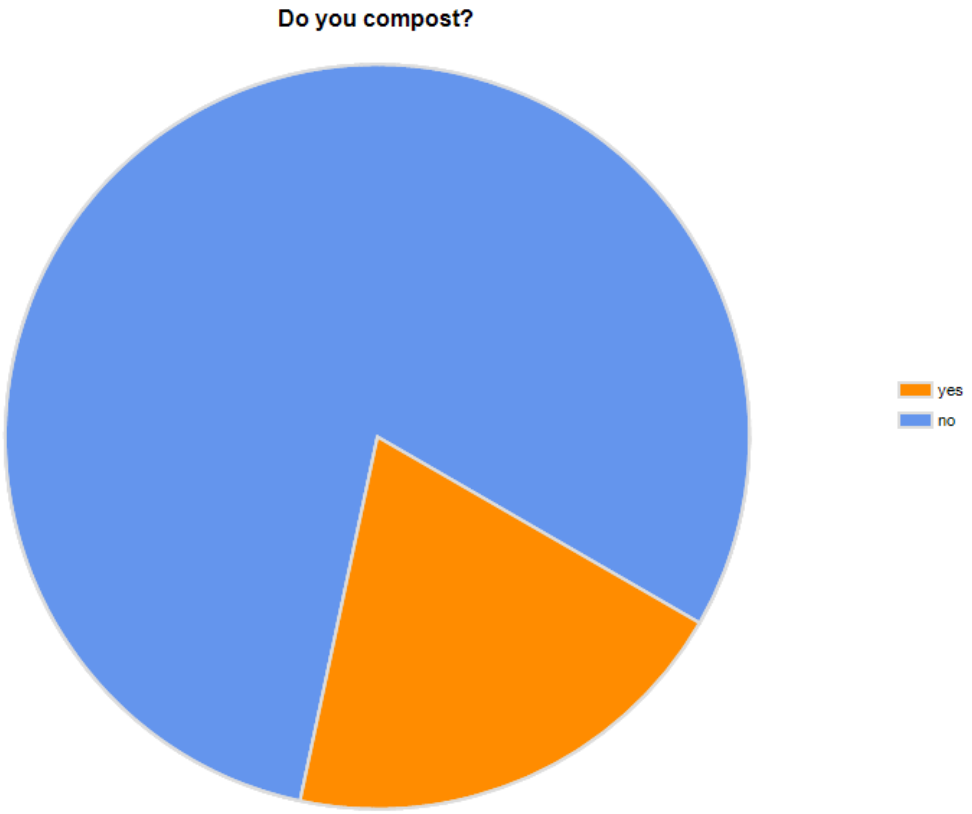
40 Longtime - I've been doing it since I was a kid
41 It's the right thing to do and wasteful otherwise.
42 environental reasons
43 Because we have limited resources, and plastics and other materials don't break down in landfills.
44 it helps ease the guilt of being human
45 Help make the earth a nice place for future generations
46 To reduce the landfills and make less of an impact on this earth

Q6-Do you believe that recycling can be profitable? Why?

