ENVIRONMENTAL ETHICS AND

URBAN PERMACULTURE

IN CENTRAL TEXAS

by

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ABSTRACT

Human activities are causing vast environmental degradation around the globe at unsustainable rates. It is more imperative now than ever that we create sustainable societies that can coincide harmoniously with the natural environment. The dominant social paradigm views nature as resources for human consumption, but this paper argues that there are ethical human activities that challenge the mainstream ways of interacting with the natural environment. Environmental ethics is a subject advancing different ethical human-nature relationships. This thesis explores environmental ethics held by permaculture practitioners. Permaculture is a specific type of sustainable agriculture that focuses on using a system's thinking approach to designing gardens that emphasize biodiversity and locally-adapted, edible perennial plants, as well as maximizing energy efficiency. Permaculture also contains embedded ethics of Earth Care, People Care, and Fair Share. Since permaculture is 'site-specific,' this paper examines the environmental ethics held by permaculture practitioners. It also explores the potential of urban permaculture in Central Texas.

Through interviewing permaculture practitioners of Central Texas, four main environmental ethics emerged, which are: social ecology, deep ecology, Aldo Leopold's land ethic, and sustainability ethics. Many permaculture practitioners blurred the distinction between these ethics, while some aligned more closely with one ethic over another. Permaculture in and of itself embodies environmental ethics, and for the interviewees in this study, their ethical practice of permaculture influenced other aspects of their lives, not just gardening techniques. Practitioners also exemplified great hope for urban permaculture and

felt that with the right amount of support, permaculture could become a more widespread practice. This paper also proposes some policy implications for implementing permaculture on a wider scale.

1. INTRODUCTION

My thesis is an inquiry into the practices that make permaculture sustainable and how these practices may translate into an urban setting. As permaculture requires a deep understanding of the local climate and natural ecosystem, I am interested in exploring whether there is an underlying environmental ethic held by the practitioners of permaculture, and, if so, what type(s) of environmental ethic is employed and if it is shared among those engaging in permaculture. By asking permaculture practitioners questions about the ethics they see present in the practice of permaculture, I can deduce what types of environmental ethics align with permaculture. Furthermore, I am interested in creating dialogue about whether permaculture can be practiced in dense, urban living. To do so, I discussed with permaculture practitioners their thoughts on urban permaculture. I also discussed with interviewees how permaculture practices might translate into an urban setting, like Austin, Texas.

1.1 METHODOLOGY

I am addressing two questions in my thesis:

I. What environmental ethics are associated with permaculture?

II. How might permaculture practices translate into an urban setting?

To address these questions, I have conducted a qualitative study by interviewing permaculture practitioners about the philosophies that inform their permaculture practices. I also asked my interviewees to be 'co-investigators' with me and consider how permaculture might be practiced in dense, urban living. My interview questions range from questions about why they personally engage in permaculture practices and how they feel about environmental issues we face today, to questions based on permaculture practices in Central Texas. The responses will give me a sense of the difficulties and/or limitations of urban permaculture. The

Institutional Review Board (IRB) has reviewed my interview questions and approved them to be used in my thesis, and my thesis has been declared exempt from review.

To find interviewees, I first joined an online forum for permaculture in Central Texas. I posted to the forum about my thesis, and people who were interested responded. I will refer to this online forum group as "local organization". Additionally, I contacted three interviewees through a different group, which I will call "local university group," and it actively engages in practicing permaculture both on and off campus through 'work-day' meetings. One third of my interviewees came from the local university group, and the remainder came from the local organization. After making contact with different individuals, we set up a time and place to meet for an interview. Three of my interviews were either over the phone or via Skype; three took place at a permaculture meeting, site, or farmer's market, and three of them were at a coffee shop. I took notes on my computer while recording the interview on my iPhone and I transcribed the interview afterwards. After transcribing the interviews, I made notes on another copy of my questionnaire of the interviewee's responses, finding themes and patterns, as well as outliers, to the questions asked. From here, I deciphered overall ethics held by permaculture practitioners.

1.2 WHY ENVIRONMENTAL ETHICS AND URBAN PERMACULTURE?

An ethical relationship with nature is imperative for a sustainable lifestyle. It is important to note that I am focusing on permaculture practices in Central Texas and subsequently will be focusing on integrating permaculture in Central Texas cities, such as Austin or San Marcos. Permaculture emphasizes that knowledge about the local ecosystem is imperative to its practice; for this reason, I am focusing only on Central Texas. However, I do believe that this model of integrating permaculture into cities might be possible for cities all over the world, though

practices will vary based on climate, best adapted species, governmental regulations, and other social aspects. The reason examining urban permaculture is important is because dense cities are arguably more sustainable than urban sprawl and rural living, for "as societies become more urban, they become Greener in their sensibilities."[2] In other words, there is potential in mass society for adopting ecofriendly and energy efficient practices, and potential for adapting to the local climate, such as rainfall, sunlight, etc. My literature review will consist of examining sustainable agriculture, various aspects of permaculture, such as systems thinking, and reviewing different environmental ethics and philosophies that may be embodied in the practice of permaculture.

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[2] Brand, Stewart. 2009. *Whole Earth Discipline: Why Dense Cities, Nuclear Power, Transgenic Crops, Restored Wildlands, and Geoengineering are Necessary*. New York: Penguin Books, p. 35

2. BACKGROUND

The modern industrial culture has caused vast environmental degradation worldwide and has contributed to the development of a consumerist culture, most noticeably in the United States, which blinds us to our innate interconnectedness to the natural environment. As we degrade nature, we ultimately degrade human civilization for humans are completely dependent upon our natural environment whether we realize it or not. "The dualistic separation of humans and nature reinforces the false notion that humans are outside and above nature and natural processes, instead of emergent from and inextricably interconnected to them."[3] In this modern era, there is a need to reconnect with nature, and learn to abide by the natural laws that govern the planet, including human systems. Kirschenmann (2010) beautifully states in his book, *Cultivating an Ecological Conscience*, "If we redesign agriculture to make us more aware of the 'most basic details of our own food production,' then agriculture might help us become more aware of our dependence on local ecosystems."[4] Sustainable agriculture, including growing our own gardens, may help our culture reconnect with our natural environment and help us to learn from nature. Much research has discussed in detail the consequences of our current unsustainable paradigm, as well as elaborated on what a new paradigm shift would necessitate.[5,6] Most of this research has focused upon global reform changes, rightly so; however my thesis will center on

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[3] Leiserowitz, Anthony A. and Lisa O. Fernandez. 2007. "Towards a New Consciousness: Values to Sustain Human and Natural Communities." Yale School of Forestry and Environmental Studies, p. 21.
[4] Kirschenmann, Frederick L. 2010. *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher.* Lexington, Kentucky: The University of Kentucky Press, p.50.
[5] Leiserowitz and Fernandez. 2007.
[6] Rowe, Stan. 2003. "The Living Earth and Its Ethical Priority." *The Trumpeter 19 (2)*, 69-81.

local community activism for environmental justice in a specific agricultural practice known as permaculture.[7]

2.1 BRIEF HISTORY OF PERMACULTURE

Bill Mollison, an Australian biologist and naturalist, coined the term permaculture in the 1970s with fellow Australian environmental designer, David Holmgren. They determined that by mimicking natural processes humans could live more harmoniously with the planet and achieve more sustainable ways of life.[8] In 1978, Mollison and Holmgren produced their first design manual *Permaculture One*.[9] Permaculture differs from other types of gardening and farming, because it has key philosophical ideas behind it. Some of the key ideas behind it are "closing the loop," or "energy cycling," and "energy efficient planning."[10] Additionally, there are three underlying philosophies of Earth Care, People Care, and Fair Share, which I will discuss at length in section 2.3. In order to achieve energy efficient design, permaculture designs with a system's approach, designing to emphasize the relationships between elements within the space, in order to maximize efficiency of the space, as well as efficient use of resources. Permaculture is a "design system based on ecological principles…" and "can be used to design, establish, manage, and improve…efforts made by individuals, households, and communities towards a

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[7] Kemmis, Daniel and Matthew McKinney. 2011. "Collaboration and the Ecology of Democracy." Kettering Foundation.
[8] Tagari Publications. "Bill's Journal." Online: http://www.tagari.com/bills_journal Last Accessed: 29 September 2013.
[9] Holmgren, David. 2013. "About Permaculture." *Holmgren Design.* Online: http://holmgren.com.au/about-permaculture/ Last Accessed: 29 September 2013.
[10] Mollison, Bill. 1991. *Introduction to Permaculture.* New South Wales, Australia: Tagari Publication.

sustainable future."[11] Permaculture is replicating how an ecosystem functions, and including humans in the design and functionality of the system.

To help people learn about these design techniques, permaculture has a course, called the Permaculture Design Course (PDC), which is offered around the world by various permaculture teachers. The first design course was offered in 1981, and since then thousands of people have been trained worldwide.[12] PDC is an intensive workshop with a specific course syllabus that covers topics, such as "patterns in nature, culture and society," "natural building strategies," and "wildlife management and biological pest control," as well as many others.[13] The PDC offers a hands-on experience of learning about permaculture principles that can be enacted in one's individual life. The course aims to teach individuals to see the world in a sustainable way—to conserve energy and water, reuse resources whenever possible, and maximize efficiency of space through design.