1 I am not sure how profit...I am thinking more about space
2 Don't know enough about the economics of this.
3 Yes, if companies can use the products.
4 sure, it benefits company to reuse items lessening costs and increasing profits
5 Yes, I've seen many creative industries born in various countries. Recycling is actually taken over by the mafia in much of Europe.
6 I think that if recycling turns into yet another system by which capital is the primary motivator, I will no longer participate. Let recycling be done for altruistic reasons.
7 Yes
8 Well, yes! If recycled paper and cardboard are bought by places like amazon [as an example], they get what they need and want probably at a lesser price than buying 'virgin' paper and cardboard, and therefore, the recycler makes money too.
9 Because my business has a shredding plant and it is profitable.
10 Yes, because we can turn old stuff into new stuff and sell it
11 It's never been my interest whether it is profitable or not- my interest is because it is the responsible, right thing to do for all. More and more we seem to only care about profit and the ethical or resposible reasons for doing something have been forgotten. We kill off species, pollute our waters, cut down trees for parking lots, steal from our world all for the sole purpose of making a buck. Whether it is or is not profitable, we should all do everything we can to recycle.
12 Yes! Cost saving to manufacturing companies and the costs go down for consumers. That's just one example.
13 yes,It cost less to process from something that already exist than to start from scratch
14 yes
15 Not sure
16 Yes, because we are reusing materials instead of creating new ones.
17 Sure! If everyone recycled and we found ways to incorporate this recycled material into every day products, that is a money-maker!
18 Yes, because if it becomes part of the norm then more centers can open and the pellets can be resold as product etc. to other manufacturers.
19 Yes. Very. This is because recycling can help re-use old things which means less money spent on new material.
20 Its a yes and a no. There are some ways you could profit from recycling but the main one to me is knowing I am trying to breathe cleaner air, swim in a cleaner ocean and help protect the ozone layer so I don't burn to a crisp.
21 Yes, it helps us to understand the value of the items we once casually wasted.
22 Of coarse, if companies worked together to make their waste someone else's source of energy, charity, financial gain, everyone would profit.
23 Yes, for companies who recycle post consumer waste and other materials from business
24 they should have returns on bottles and cans like michigan. It should be in every state.
25 Not sure
26 I would think so because there are companies that do it for-profit
27 Sure, sell recycled materials to manufacurers...generate energy to sell to power companies...
28 No

29 not for the average person
30 yes. less is more.
31 I do believe that the more we recycle the less material waste we have to pollute the ocean and harm the environment
32 No
33 yes, for the environment
34 I guess it could be for the people doing the recycling. It might also save in the manufacturing end that uses recycled materials. I have a gut feeling though that recycled raw materials might be more expensive, due to the cost of recycling. The circle of life or death??
35 Yes, it's been done profitably for decades
36 Yes reduced cost and its renewable
37 yes, they can make products out of recycled plastic, paper, etc
38 I'm not sure if you mean for companies or individuals. I think that companies can save money by recycling and maybe for some items individuals could be compensated for recycling items that are inconvenient for them recycle.
39 Yes, recycling can be profitable because it becomes a new reusable purchasable item when recycled.
40 Not yet but it'll get there
41 less use of natural resources many of which aren't renewable, creates new and different jobs and businesses and pushes us to develop new technologies
42 Absolutely. I've witnessed it first hand, as my company partnered with an eco- conscious company that made money collecting and recycling hardware and computer equipment.
43 probably but not my motivation
44 I think perhaps it could be, but I imagine it might take gov't subsidies or tax incentives to make it so. I would think that metals are probably more profitable than other recyclable materials at this point, but that in the case of plastics it's probably cheaper to make new plastic than recycle old plastic.
45 yes, it can be cheaper than raw materials
46 Do not know -all I never thought about it.
47 yes, everything can be made into something else
48 Yes. But it shouldn't be. If its being done for profit, something is wrong.
49 I would hoped it is, but am not sure it is
50 yes. because its a service.
51 Yes, saves resources
52 Certainly! Once there's a stronger market for recycled goods, more, less expensive products will be made available. In addition, I'm able to sell printer cartridges back to a company for a small fee which I use to buy more ink.
53 Yes
54 yes, materials are still worth something.
55 IT IS A GOOD IDEA, MAYBE IT IS BECOME PROFITABLE MORE PEOPLE WILL START RECYCLING.
56 sure
57 Yes. I believe it can be profitable because recycled items mean that you don't have to mine or cut down trees. Also, the more trees that remain the more oxygen in the atmosphere. So there is a cost that needs to be considered when depleting the raw materials.
58 I think you can make money on aluminum cans.
59 On a large-scale basis, yes. I'm not familiar enough with the literature to express more than a general opinion, but I would expect that it would involve costs savings, both in terms of disposal and reuse. On an individual level, I suppose if one put sufficient effort into it it could be profitable.
60 No because you don't get money for helping out

Q7-



Q8-. On a scale of 1 to 10, (1=not important at all, 10=very important), recycling is ? and why?