2.1.1 Brief Review of Industrial Agriculture

There are many other types of agricultural practices around the world, such as organic farming, industrial agriculture, and genetically modified farming, to name a few. This paper merely aims to present permaculture as yet another form of agriculture being practiced throughout the world. Permaculture emphasizes mindful awareness of the local ecosystem and has the ability to contribute to a more sustainable society. Permaculture is arguably less environmentally degrading, or more sustainable, than traditional, industrial agriculture, which

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[11] Holmgren, David, 2013.
[12] Mollison, Bill, 1991, p. 205.
[13] Permaculture Institute. 2013. "Sustainable Living, Practical Learning." Online: http://www.permaculture.org/nm/index.php/site/permaculture_design_course Last Accessed: 29 September 2013.

will be discussed further below. The sustainable agriculture movement is rooted in five main ideas: "environmental conservation, family farm preservation, food safety, agricultural science, and radical agricultural transformation."[14] There are many different theories about how to achieve sustainable agriculture. Nonetheless, permaculture is on par with organic agriculture in terms of being less environmentally destructive.[15,16]

Agriculture has become very industrialized over the last few decades. However, industrial agriculture does have benefits, such as high yields for feeding large populations, but it often depends heavily upon intensive fertilizers and pesticides created from fossil fuels that are designed to increase the yields of crops. The Green Revolution of the 1950s definitely had an important vision, which was to increase food production in order to feed the growing world population, however now humans are seeing the unintended consequences of these intensive agricultural practices. The Green Revolution depends upon two crucial measures: 1) monocultures, usually genetically engineered for high yields, and 2) intensive water inputs and synthetic fertilizers and pesticides.[17] Industrialized agriculture practices monocropping, or planting one type of seed in an entire field, with no genetic, biological, or species diversity. These types of farms are left vulnerable to disease and pests, for without diversity there is no resilience within the system. Diversity is the basis of natural life; Earth and its entire species have evolved

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[14] Allen, Patricia L. and Carolyn E. Sachs. 1992. "The Poverty of Sustainability: An Analysis of Current Positions." *Agriculture and Human Values 4 (4),* p. 29.
[15] Mackintosh, Craig. 2007. "Greening the Desert." *The Permaculture Research Institute.* Online: http://permaculturenews.org/2007/03/01/greening-the-desert-now-on-youtube/ Last Accessed: 29 September 2013.
[16] Rigby, D. and Cáceres, D. 2001. "Organic Farming and Sustainability of Agricultural Systems." *Agricultural Systems 68 (1),* pp. 21-40.
[17] Miller, Tyler G. and Scott Spoolman. 2010. *Environmental Science.* California: Books/Cole Cengage Learning, p. 208.

through genetic and species diversity. We do not yet know the full implications of biodiversity loss.

Industrialized agriculture has further unintended consequences, such as excessive nitrogen and phosphorous runoff (which results in pollution of nearby bodies of water), subsequent soil erosion and desertification, and salinization of soil. Excessive nitrogen and phosphorous comes from the use of synthetic fertilizers. Topsoil loss is an especially serious issue for much agricultural land, as this critical layer of soil results in decreased soil fertility and contributes to soil erosion and water pollution. Topsoil loss occurs from both natural causes, such as wind, and from human activities, like overgrazing of livestock, deforestation, and monocrop farming.[18] Relying on such external inputs is not a sustainable form of agriculture.[19] Additionally, the United Nations Environmental Program (UNEP) estimates that 70% of water removed from freshwater aquifers and surface water is due to agricultural needs.[20] Industrialized agriculture has significant detrimental effects on the land. By its very nature, it is not attentive to an understanding of local ecosystems. "Agriculture can contribute directly to desertification through poor agricultural practices such as over-cultivation, overgrazing, and overuse of water, and indirectly when land is deforested to create new cropland or new pastures for livestock."[21] Although industrialized agriculture may result in overall higher yields, through intensive inputs of fertilizers, the devastating soil fertility loss and eventual desertification are serious impacts that might outweigh the benefit of higher yields. Permaculture differs from industrialized agriculture, because it does not rely so heavily on external inputs. Industrialized agriculture emphasizes

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[18] Miller, 2010, p. 212.
[19] Allen, Patricia L. and Carolyn E. Sachs, 1992, pp. 29-35.
[20] Miller, 2010, p. 212.
[21] Horrigan, Leo, Robert S. Lawrence, and Polly Walker. 2002. "How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture." *Environmental Health Perspectives 110 (5),* p. 447.

natural resources and ecosystem services as simply for the benefit of humans, and overlooks how essential natural processes are to all life on this planet.

Industrial agriculture has attempted to increase yield while decreasing environmental destruction through genetically modifying the DNA of crop seeds, so that less fertilizers and pesticides have to be used in order to obtain a higher yield from the crops. This is a highly controversial topic in agriculture, because there are many concerns about the effects of genetic modification, such as allergic reactions or gene transfers once the food is consumed and genetic transfers from genetically modified crops to conventional crops.[22] The World Health Organization reports "The GM [genetically modified] crops currently on the market are mainly aimed at an increased level of crop protection through the introduction of resistance against plant diseases caused by insects or viruses or through increased tolerance towards herbicides."[22] The "introductions of resistance against plants or viruses" are created by changing the DNA, or genetic makeup, of the crop. Genetically modified agriculture focuses on the higher crop yields by requiring low-till or no-till agriculture and less herbicides and pesticides, which can have many environmental benefits, such as reducing greenhouse gas emissions.[23] Genetic modification might actually benefit urban agriculture, though permaculture has many techniques that might provide the same benefits without the need to scientifically adjust the genetic makeup of our foods. In my discussion of permaculture below, it will become clear how permaculture, unlike traditional industrial agriculture, strives to utilize natural ecosystem processes to create a sustainable agricultural system that benefits human and nonhuman nature alike.

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[22] World Health Organization. 2013. "Food Safety: 20 Question on Genetically Modified Foods." Online. http://www.who.int/foodsafety/publications/biotech/20questions/en/ Last accessed: 9 October 2013.
[23] Brand, 2009, p. 134.

Industrial agriculture is a significant contributor to some of the greatest environmental problems today, entangled with oil, toxic chemicals, and synthetic fertilizers, causing soil and land degradation. "Corporate farms managed by absentee owners whose primary motive is short-term profit, will not protect the soil," writes "farmer philosopher" Fredrick Kirschenmann.[24] A farmer himself, he advocates for farming with an "ecological conscience," clearly influenced by Aldo Leopold's "land ethic;" they both put forth that having knowledge of the local ecosystem can help enable the natural systems that grow more sustainably than our industrial system. "Sustainable agriculture focuses on submitting to the power of nature and employing tools of gentle adjustment."[25] As permaculture is a holistic approach to organic gardening and organic farming with emphasis in biodiversity, it promotes soil fertility, long-term yields, and healthy foods, thus is a theoretically sustainable practice.

2.2 SYSTEMS THINKING

Before moving into the discussion of permaculture, it is important to briefly discuss systems thinking, as permaculture, both at the theoretical and practical levels, is guided by systems thinking. General Systems Theory was developed by Ludwig von Bertalanffy in the mid-twentieth century, as a "new philosophy of nature that is holistic, ecological, and integrative, emphasizing the organized nature of the world."[26] Systems thinking presents a new type of science that draws upon, yet expands on mechanistic science, and applies it in a holistic manner, philosophically observing the natural world. This new approach is holistic and integrative as it recognizes how all components of a system, from organic to inorganic, exist in a state of

[24] Kirschenmann, 2010, p. 24
[25] Kirschenmann, 2010, p. 37
[26] Hammond, Debora. 2005. "Philosophical and Ethical Foundations of System's Thinking." *Triple C 3 (2),* p. 21.

intrinsic interconnectedness. Hammond's theory expands on General Systems Theory by positing that the entire planet is a self-organizing system, composed of many smaller systems, nested within one another. These systems are guided by natural laws, such as the Laws of Thermodynamics and gravity; human systems are likewise subject to these very laws. Systems thinking theory recognizes relationships as being "inextricably imbedded in the Earth."[27] In order to maintain a sustainable practice, one must recognize these inherent limitations, while also acknowledging intrinsic relationships between component parts of the whole. It is interesting how despite the fact that relationships are the very primacies of existing on this planet, humans, especially humans of consumer economies, act as if they are disconnected from the environment around them. Cultural ideologies, such as "individualism, materialism, consumerism, and militarism," have created superficial relationships that have engrained in us to overlook natural relationships.[28] Through reductionist methods of science we have studied component parts in isolation, but now we must recognize how they relate to one another. Adams argues in his article "The Primacy of Interrelating," that "it is critical for us to (re)connect consciously with our direct, interrelational experiences within the community of nature,"[29] thus speaking to the essential natural way of interrelating with human and nonhuman nature. Sustainable practices recognize limits and avoid depleting resources. "Humans are relational beings, and our interrelationship with nature is one of the most significant in all of our lives (whether we appreciate it or not)" because we are inherently rooted within a system consisting of humans and

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[27] Hammond, 2005, p. 26.
[28] Adams, W. W. 2007. "The Primacy of Interrelating." *Journal of Phenomenological Psychology 38 (1),* p. 26.
[29] Adams, 2007, p. 57.

nature.[30] Recognizing a mutually beneficial relationship between humans and nature can enable sustainable behaviors.

2.3 PERMACULTURE

Permaculture is a specific type of agriculture that emphasizes biodiversity, integrating unique gardening techniques and a systems thinking approach. Permaculture sites often integrate organic gardening, organic farming, and livestock agriculture into one farming site; blending these three types of agriculture enables the component parts of the system to work together in cohesion, increasing the efficiency of the overall system. Permaculture sites are "consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre, and energy for provision of local needs."[31] In this way, permaculture differs from other intentional communities, because a permaculture site is one based around diverse, organic gardening and farming practices that can produce enough food and energy to sustain a small on-site population, which includes the human community, as well as the chickens, pigs, and other livestock living on-site. Although this implies that permaculture must be on a large plot of land in order to be productive, Bill Mollison, the co-founder of permaculture, argues that permaculture can be practiced at many different levels. It can function on a large farm, integrating large livestock with farming and gardening. At this scale, permaculture design is important as "integrated crop and livestock systems minimize the effects of weather-related adversities," and as "crop residue is an excellent feed source for livestock and manure can be composted and returned to the fields," bringing together crops and livestock is

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[30] Adams, 2007, p. 56
[31] Holmgren, David. 2002. *Permaculture: Principles and Pathways Beyond Sustainability.* Victoria, Australia: Holmgren Design Services, p. xix.

an efficient farming method.[32] Permaculture can also be practiced at a smaller scale, without large livestock, and still feature cyclical processes of natural systems. Certain aspects of permaculture, such as the spiral herb garden (an efficient way of growing herbs, placement in the spiral is based on water needs) or plant fencing, chicken coops, planting edible foods, and composting can all be practiced in the urban setting (spiral herb gardens and chicken coops will be discussed further below).

In order to be truly sustainable, permaculture must design for the local climate and for the long-term, as a lack of design (or poor design) can lead to future problems and possibly even a total collapse. Permaculture sites are crafted according to basic principles stressing that each community is adapted to its own local ecosystem, which means that species present on site should be those well adapted to the specific climate. Permaculture is not stringent about relying only on native species, though plants must be well adapted. Using Central Texas as an example, plants that need a lot of water or plants that cannot bear heat would not be well adapted to the Central Texas climate. Permaculture design is based on a systems thinking approach, viewing the relationships between elements of the design, rather than just focusing on isolated parts. "All members of an ecological community are interconnected in a vast and intricate network of relationships, the web of life."[33] Each component part of the permaculture site is interrelating with other aspects on site, thus recognizing such relationships are important to the function of the system as a whole. Another aspect of permaculture is that each component of the system serves multiple functions, and each function is supported by multiple components.[34] For example, trees can act as wind barriers, protecting the center of the farm from harsh prevailing

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[32] Kirschenmann, 2010, p. 35
[33] Capra, Frijtof. 1996. *The Web of Life*. New York: Anchor Books, p. 298.
[34] Mollison, 1991, pp. 6-8.

winds, and can act as shade for plants that need less sunlight. If a plant needs a lot of sunlight and is placed near a tree that provides a lot of shade, the tree will prevent the plant from growing to its full potential. This is an example of the inherent relationships that exist in systems. In this way, permaculture embodies a holistic and integrated approach as the "sustainability (of the culture) depends on the relationship with the land."[35]

Since ecosystems provide invaluable processes, there are inherent ethical implications of preserving biodiversity and ecosystem services in permaculture design. Ethical principles are then explicit in permaculture as the three foundations are Earth Care, People Care, and Fair Share, thus in theory permaculture strives for social and environmental sustainability.[36] There are many different reasons to live a low-impact lifestyle, such as "reducing dependency upon fossil fuels, reducing your 'carbon footprint' and/or to ensure you have services if the grid goes down."[37] Energy efficiency and ecodesign are inherently embedded within permaculture. Diverse cultures, or genetic, biological, and species diversity, allow for less intensive inputs of water and fertilizers, because the different root systems are able to capture necessary nutrients and moisture from the various depths of the soil.[38] This exemplifies how essential ecocentric concerns are to permaculture; in other words, permaculture is focused on allowing ecosystem processes to flourish naturally and without the use of intensive external inputs. Essential to permaculture is a supportive relationship between humans and nonhumans, as a thriving garden provides for humans and non-human life alike. When humans minimally interact with the

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[35] Jackson, Sego. 1984. "Permaculture: Sophisticated Ecological Understanding Blended with Common Sense Design Creates Productive Landscaping." *Living in the Land.* Context Institute. Online: http://www.context.org/ICLIB/IC08/Jackson.htm Last accessed: 9 December 2012.
[36] Holmgren, 2002.
[37] Black, Dave. 2008. *Living off the Grid.* New York: Skyhorse Publishing, p. 9-10.
[38] Miller, 2010, p. 208.

natural process of the garden, the garden is able to flourish and provide nutrients to humans. Fair Share implies that some of the surplus of the garden is given back, so that the garden can continue to thrive. The relationship between nature and humans is reciprocal. In this way, Earth Care, People Care, and Fair Share all play an important role in the human/nature dynamic.

Permaculture design is quite unique and will vary by the plot of land, slopes, prevailing winds and solar orientation. Permaculture design divvies up the land into areas called "zones," which range from high intensity (near the house and includes herbs and vegetable gardens) to low intensity furthest away from the house (cow pasture, large windbreaks). "Zoning is decided by (1) the number of times you need to visit the element (plant, animal, or structure) for harvest or yield; and (2) the number of times the element needs you to visit it."[39] Therefore understanding energy flows, the geography of the site, and knowing the function of elements within each zone are essential to creating the most efficient landscape. Community members must be aware of energy throughputs, or input resources and output wastes. Goodland and Daly set forth the "input-output rule," which says that in order to be sustainable we must not waste more than the geoecosystem's capacity to absorb wastes, not harvest renewable resources faster than regenerative capabilities, and not deplete non-renewable resources faster than the rate substitutions are being developed.[40] Permaculture communities must be efficient in terms of building design, landscaping, and technology. At a smaller, more localized scale, biomimicry and cradle-to-cradle can be a way of life, in which one is "thinking relationally, thinking ecologically."[41]

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[39] Mollison, 1991, p. 9.
[40] Goodland, Robert and Herman Daly. 1996. "Environmental Sustainability: Universal and Non-negotiable." *Ecological Applications 6 (4),* p. 1008.
[41] Rowe, Stan. 2003. "The Living Earth and Its Ethical Priority." *The Trumpeter 19 (2),* p. 73.

Biomimicry is a designing tool that looks to mimic natural ways of creative and efficient design. An example of biomimicry in permaculture is the spiral herb garden, which by being built upwards, efficiently uses space and organizes herbs by water needs. "Using the natural universal design of a spiral, the forces of gravity and water flow are utilized to their fullest allowing for proper drainage downhill. Herbs that thrive on drier soils live at the top, whereas those needing more moisture reside at the bottom where water collects."[42] Two herbs that grow well in Central Texas are sweet basil, which does not require a lot of water, but does need frequent trimming, and rosemary, which is quite resilient to heat, but needs space and proper drainage to grow. The tall spiral has other advantages, such as watering in the center of the spiral where gravity can pull the water to the lower plants, and there is less physical demand of bending over, so tending to herbs (which is a frequent task) is not as difficult on the human body. Cradle-to-cradle is a complimentary idea to biomimicry and was introduced by William McDonough and Michael Braungart. Cradle-to-cradle is the idea of redesigning systems so that there is no waste produced—the outputs of a product are cycled back to become inputs.[43] All waste would be recycled back into the beginning of the process of the system, thus "closing the loop." For example, composting takes food scraps and recycles them so eventually it is natural fertilizer for the garden to grow more food. Being mindful of the local ecosystem can help foster this sense of "thinking ecologically" and create a sound environmental ethic.

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[42] Bardot, Jean. "15 Reasons to Build an Herb Spiral for Your Permaculture Garden." http://www.realfarmacy.com/15-reasons-to-build-an-herb-spiral-for-your-permaculture-garden/ 17 September 2013.
[43] McDonough, Michael and William Braungart. 2002. *Cradle to Cradle*. New York: North Point Press.

Figure 1. Spiral Herb Garden

2.4 MODELED PERMACULTURE

By exploring the characteristics of permaculture and examining them on a map of Djanbung Gardens in Nimbin, Australia (a permaculture site I visited while studying abroad in 2010) we will examine permaculture 'in action'. This site is just one of many around the world, which all vary as necessary to adapt to the local climate. The map of Djanbung Gardens' design guidelines will allow us to walk through a modeled permaculture site. Beginning with a plot of land, we would want to know the orientation of the sun and the direction of prevailing winds. This information is critical to the design of the system, including the design of the building, which would need to utilize passive solar design in order to achieve maximum energy efficiency

and sustainability. The home is the nucleus of the design; it is the most visited component part and thus sets the tone for the rest of the design. Recall zoning is the practice of grouping energy flows from most visited to the least visited, and the home is the most visited part. Thus zoning starts with the home and works outward. Figure 2 demonstrates the zoning practice, with zone 1 being the home, office, and workshop structures. Also in zone 1are the keyhole garden and vegetable gardens, spiral herb garden, pizza oven and outdoor seating. These are the most visited parts of the farm and have the highest energy flow of the system, thus designing them near each other makes common sense in terms of frequency of use. Figure 4 shows the entire plot of land of a permaculture site. It shows zone 1 with parts 1 (education and resource center), 2 (greywater wetland treatment center), and 3 (residential area). Zone 2 consists of 4 (Bamboos), 6 (Djanbung hill gardens), 9 (Chickens, turkey, and pig systems), and 13 (Blackwater reedbed treatment and flowforms). Note how the zones are working outward. The furthest zone would be land spaces like 16 (Djanbung waters—main dam), 17 (woodlot, wildlife corridor, and bushfoods), and 19 (top dam for gravity irrigations) on the map.

Robyn Francis bought five acres of land outside of Nimbin, Australia in 1993 after studying permaculture at the Permaculture Institute in Australia. Permaculture does not require native plants, but rather species that are adapted to the local climate and can thrive without the need of excessive external inputs. Francis mentions in her video (see link below[44]) that her perimeter trees are oak trees, not commonly found in the subtropics of Australia, but they can grow well in the climate her farm is located in. The hill gardens consist of greens, different types of lettuce, zucchini, tomatoes, taro, cabbage, squash, various beans, and fruit and vegetable

[44] Regenerative Design Institute. "Robyn Francis." Online. http://www.regenerativedesign.org/robyn-francis Last accessed: 17 September 2013.

plants.[45] She plants at three different seasons: autumn and winter is the right timing for temperate vegetables, like kale, mustards, beets, and lettuces; while the spring is hot and dry, a good time for "Mediterranean crops," such as sweet corn, squash, okra, beans, and more; the humid summer is a good climate for turmeric, yams, cassava, and taro.[45] Her trees include, but are not limited to, citrus, apples, persimmons, Japanese plums, peaches, Brazilian cherries, coffee plants, original Bushnut, as well as a plethora of other species on site. Djanbung Gardens is also home to many different animals, which live natural lives, with large plots of land to roam, and they also provide natural ecosystem services. Francis gives the example of her ducks, which "keep weeds down, pests down, and fertilize trees."[44] In this way, waste does really equal food. Francis at Djanbung Gardens is able to close the production-to-waste loop and create sustainable uses for what is often called "waste." Another example of this is the greywater system, which she designed with a created wetland, and it recycles water on the property. "Permaculture likes to have at least three uses for things," Francis says.[44] The variety of bamboo species she has provides building materials. These great varieties and intermixed species are often referred to as food forests in permaculture.

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[45] Francis, Robyn. "Permaculture: Djanbung Gardens." Online: http://www.robynfrancis.com/category/permaculture/djanbung-gardens-permaculture/page/2/ Last accessed: 17 September 2013.