1	6- what saddends me it that there are not containers all over for recylables..all facitilies should have them for cans glass and water bottles
2	10
3	10
4	10 to so our share to take care of our earth
5	5
6	7. Recycling is a way of encouraging individual participation, but its overall effectiveness would pale in comparison to better environmental policy making at the national and government level.
7	10
8	9 - I only put 9 instead of 10 because I don't want to appear completely obsessed with it! I do the best that I can to recycle to make a difference everyday.
9	8 We should all do our part to save our planet!
10	9 because it saves resources and energy
11	10. For the reasons stated in #5
12	10 - the little bit we can do can save the environment, money and time.
13	10
14	10
15	10

16 10
17 7. The reason I say 7 is because I know I could do more. My family members don't recycle and I could be more adamant about "making" them. I HATE to see them throw plastic, etc in the garbage.
18 10, because I think it is very important for our enviromental future.
19 8. I think recycling is very important because it helps out the Earth and save money.
20 I honestly think that recycling is very important. A 10 for me because if we wanted to live in a polluted city, country, state, town, world we would but we don't one, because its not healthy of the earth or for us. Two, because its not safe for animals or for humans. Third, it would screw up the ways things are on earth here & we probably would not have even made it to 2012 if that were the case in my opinion.
21 10, we have to take responsibility now for our effect on future generations.
22 10
23 10- more important than ever to reduce our impact on the earth!
24 10
25 8
26 9 because it cuts down the amount of waste in landfills, it reuses a product that has already been manufactured
27 9..... We have to!
28 10
29 8
30 10
31 recycling is about an 8 because I realize not everything is recyclable. I think it should be a 10 but there are some things that recycling companies wont pick up and the nearest center to me is not so near...
32 3
33 10, to save the earth
34 10 Recycling is important, but I'm not convinced that we are making head way.
35 10 Resources are finite. Minimize trash dumps. Ground and water contamination. Impact on wildlife. Lessen dependence on fossil fuel and use of energy.
36 10 renewable less trash
37 10 because our planet is turning into a dump site
38 8 I want to do the right thing for the planet but I've heard that some recycling is sent to landfills anyway - it's disheartening.
39 10
40 10 the future is on the balance
41 10 - One of our core responsibilities as consumers
42 10
43 10
44 10. Because we're eventually going to run out of places to pile our garbage. The importance of recycling seems self-evident to me, and honestly, people who don't recycle at all make me pretty angry.
45 9
46 6- spending time with my family rates a 10. Anything that takes time away from this rates lower
47 9, why not?
48 10. I would like to ask why not? During WWII, everyone recycled just about everything. Why did we stop?
49 10,10,10, We are ruining this planet and turning it into a waste land for ourselves and the other animals that live on Earth, it is so disturbing to see what we as humans have done to it since 1900...we should be ashamed of ourselves, if you borrow a car you don't go and trash it then pass it on, why do we trash our planet and pass that on...so sad
50 10 - for the world to be more efficient and clean up planet
51 10
52 5 only certain items recyclable now, would be higher if there were more options
53 10. It is very important because our resources are not limitless.
54 10
55 10-very important, good for the environment