Figure 2. Permaculture Zones

Very briefly, I will explain the benefits of keyhole gardening, which is a common permaculture practice. In figure 2, keyhole gardens are located in zone I, as they contain frequented vegetables. A keyhole garden is designed by creating a raised bed, maybe three feet off the ground, with a hole in the center for watering and placing compost. By placing compost in the center of the bed, the plants receive natural fertilizers, which become nutrients and food for the plants. The bed has layers of wood or cardboard, dirt, composting materials, and soil.[46]

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[46] Acker, G. Elaine. 2012. "Keyhole Gardening: unlocking the secrets of drought-hardy gardens." *Texas Co-op Power.* Online. http://www.texascooppower.com/texas-stories/nature-outdoors/keyhole-gardening Last accessed: 13 October 2013.

Mollison in his *Introduction to Permaculture* recommends keyhole gardening for planting tomatoes, as the raised bed technique makes it so that "they are reached and picked easily as tomatoes ripen," and as tomatoes "dislike wind" the keyhole garden bed can be surrounded by a hedge or stones to act as a windbreak.[47] Furthermore, keyhole gardens are beneficial in Texas because they work well in dry climates, and the layers of composting wood, materials, and soils retain water, so it is not lost to evaporation in the Texas heat.[48]

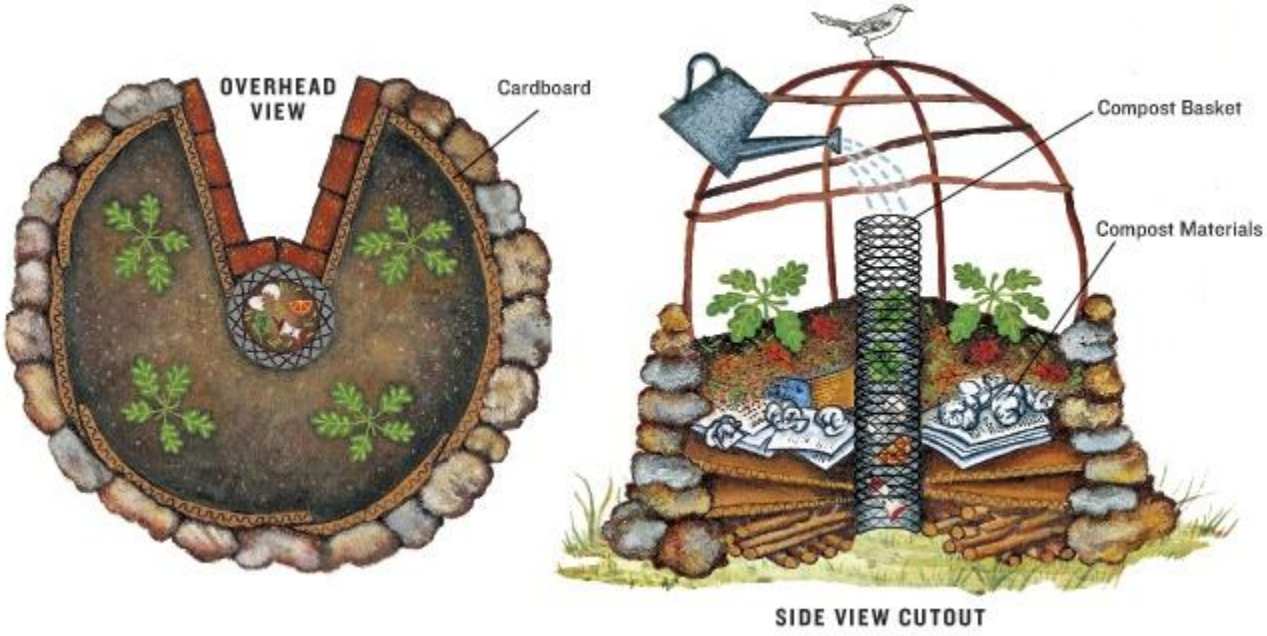

Figure 3. Keyhole Garden Bed

[47] Mollison, 1991, p. 97.
[48] Acker, 2012.

Figure 4. Rural Australian Permaculture Farm

2.4.1 Other Examples of Permaculture in Action

Another example of where permaculture has really thrived is in Cuba. After the fall of the USSR, Cuba was left quite detached from the rest of the globalized world. In the 1990s, they lost approximately 80% of their export market.[49] Urban agriculture had begun to take root in 1990, and in 1993, a group of Australian permaculturalists visited, and assisted with teaching

[49] Quinn, Meagan. "The Power of Community: How Cuba Survived Peak Oil." Resilience.org. Online. http://www.resilience.org/stories/2006-02-25/power-community-how-cuba-survived-peak-oil Last accessed: 17 September 2013.

permaculture in Havana on a grant from the Cuban government. "When this all began, it was a necessity;" Cuba had been cut off from the rest of the world due to heavy trade embargos, and could no longer rely upon industrial agriculture, as the fall of the USSR had led to more than a 50% loss of oil imports.[50] Cubans began small-scale backyard gardening in order to survive. As more Cubans saw how effective permaculture techniques were for growing food, permaculture spread throughout the country. According to a report from Oxfam, "Obtaining enough food for the day became the primary activity for many, if not most, Cubans."[50] Robyn Francis has given many talks about Cuba's success,

> Cuba provides important food for thought for everyone enjoying 'western' affluence to meet the challenge of radical and rapid reduction of consumption and waste—as this is ultimately what drives climate change and resource depletion. Cuba's capacity to survive collapse gives hope and inspiration as we grapple with the need to embrace radical changes for the great transition to a low-consumption conserver society.[51]

Cuba also implemented many renewable energy projects and public transportation, because cars were not a viable option with hardly any oil imports. Bicycles became a more popular mode of transportation. Cuba has transformed its economy from the 1980s of a global, heavily-import dependent economy, to a local economy that empowers the local community. Permaculture provides for more than 80% of Cuba's food resources today.[50]

In addition to the example presented here of Djanbung Gardens in Australia and Cuba's permaculture, there are many other successes of permaculture around the world. Many communities connect across the world through online sites, such as the Permaculture Institute

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[50] Quinn, http://www.resilience.org/stories/2006-02-25/power-community-how-cuba-survived-peak-oil
[51] Francis, Robyn. 2010. "Learning from Cuba's Footprint." Permaculture College Australia. Online. http://www.permaculture.com.au/articles/permaculture-insights/learning-from-cubas-footprint.html Last accessed: 8 October 2013.

and Permaculture College Australia. The Worldwide Permaculture Network attempts to capture all permaculture sites around the world, from rural to urban, from tropical to semi-arid climates.[52] These sites offer unique tools for permaculturalists to connect in a larger, international community.

2.5 COMMUNITY ASPECT OF PERMACULTURE

The example of Djanbung Gardens is an example of a rural—or not urban farm—and is presented here mostly to demonstrate what a large permaculture site would look like, how zones function on site, and provide a large example of systems thinking in practice. Robyn Francis bought this land herself, and she discusses how she designed the site (see Figure 2, her hand drawing of the site). Francis is certified in permaculture design and is also an educator. Djanbung Gardens also is as an education center (this is how I found myself visiting it in 2010). Francis may make many of the decisions of what to plant, when and where, because of the knowledge and skillset she has, but she hosts volunteers on her property who assist with the gardens and learn from her knowledge. Djanbung Gardens provides experiential learning, creating a community of short-term volunteers to long-term students of Francis. Although Francis may make the majority of decisions for her permaculture site (bear in mind, she owns the land), community still exists on site with the host of volunteers who stay at Djanbung Gardens.

This paper is mostly focused on urban permaculture and how to get more city-folk involved in permaculture without having to leave the urban lifestyle. For urban permaculture, zones one and two are the primary application of permaculture. Likewise, communities will

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[52] Worldwide Permaculture Institute. 2010. "Worldwide Permaculture Projects." Online. http://www.permaculturegloba l.com/projects?utf8=✓&search=&type=&climate=&commit=Filter Last accessed: 13 October 2013.

likely look different between large farms and urban permaculture sites. At a rural farm, communities may live on site and physically work together to maintain the gardens and livestock. In the urban communities, people may come together at a particular site to volunteer for manual labor, but live separately. Community gardening typically consists of local neighbors who participate in joining together at a particular location to grow plants, and create a group centered on gardening, planting, digging in dirt, being outside—this group of people shares similar interests in gardening, and so they join together to make a community garden. Nevertheless, communities can be different in how they participate with one another, though they are all centered on one pivotal purpose.

After describing different ways permaculture can come into action, it may seem like any community garden is permaculture. However, this is not the case as permaculture has unique design techniques, which center on a systems thinking approach. Permaculture also emphasizes biodiversity and plants that are adapted to the local climate, as well as few external inputs and a closed loop approach. Permaculture can vary from site to site because each location will require a different design, given the location and microclimate. Mollison defines a microclimate as "the localised climate around landscape features and buildings; important for selecting sites from specific crops or species."[53] Thus permaculture differs from other types of gardening, even other types of organic gardening, because there is no 'one size fits all' approach.

2.6 URBAN PERMACULTURE

Urban permaculture would incorporate aspects found in zones one and two, such as greywater treatment, spiral herb gardens, and small vegetable gardens (see figure 2). These

[53] Mollison, 1991, p. 201.

practices could take place on a rooftop, balcony, or top of a parking garage, or in an empty parking lot. This would create a lot more "green space" in the downtown or city landscape. On the next scale, of the size of a back yard or so, food forests could be created. Berms and swales are a common design practice in permaculture, because the swale provides water retention and percolation into the soil, and the berm acts as a raised bed for gardening. See figure 5, showing green land "berm" and blue water "swale". Suburbs could incorporate small to large-scale personal gardens, community gardens, and even food forests. Food forests are typically perennial gardens that take time to create through layering plants. It often consists of a canopy layer, low-hanging fruit or nut tree layer, shrubs, herbaceous, root crops, ground cover, and vines.[54] Also at the urban and suburban systematic level, people can begin composting and reusing water either for their own gardens, their neighbor's garden, or a community garden.