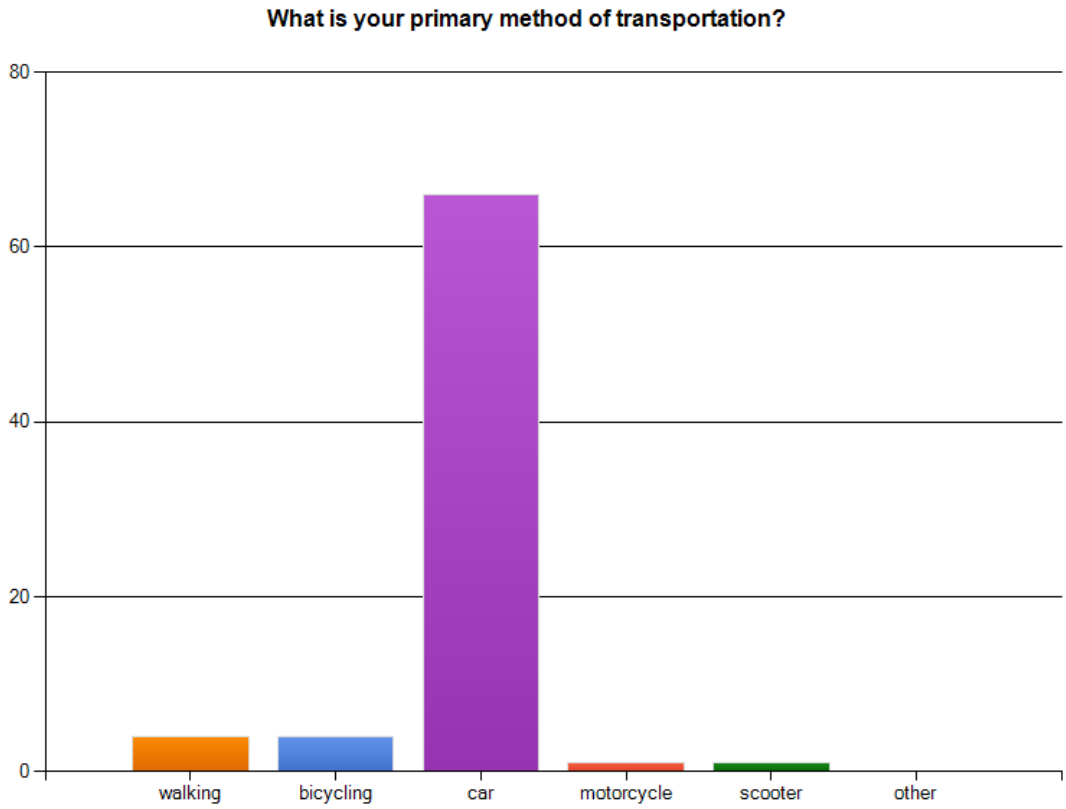
56 10
57 8 earth
58 7. It is important because we need to replenish the soil .
59 8
60 10. It's good for our environment, it can provide useful business, and frankly I can't see a downside to it anyway.
61 10 because we need to keep the earth safe because its the only one we got and are ever going to get.
62 recycling is very important because it helps to keep our environment safe. by recycling, certain forms can be used as an alternative energy source therefore cutting overall cost. recycling as a whole is better for us on a global scale to ensure that we have a better, cleaner and happier future for generations to come.
63 7
64 10 - very important, to reduce the amount of trash we throw away and to keep the environment cleaner.
65 8

Q9- I would recycle more if:

1 if that was my main focus I would do more but w/ full time job 2 kids it is lower on the pole...
2 It were more convenient.
3 I new what to recycle and it was picked up.
4 i knew more
5 Facilities were set up where I live(in a condo)
6 The recycling program collected more items.
7 I had the opportunity to!
8 I had the time to get organized!
9 I knew what to do with some of the flimsy plastic containers that you get in delis and restaurants
10 More items could be recycled. More options available curbside.
11 More facilities or options in my area
12 i already recycle everthing that can possible be recycled
13 convenient containers were provided
14 They picked up other items curbside
15 more items could be recycled in my area.
16 See above. Also, we don't actually have recycling on the property where I live so I have to take it to the nearest recycling facility on my own.
17 I would recycle more if I were educated more on additional ways to recycle other than what I am already doing.
18 There were more facilities available for me to recycle.
19 I knew I was not the only person within a 20 mile radius who recycled to the best of my ability. Not saying my neighbors do not but there is always more of an impact positively if more people help than negatively if its only a few people.
20 I was more educated about not so obvious ways to recycle.
21 If I had a better knowledge on what could be recycled.
22 Facilities were more available, if business made it economical (trade in used materials,products-discounted on new items)
23 If they made it worth it, like can and bottle returns.
24 It were more convenient
25 I knew what else could be recycled and who would use it
26 It were easier... Yes, like most Americans I'm lazy...
27 I knew exactly how it helped instead of just being told that it's good.
28 The easier it is...the more that will be recycled.
29 the companies made more items recyclable and if the waste managment had more items or there recycle list instead of having to drive a distance to the recycle or waste center
30 It were easier and I didn't have a mean recycling man
31 I had more room for recycling.