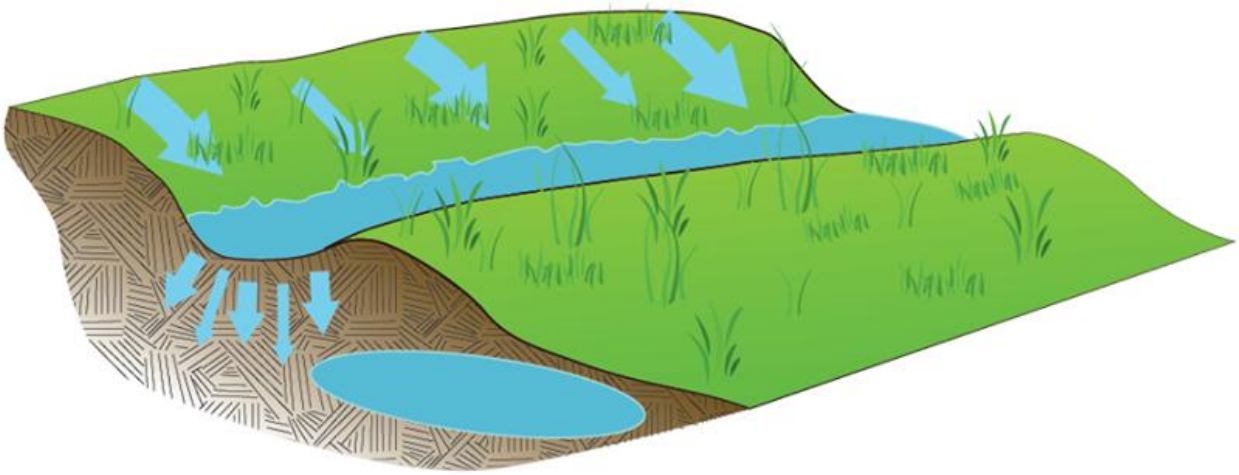

Figure 5. Berms and Swales

[54] Permie Taelor. Austin EcoNetwork. "So, what is a food forest anyway?" Online: http://www.austineconetwork.com/blog/so-what-food-forest-anyway Last accessed: 23 August 2013.

Mollison explores different designs in his *Introduction to Permaculture*. Permaculture is about the system's design, thus it can be implemented in many different types of spaces and scales. Below is an image of Mollison's greenhouse, or "hot house," with attached chicken coop. He suggests that the greenhouse gives "food for people, and some crop wastes for chickens," while the chicken can help supply manure and heat that the greenhouse needs.[55] This design could be implemented almost anywhere, from urban community garden to rural farm.

[55] Mollison, 1991, p.7

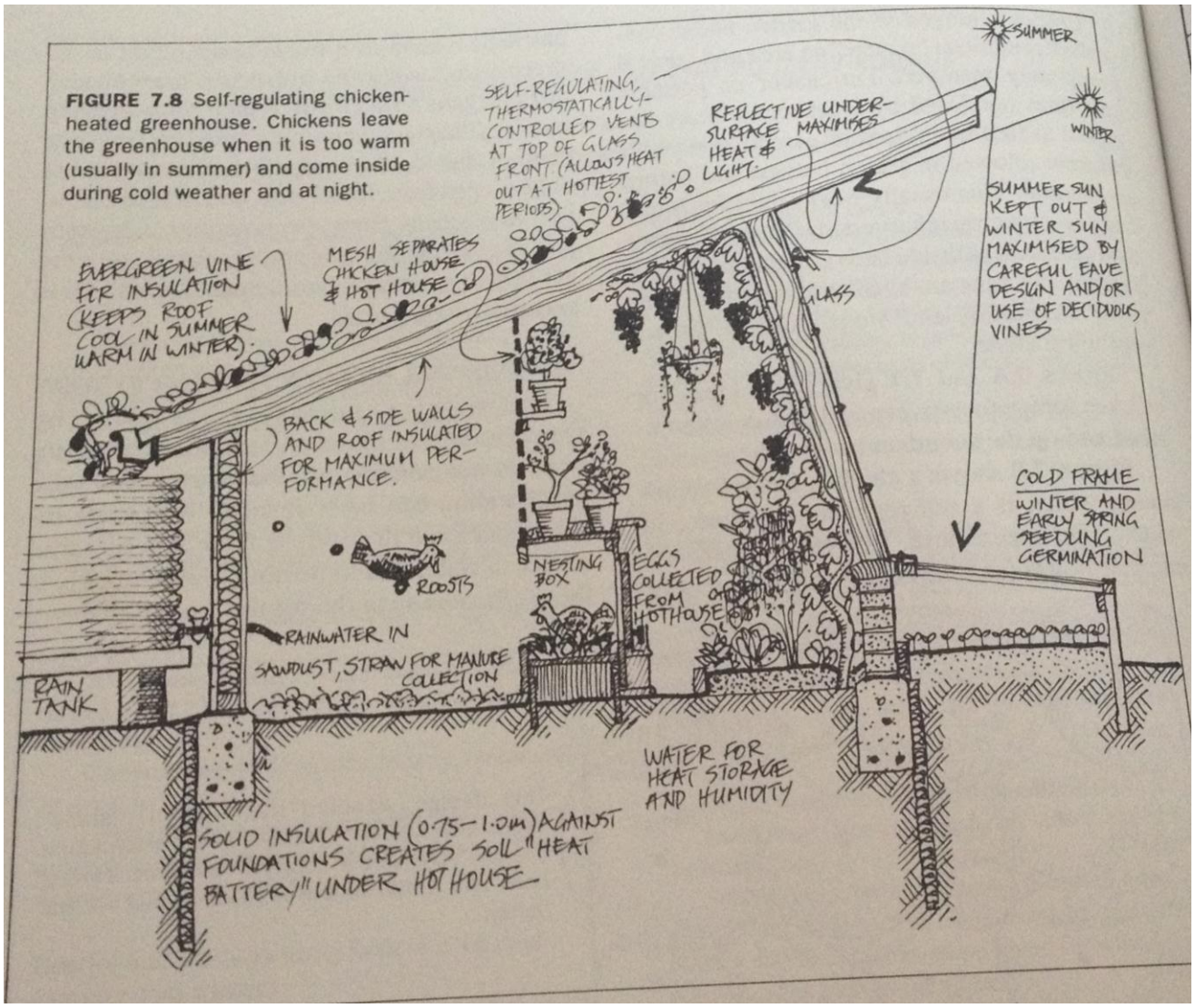

Figure 6. Greenhouse with Chicken Coop

The City of Austin does allow backyard chickens in the city limits, so permaculture in the urban Austin area can incorporate a chicken coop.[56] Chickens are helpful little creatures, that when allowed, will eat the scraps of a garden harvest, while fertilizing and 'tilling' the soil for the next round of planting.

[56] Austin, Texas, Municipal Code § 03-02-16.

3. ENVIRONMENTAL ETHICS

Humans must coincide with the natural environment in order to sustainably thrive on the planet. Environmental ethics focuses on what the proper relationship between humans and nature should be. A common distinction within the discussion of environmental ethics is the anthropocentric versus ecocentric points of view. Anthropocentrism posits that human needs, interests, and values always dominate over the interests of the environment. Ecocentrism places emphasis on the natural environment as the center of the ethic, and holds that the relationship between humans and nature must benefit nature, not just humans. For the ecocentric theorists humans are but one species among many—no more or less important than any of the other dwellers of the earth; whereas anthropocentrism positions humans independent of other species.

Permaculture embodies certain ethics, apparent in the philosophies and worldviews of permaculture activists. Because of the particular awareness of the relationship between humans and the natural environment that is needed to sustain permaculture, practicing permaculture cultivates a sense of place and reconnects the individual to the natural world. Philosophies I would expect to influence permaculture practitioners include Aldo Leopold's land ethic, deep ecology, and social ecology. There is an inherent difference between the three ethics. Firstly, deep ecology and social ecology fall on opposite "centric" extremes. Social ecology is anthropocentric because it advances that destructive human relations are the cause for environmental degradation, so by improving human relationships, we can change our actions towards nature. Deep ecology, an ecocentric point of view, on the other hand, claims that nature has intrinsic value in and of itself, whether or not humans can find use for it. The land ethic does not place humans as conquerors of the land, but does place considerable focus on human needs. Whatever ethical framework is adopted, the reality is that humans must coincide with nature and

natural processes to live. Environmental ethics focuses on what the proper ethical use of nature, or the relationship between humans and nature, should be.

The Land Ethic is an idea put forth by Aldo Leopold in the 1940s, in which he advocates that society already has accepted ethics for how we behave towards our community. According to Leopold, "the land ethic simply enlarges the boundaries of the human community to include soils, waters, plants, and animals, or collectively: the land."[57] We should extend socially acceptable morals, such as respect and thoughtfulness, to include the environment in which we live. In practice, this would mean being mindful of the impact we have on our natural environment. The biota is a system of interdependent parts, which should not be regarded as commodities, but rather should be acknowledged for their inherent and irreplaceable value. Humans should have a land ethic, for we are a part of the greater socio-eco-community, and we should not dominate and degrade the land as our current practices do. Humans should strive to preserve the "integrity, stability, and beauty of the biotic community."[58] The land ethic is holistic and sustainable, reflecting an ecological conscience, understanding the local ecosystem, and working in harmony with the natural environment to achieve social goals. The land ethic supports the creation of sustainable communities and cultivation of environmentally conscious lifestyles.

There are many other environmental philosophies that might inform people's permaculture practices. Social ecology and deep ecology require a dramatic shift in thought from the dominant economic globalization worldview. Social ecology is centered on human relationships with one another and how such relationships promote environmental justice. The

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[57] Leopold, Aldo. 1949. *A Sand County Almanac: and Sketches Here and There.* London: Oxford University Press, p. 39.
[58] Leopold, 1949, p. 46.

founder, Murray Bookchin, was influenced by Karl Marx, and believed that the roots of environmental problems lie within human relationships with one another.[59] Social hierarchies are created from human domination over one another, which also result in immense environmental destruction. Social ecologists argue that environmental and social justice can be achieved when we treat one another with respect and recognize inherent relationships in the way we live. Social ecology theory is very anthropocentric, positing that environmental destruction is the result of unsustainable social relationships, distinguishing it from other environmental philosophies presented here.

Another environmental philosophy is deep ecology, which is focused on the inherent interconnectedness between humans and the natural environment. Arne Naess founded deep ecology in 1973 in opposition to "shallow ecology" which is concerned only with human welfare. According to deep ecologists, nature has an equal right as humans to thrive and flourish. Deep ecology is ecocentric, meaning it comes from the point of view of nature, not from a human-centered approach in which humans are dominant over nature. In fact, deep ecology views human and nature as the same. With an ever-increasing human population, nonhuman populations are diminished in their ability to flourish, and this is not an ethical way to treat other life that is equally essential to this planet's functioning.[60] Thus, deep ecology also begs for stability in the human population. Humans do not have a right to destroy and exploit nature for humanity's benefits. Since humans and nature are one and the same, everything humans do

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[59] Palmer, Clare. 1997. *Contemporary Ethical Issues Environmental Ethics*. California: ABC-CLIO, p. 17.
[60] Naess, Arne and George Sessions. 1993. "Deep Ecology Platform." Green Web Publications. Online: http://home.ca.inter.net/~greenweb/DE-Platform.html Last accessed: 21 September 2013.

should be for the benefit of both humans and nature. Both deep ecology and social ecology call for major changes in the current dominant worldview.

4. RESULTS FROM INTERVIEW QUESTIONS

The interviewees in this study all engaged in permaculture in different ways, from teaching it, to growing a food forest in their own backyard, to composting at home, to volunteering at permaculture sites when their schedules permit. These great varieties in permaculturalists, from those who are certified to those who are not, allow me to be able to see the range of individual involvement. This range provided the ideal data set for this project, so that I can reflect on how other people may be involved in permaculture.

To preserve the anonymity of the participants in this study, I have created pseudonyms. Of the nine interviewees, five were male and four were female. I did not ask for specific ages, but rather gained information on age ranges—three ranged between 18 and 30 years old, four between 30 and 50 years old, and two were older than fifty. I did not collect information on race or ethnicity. The table below demonstrates if the interviewee is certified in permaculture, what types of responsibilities the interviewee reported having to permaculture, and the ways in which the person reported engaging in permaculture. It also shows which group the person is involved with (again I have listed a generic name to preserve the group's anonymity) and if permaculture is the interviewee's means of employment.

Table 1. Introduce Interviewees

Who	***Certified?***	***Responsibility / types of engagement***	***Group involved in***	***Employed other than Permaculture?***
Bob	No	Practices at home, creating a food forest at home, attends permaculture group meetings/participates in permaculture group forum	Local organization	Yes
Joe	Has certification in permacultu re*	Leader of several local volunteer groups, practices at home, educator, hosts talks, teaches PDC, "teach it and try to live it," local activist, "responsibility to tread lightly"	Local organization	Retired
Sally	No	Treasurer of local university group, practices at home, volunteer/ manual labor with local groups	Local university group	Yes
Mary	Yes	Leader of group, "emerging educator," volunteer /manual labor, practice at home: composting, pest management, planting perennials	Local university group	Yes
Dave	Yes	Resident & owner of off-grid permaculture farm, sells at Farmer's Markets, teaches PDC, responsibility to: treat own water, generate own power, grow own food	Local organization	Yes
George	No	Practices at home and tries not to disrupt soil, let nature do the work; spread knowledge, responsibility to "tread as lightly as possible"	Local university group	Yes
Lauren	Yes	Teaches, talks about it, administrative contact for several groups, which includes organizing classes; volunteer/ manual labor, practices at home, reduces wasted energy, "harness laziness- try to find a way to not do something"	Local organization	Yes
Christine	Yes	Educator, teaches PDC, resident of permaculture site, leader of youth group, permaculture consulting work, "connecting cross-culturally" by enacting permaculture abroad	Local organization	No – permaculture is job
Paul	Yes	Educator, resident of permaculture site, co-founder of local group, teaches PDC, leads volunteer group, worked internationally at permaculture sites, freelance permaculture consultation/facilitator	Local organization	No – permaculture is job

* Joe made a distinct remark about being certified in permaculture. My question was "are you certified in permaculture?" and he said, "There is no such thing as certified in permaculture. I have a design certificate, and that is an important point. Unless you have been to Australia, and spent a year and got a diploma, or you get to the UK or Italy and gotten certified, there is no such thing as certified." He continued on and made the analogy that a "certification would be reserved for people, like professional engineers, who've spent a few years studying, like a Master's. Permaculture design course…is more like a Bachelor's." This interviewee has a "permaculture design certificate," which he received while studying under a well renowned permaculturalist, Geoff Lawton.

Individuals did not just have one set of responsibilities. They had multiple responsibilities both to themselves and to others within in their community. Some had more responsibilities to their group, such as Joe, Sally, Christine, and Paul who are all leaders of local permaculture groups in Central Texas, while others had much more responsibility for their personal permaculture practice, such as Bob, Dave, and Paul, who each have extensive permaculture sites as part of their homes. However, there was no indication that for those who mostly volunteered and practiced permaculture on a smaller scale, such as George and Mary, that they felt less responsibility than those previously mentioned. In addition to her personal practice at home and volunteer work, Lauren took on the responsibility in her current residence in a state outside of Texas to compile an online directory of permaculture groups active in that state, and provide communication efforts for these groups. It appears that although there may be specific roles to play, such as treasurer of a group, intern on a farm, or owner of the land, the responsibility really lies within taking care of the Earth and the people around you. The biggest reward of practicing permaculture, that the interviewees said, falls into three non-mutually exclusive categories of community, environmental and social awareness, and experiential

learning. There also seems to be a sense of optimism within people's responses. The table below is comprised of quotes and paraphrases from each interviewee about what they see as the biggest reward of practicing permaculture.

Table 2. Rewards of Permaculture

Who:	***What is the biggest reward of practicing permaculture?:***
Joe	"Permaculture is a worldview, a lifeway… watching people understand this- that the rest of their lives they'll have to be more sustainable, more accepting of people in their community… Helping people integrate permaculture into their lives."
Dave	"Satisfaction that you can improve on the way things are now. Everything you do is a step to become more sustainable, and when you achieve these little steps, that is a reward."
Bob	"Reaching into the future."
Lauren	"Knowingness that we have everything we need to have a sustainable planet."
Christine	Recognizing interconnectedness to human and nonhuman world, and being part of a greater system.
Paul	Powerful impact permaculture has on other people's lives, watching people "adjust their lives to live more in harmony with natural systems"
George	"Seeing the beauty of how nature works… Humans are a part of nature."
Sally	Seeing permaculture and sustainability in action. Experiencing permaculture.
Mary	"Many rewards. One of the main ones is the community aspect… seeing how passionate they are about taking charge of their own food security, opposed to leaving it to agri-business to do it for them. Awareness that comes with talking to people."

These responses, in their own respective ways, really capture the themes that will be presented and discussed throughout the rest of the paper. Mary, Paul, and Joe discuss a sense of community within permaculture and how it can impact individual lives. Bob, Dave, and Lauren hit on a theme of the promise of permaculture, that it can be a key to a sustainable society. Very similarly, Sally said the greatest reward for her is the experiential aspect of permaculture. For George, the greatest reward is a connection to nature, similar to Christine, whose permaculture practice allows her to see inherent relationships within systems. An overarching theme emerges of social and environmental awareness, which I will discuss further below. Other themes that emerged from the interview process that I will discuss include a sense of isolation from mainstream society and urban permaculture.

One of the questions early on in the interview was if the interviewee grew up engaging in outdoor activities. There were various degrees of engagement with the environment, many grew up heavily engaged—camping, gardening, biking and hiking from a young age; while a few others felt that they grew up more in the city and lacked some of that environmental engagement as a child. There was not a definitive correlation between those who were outside a lot as a child and their practices in permaculture later in life. Because not every participant grew up extensively playing in outdoor activities, I can infer that childhood outdoor time is not the main contributing factor to practicing permaculture later in life. As a side note, those who were able to grow up engaging in outdoor activities really valued the experience they had growing up, and also really appreciated that I asked this question in general.

I asked my interviewees what they felt was the biggest challenge or disappointment that they encountered during their permaculture practices and I was very surprised to see a profound theme of "isolation" emerge. Respondents felt that there is a "commune connotation," as Sally said, with permaculture. Dave, Joe, and Christine all wished it was a bit more mainstream,

because at times, it is difficult getting the word out about permaculture. Paul mentioned that the difficulty of getting the idea of permaculture out there is really rooted in the competitive nature of the United States. As Americans are so persistent on being individualistic, it is difficult to present such a community-oriented idea. Permaculture needs community action, and as Joe and Lauren mentioned, community is really lacking in the U.S. and people don't even realize it. Mary and Sally, two of the younger interviewees, both mentioned a negative "hippy" or "radical" connotation with permaculture. Mary said, "By growing your own food, you are a radical, because you are not giving your money to HEB [a large grocery store company] or whoever." Thus, overall participants in this study felt that permaculture can be marginalized by the rest of society, because it is so ecocentric and community-oriented.

Interviewees also stated other types of challenges that are endured while practicing permaculture. Mary responded that bureaucracy is one of the greatest impediments to implementing permaculture. Mary said, "In the garden project [my permaculture group is] doing, the biggest battle is getting permission to do it. We have all the tools, labor, and things needed, but don't have the permission just yet, we have to convince those at top to let us do it. And even if we did do it, guerilla gardening style, we might get sued or a warrant put out, we cannot just go out and do it." She felt the impediment of bureaucratic permission to plant climate-adapted species on an unused plot of land. Lauren mentioned sometimes leading a permaculture life can be a financial stretch; permaculture teachers and practitioners don't make as much money as other people in the world. The upside of permaculture is it teaches you how to be more frugal, and so Lauren feels she is able to deal with the financial stretch. Bob said the upfront investment time can be intensive, so you have to have the time and resources to put into beginning a permaculture site. George mentioned that as we are so surrounded by technology in our everyday lives, it can be difficult to peel one's self away from it, in order to engage in the great

outdoors. Joe commented that permaculture does very well in countries where people have less (like Cuba or Thailand), whereas in the U.S. we have too many material possessions and too many modern conveniences, which make permaculture disenchanting to many people. This theme of isolation from the rest of society only emerged when discussing challenges of the permaculture. The participants of this study overall had optimism and hope for permaculture throughout the rest of the interview.

In the interview, I asked, "Do you consider yourself a social, political, and/or environmental activist?" Seven said yes to at least one, while Christine said, "No, but I am active in these things, so if that makes me an activist, then yes" and Paul stated "not at all." I was surprised to find that some permaculturalists did not see themselves as activists. George, who considers himself an activist, stated, "It's hard to ignore any person that is engaged in permaculture, to not be passionate about defending what is an obviously marginalized idea: protecting the environment, having it as the number one resource that we can't replace." Although two of the interviewees did not consider themselves activist, both George and Christine make a good point that all permaculturalists are active in the environment, society, or politics in some way. Paul stands out in that he does not consider himself an activist. I think this begs a greater discussion of what defines an "activist?" For the purposes of exploring environmental ethics and permaculture, I will say that most of the interviewees defined themselves as activists.