32	I had more to recycle.
33	City of Orlando picked up
34	I had a bin
35	I were more aware of places & commodities
36	I knew for sure that the it was making a difference and if my local recycling station accepted more items.
37	More items were allowable.
38	there were kitchen bags that were biodegradable
39	closer places to recycle or curbside pick up
40	My municipality picked up more types of recyclables.
41	there were something else I could do--what am I missing? Hmmm
42	I could
43	More items were easily recyclable.
44	it wasnt a pain in the ass
45	Convenience
46	More options in my area
47	The City is considering a pilot program which would attempt to recycle all of our trash. They would sort it themselves and use some of it for biofuels and other parts for other recycling projects. I am praying for this project to happen because it would mean 100% of City of Orlando residents would be recycling all of their waste.
48	it were easier.
49	IF WE HAVE CLOSER FACILITIES AVAILABLE AND IF THE CURBSIDE PICK UP CHANGE TO TWICE A WEEK.
50	it was more accessible
51	My husband was going to get us started but he has been extremely busy with travel. Once we get system in place then I can do it.
52	I had bins and curbside pick up.
53	If I utilized other things which could be recycled on a practical basis.
54	If I used more recyclable stuff.
55	if the facilites was closer.
56	It were convenient
57	N/A
58	Curbside pick up at my salon

Q10-



This information was not surprising given the urban structure of the Orlando area.

Appendix B –Girl Scout Eco Activities

Over the weekend of April 27-29th I worked with a group of Girl Scouts at our annual Camporee event to earn Environmental badges. We had such a blast doing these activities and the girls really took away some important information that can help them function as good global citizens.

On our nature walk, we looked at the evidence of controlled burns and discussed the benefits that this practice can have in preventing devastating forest fires. Controlled burns, aimed at preventing loss of vital forest land, are routinely practiced at Wekiva State Campground.

We also looked at tree stump rings as a way to determine how old some of these trees were at the time they were cut down. This particular tree was 48 years old when it was cut down. The girls understood how long it takes to replace trees cut down for commercial purposes.

Environmental Engineer, Cammie Dewey of St. Johns Water Management, explains to the girls how waste travels through the water table. As humans carelessly dispose of trash on land, it finds its way into the rivers and lakes that we use for clean drinking water.

The girls designed their own towns and looked at the different types of waste that are created in commercial stores and homes such as grease, cardboard and food waste. They really engaged in this activity and understood how important clean water is to communities. Most of the girls answered that they thought water came from Publix, Wal Mart, and the faucet, but never really looked any further than that.

We discussed various types of lichens that are growing upon the trees (made of 2 species-algae and fungus). The girls were fascinated by the shapes of these lichens on a dying tree.

We spent a lot of time following our friend, Sharky the squirrel, over the weekend. The girls chose this name for him. He is a fox squirrel, native to Florida. He let us get pretty close to him and we looked at his habitat and main source of food-nuts!

Sharky's main food source, nuts, was plentiful around the campground! We found evidence of eaten acorns and nuts everywhere. This told us that although he was the only fox squirrel that we saw, Sharky was not the only one of his species in the area.

A gopher tortoise came out to say goodbye. There is a large population of these at the springs and they are also native to Florida.

Our primitive cabin was filled with lots of native bugs and other species - scorpions, roaches, frogs, snakes, and other unidentified bugs. We decided that it was fun to visit, but that we would not want to live there long term! There was no air conditioning and it got very hot during the day.

Hands-on activities like this are so important for youths to experience. When they see habitats and experience learning about our environment firsthand, they become more aware that our actions have a greater impact than we can imagine.