A second theme emerged out of the interviews, which is a sense of community within permaculture. This theme is not in opposition with the first theme of isolation from society; permaculture practitioners may feel isolated by mainstream society, but they feel a sense of community within permaculture. There was a unanimous response that being in a community group about permaculture influences environmental awareness and behaviors within the group.

The reason to get involved with a permaculture group in the first place is because there is an active interest that already exists. Mary felt that within the permaculture group, it can be a little bit of "preaching to the choir." Nevertheless, she felt that joining a permaculture group results in sharing awareness, and the hands-on experience can help motivate people to continue their involvement. Christine says, "Community growth is the by-product that promotes inspiration" in practicing permaculture. Lauren felt that "permaculture really is about community and people care." Sharing awareness, or being part of a community, is one of the foundations of permaculture. Being a part of a permaculture group is a positive behavior because people can learn from one another about what works or doesn't work when implementing permaculture on their own. It is a way of sharing knowledge about permaculture. In this way, group members can be influenced by one another. I even noticed within my own study, people used similar language in some of the interviews, such as Joe and Bob, both a part of a local organization, both said "mining the earth" when talking about how unsustainable our culture is and the vast environmental degradation or unintended consequences. They both explicitly reject the anthropocentric view of nature as natural resources. This exemplifies how being in a community sharing similar interests can have an overall influence on the individuals within the community.

Another theme emerged when I asked the participants of this study to describe how they see the relation between humans and nature. Respondents feel both a sense of social community, or human community, when practicing permaculture, because of the way that they interact with other permaculturalists. Expanding beyond just the human community, they see themselves as one and the same as nature. For the permaculturalists in this study, there is no disconnection between humans and nature. I asked my interviewees to describe how they viewed the relationship between humans and nature, and I received a unanimous response, "We are nature." Joe said "all other beings have the same rights as humans," and Lauren similarly said,

"We are just one of many species." Paul felt that not only are humans a part of nature, but that "when we made the distinction [that humans were separate from nature] this is when we came into disharmony with nature. Permaculture reconnects us with nature." Dave also said that permaculture can reconnect humans with nature because observing nature is key in designing for permaculture. This "we are nature" theme supports a very eco-centric point of view, in which permaculturalists actually see themselves as one in the same as nature, not viewing humans as separate or divorced from nature.

I then asked, if practicing permaculture helped to enlighten this view, and I again received a unanimous "yes." When I asked if this view of the relationship between humans and nature had changed since beginning their permaculture practice, mostly the interviewees said "yes." I did not receive any "no's", but there were some unique, expanded responses to share here. For Christine, practicing permaculture has helped her see that the mainstream view of humans being separate from nature is an "illusion." For her, the mainstream worldview held by most Americans is that humans and nature are separate from one another, but this simply is not true. Christine said, "It's all about the relationship of elements in the space," and seeing herself as part of nature and part of the greater system, enables her to design better. Lauren said she has become "more deeply aware… in an abstract sense." Similarly, George said since practicing permaculture, he thinks more "seriously about his relationship with nature." Before practicing, he was aware that humans live within nature, but now he sees more of how truly interconnected humans and nature are within a natural system. Paul did not feel that his viewpoint had changed so much as it has "evolved." Since he grew up in a rural area, farming and gardening, he was already aware of a lot of agriculture knowledge. "Really permaculture is just an understanding of ecology… Looking at ecology and using that as a model for design. It's my knowledge of

ecology that has evolved my perspective." In this way, through practicing permaculture, people have learned more about the perspective that humans are a part of nature.

I asked interviewees if they had a philosophy, mantra, or motto that informed or motivated their continuous practice of permaculture. Many responses had themes of connection to nature and awareness of one's self in the greater system. The following table contains the individual responses.

Table 3. Philosophies of Individuals

Who:	***Philosophy or motto:***
Bob:	"No"-just to grow own food
Sally:	"Biggest possibility of hope"
Joe:	"Leave it better than you found it" & "Enjoy it"
Mary:	"Closing the loop"
Dave:	"Be very careful to recreate balance"
George:	"Seeing the beauty of how nature works"
Lauren:	"Bill Mollison says, 'Problems of the world are increasingly complex, but solutions remain embarrassingly simple' and other quotes that I like, 'You don't have a snail problem, you have a duck deficiency'"
Christine:	"Patience. Remembering you are on Nature's time"
Paul:	"Everything- joy and appreciation…wealth in other ways"

Overall there is an overarching theme of awareness—awareness of one's self and the impact on others, as well as social and environmental awareness. Not all responses had a theme of "connection to nature," but Dave, George, Lauren, Christine, and Joe definitely offered such responses. Bob really did not have a specific philosophy that supports his permaculture practice, but rather he just chooses to grow his own food. Sally's response is quite optimistic, stating that

permaculture offers hope for the future, which coincides with Bob's response that the biggest reward to practicing permaculture for him was "reaching into the future."

This leads to another theme that emerged amongst the interviewees. There seems to be a shared sense of a "promise of permaculture" for the future. I think this is especially true, because of the way Bill Mollison and David Holmgren present permaculture, as being a better way for agriculture and living that can be for the long-term. When asked, "Is permaculture a sustainable way of life?" interviewees responded yes, with the exception of Christine and Paul, who see permaculture as beyond sustainability, actually regenerative, giving back to future generations. Permaculture as regenerative means that is providing more to the micro-ecosystem than it takes away, so more nutrients are in the soil with better water retention than when before the permaculture site began. Sally also mentioned that for her, permaculture "has a lot to add to sustainability science" and it "means healing degraded landscape and it means regenerative design." For Dave, "permaculture is a design system for sustainability," much like Lauren's idea that permaculture is a "toolkit" that can be used when designing for the benefit of humans and the environment. There was this sense that permaculture is, at the very least, synonymous to sustainability. Bob and Joe both commented that permaculture is "real sustainability" and that if the idea of sustainability was being created today it would be called permaculture. Bob continued by saying that permaculture is "leaving things better than we found them." Christine stated the same idea, but that regenerative design is leaving things better than you found them. George also commented very similarly, "sustainability is not compromising resources for the future, and this is what permaculture accomplishes." So interestingly, whether permaculture is seen as sustainable or regenerative, it is doing more good than bad. Below is a figure illustrating the scale of human interaction with the Earth. Many interviewees thought that currently humans are in

between destruction and sustainability, when really our interactions should be in between sustainability and regenerative.

Figure 7. Scale of Human Interactions with the Earth

Dave had a unique sense of learning from nature, which he discussed at length. Dave said,

> Unfortunately there is a big disconnect between humans and nature, and permaculture is trying to restore some of this disconnect. It is trying to benefit from nature by learning from nature, trying to replicate some of the features of natural systems. In permaculture, we have a class dedicated to patterns in nature. We study those and learn how we can apply those into our manmade things. There are many repetitive shapes in nature, it is very powerful like spiral, circles. These are all things that exist in natural systems for a good reason, and we can learn a lot from that. How do we purify wastewater? How do we remediate pollution? We tend to always attack that with mechanical force rather than take a step back and say, 'How does that work in nature?' One of the classes I teach is remediation, and how to purify your wastewater in a natural way, rather than build a sewage plant. These are all examples of how by observing nature, we can learn things and then replicate them in our own life. Observation is one of the most important things in permaculture.

Dave lives on an off-grid permaculture farm, where he treats his own water and supplies his own energy. George, who said he felt a responsibility to establish closed loop systems that complements the microenvironment, shared Dave's view of observing nature to learn from it. In this way, permaculture is sustainability, because it replicates natural systems and incorporates the human component of the system. Permaculture places great emphasis on observing and learning from nature, which the current dominant social paradigm does not, thus permaculture creates hope and a sense of "promise."

This promise of permaculture exists, because of how permaculturalists view the environmentally degrading social behaviors of our culture. I asked interviewees to compare and

contrast permaculture and industrial agricultural practices. Many interviewees responded at first with a joke along the lines of "Do you have all day?" as there are many sharp differences between permaculture and current industrial practices. Respondents pointed out that permaculture focuses more on a healthy, thriving ecosystem with bio-diverse plant and soil life. Permaculture is centered on giving back to the land and soil, while providing food for human and animal consumption, and 'waste' for compost. Permaculture closes the cycle, by turning 'waste' into fertilizer (plant and soil 'food'). Below is a table that lists the responses given by the interviewees.

Table 4. Industrial Agriculture vs. Permaculture

Industrial Agriculture	**Permaculture**
Benefits multinational corporations	Benefits individuals (farmers/gardeners)
Monocropping creates vulnerability to pests and diseases, which drives further need for synthetic, external inputs	Biodiversity, resiliency in systems approach
	Natural cycles, mimics nature
Focus on yield per farmer	Focus on yield per acre
Topsoil loss is "mining the soil" and depletes nutrients from the soil	Giving back to the soil; a lot of attention to soil management
Cheap food	
Contributes to water pollution	Cleans water
Recognizes limitations of human beings, so it involves machines and synthetics… but this is for quantity, not quality	Quality food, not quantities of the same crop
Paul: "Green revolution takes chemical warfare and turns it towards how we're treating the land"	Natural pest management
Inputs far exceed outputs	Working in "cahoots" with nature
	Taking care of the whole system

Interviewees all shared a common view that industrial agriculture is disharmonious with natural systems and processes. Industrial agriculture is ultimately degrading the land, because the practice of monocropping and reliance on external inputs is causing soil degradation. Thus, industrial agriculture is not taking care of the earth. Permaculturalists in this study seemed worried that multinational corporations that run big agri-business are not concerned with taking care of their farmers, but rather have the goal of profit. Agriculture should be the for the benefit of humans and the environment, and permaculture is a design "toolkit," as Lauren said, or as Paul put it, permaculture is a "step in the right direction" towards agriculture that benefits both humans and the environment. Permaculture's holistic foundational ethics creates relationships between humans and nature, and works in harmony with the natural environment, instead of against it. In this way, it can benefit both humans and the environment.

The next theme that became apparent amongst all interviewees in the study is that permaculture is more than just gardening with a holistic approach; it actually means embodying a way of looking at the world. Bill Mollison writes about permaculture ethics in his *Introduction to Permaculture*, but these aren't just words written on a page. The participants of this study adhere to those ethics and lead their lives by them. Permaculturalists see permaculture as a way of life, a worldview, and an ethical foundation for one's behavior. Therefore, when asked about "other ecofriendly behaviors that they practice," many felt that their other habits were all behaviors that are a part of permaculture. Permaculture is not just limited to agriculture, though it begins with a systematic way of growing one's own food, whether that be for food security or trying to reduce environmental degradation through industrial practices. It seems apparent to someone not practicing permaculture that composting and shopping at farmer's markets are ways to potentially become involved with permaculture, but most permaculturalists include biking, nutrition, finances, and even voluntary simplicity as a part of their permaculture practice.

Permaculture is all about the daily habits of energy consumption, and trying to use the full potential of resources, or not wasting as much. Paul, Christine, and Dave both felt there are no end and no borders to permaculture. Permaculture is ultimately about conserving energy and resources as much as possible, while still creating earth care and people care. Lauren really hones in on this idea of energy conservation by saying she tries to "harness laziness." She gave the example of cooking vegetables from her garden on the stove, and then deciding to cook an egg for additional protein. "The other day I was cooking potatoes and vegetables for breakfast and I wanted an egg, like a hardboiled egg with it, and so I actually stuck the egg in its shell into the hot vegetables, and it made a perfect hardboiled egg itself. It's useful to a person who is using a single burner, or if you're an energy geek and a water geek, and boiling water is a high BTU operation… you don't have to use that water." She sees part of the design process of permaculture is designing your lifestyle to reduce energy consumption.

There are three ethical foundations that underlie the practice of permaculture, as put forth by Bill Mollison. They are Earth Care, People Care, and Fair Share. They are obviously terms that can mean many different things to different people, but they do indicate taking care of entire systems. Taking care of the earth and the people, taking care of the system, recreating balance—these are the ideas behind earth care and people care. The name of these two principles gives way to their meaning. Fair share differed among the interviewees, though always meaning a share of surplus, but what is "fair?" Since fair is "relative" as Bob saw it, similarly, Lauren saw fair as "erring on the side of caution," and Joe made a similar point that "fair" is about everyone doing their part. Joe, Sally, and Paul all mentioned that fair share is the redistribution of the surplus back to the environment and around to the people, and there are necessary limitations to growth.

Table 5. Earth Care, People Care, Fair Share from Interviewees' Perspective

Who:	***Earth Care***	***People Care***	***Fair Share***
Bob	"Leaving things better than you found it, improving the earth, not mining."	"Making sure we do things to take care of people, community, self, and family."	"Share of surplus, not so much 'fair share'" because "fair is kind of relative"
Joe	"Take care of the earth, human and nonhuman care, making the Earth better than it was."	"Take care of all the people of the earth is included in Earth care, so it's more of economic and social justice, which means everyone has a right to a decent living."	Created and yielded surplus that you share. Everyone has to do their part.
Mary	"Taking care of the earth…	…the earth takes care of you."	"There is always a surplus that is only bound to get shared, because you grow it for the sake of growing it. It's really about the closed loop."
Dave	"Take care of the environment."	"Nutrition is one of the biggest ones."	"Make sure there is something left over for those who come after us."
Sally… "These ideas are really vague and can mean different things to different people"	"Taking care of something, anything… you want that entity to be healthy and happy."		"Redistribution of surplus… limits to growth and consumption."

Table 5. Continued

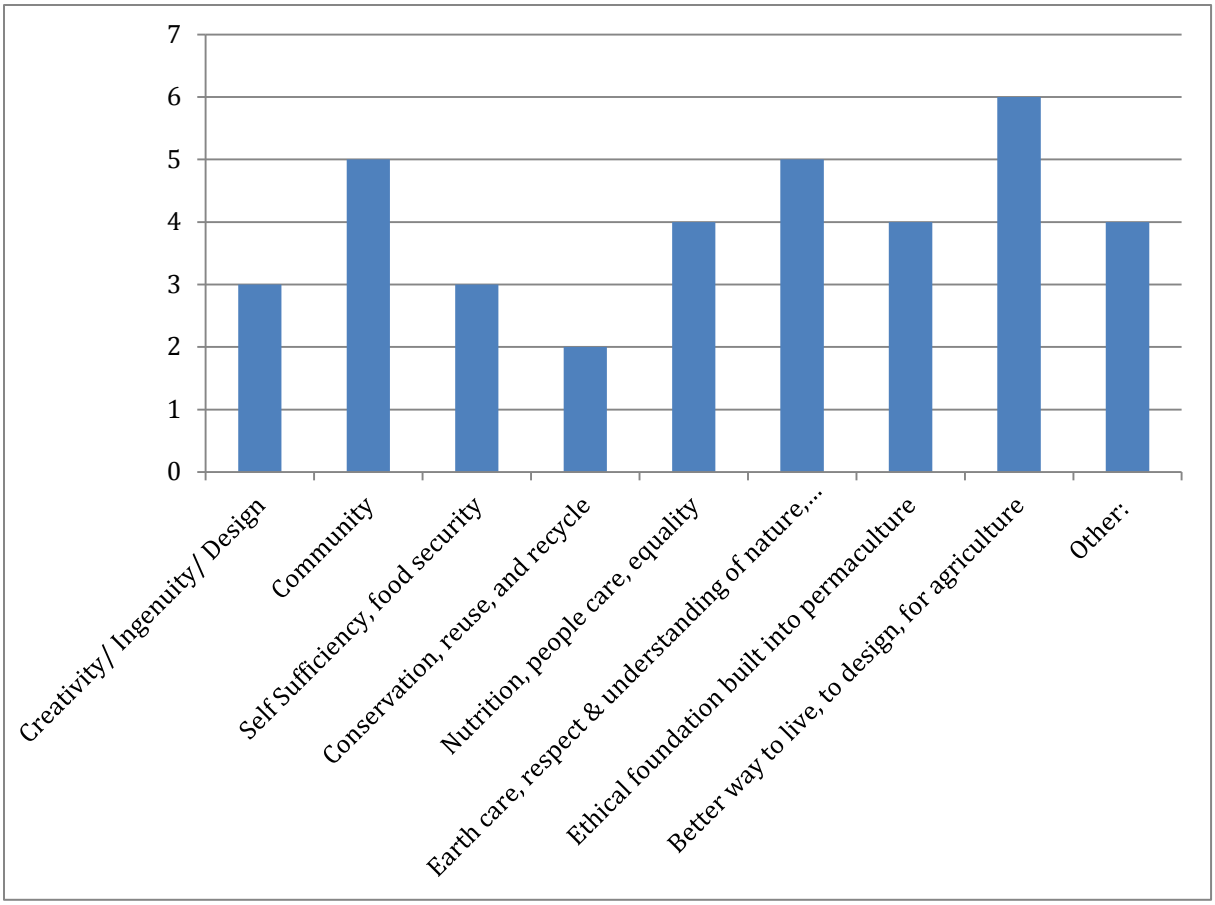
Who:	***Earth Care***	***People Care***	***Fair Share***
Lauren	"Trying to see consequences of everything and bring them into our own control."	"It's wider than we think… It's allowing people to make a living…It's getting real about what human beings need"	"Living consumption and share of surplus, but we don't always know what's fair, so fair share is erring on the side of caution."
George… "They define exactly how I view the natural way of things"	"When you are living in a certain way, self-sufficiently, you are looking after yourself and the earth…	…and those you share the earth with"	"If you are working with nature then you will inherently 'earth care, people care, fair share'"
Paul… "They are several feedback loops built into each other"	"If you care for the earth then you are caring for the people…	…and if you are caring for the people, then you are caring for the earth."	"Return of surplus…which means giving back to the system, as well as people…making the system regenerative… and if we don't understand what the limitations of growth are, then we get destructive."
Christine… "Designing to these three ethics, they're impossible to separate… When designing, ask yourself 'within this space, is	"Earth care questions: is it building soils? Promoting diversity?"	"People care questions: achieving well-being of self? Well-being of neighbors?"	"Yields of food, but also yield and wealth of happiness or depth of happiness with the abundance that can go back into the system. When Mollison came up with this, I'm sure he was thinking of extra apples, you share them with the neighbors, and this is also sharing compassion.

Table 5. Continued

Who:	***Earth Care***	***People Care***	***Fair Share***
design to those three ethics?' If it is, then continue; if it's not, then redesign."			So fair share is connection, compassion and inspiration; it's a wealth of happiness. These three things allow for the cultural movement."

Core values really vary, as there were a lot of different ones mentioned during the interviews. All of the specific values fall within the greater umbrella of "earth care, people care, and fair share." All practitioners listed several values that they saw present in permaculture. I've compiled a table of values that interviewees mentioned as core values to permaculture throughout the interview process. To create this table, I reviewed individual interviews looking for key words, listed along the x-axis. The values mentioned are: creative design, community, self-sufficiency or food security, conservation and reuse, people care, earth care and respect and understanding of nature, permaculture is built on ethics, a better way to live, and other. The "other" category includes four ideas, mentioned specifically from four different practitioners: "permaculture offers something 'rich'", humility, water capture in Texas, and commitment to a different lifestyle.

Table 6. Emerged, Shared Values



The value that the permaculturalists in this study felt was most important to themselves and other permaculturalists is that permaculture can provide a better way to design society and more specifically a better design for how we grow food. This value was mentioned by six of the nine interviewees. Earth care, environmental awareness, and respect for nature (all one category), as well as community, were the next two most frequently mentioned values, stated by five of the nine interviewees. The various values included here demonstrate that permaculture is a lifeway that is built on ethical ways of viewing and interacting with the rest of the world.

I asked interviewees to be 'co-investigators' with me and explore what urban permaculture may look like. A theme that really presented itself was the potential for urban permaculture and how to put that into action. Although some interviewees felt there may be

impediments at first, they all had hope for more participation in permaculture, which would most likely come from the spread of permaculture to the urban areas. Interviewees felt that there is great potential for urban permaculture, and that it is one of the best practices urban society can adopt to become more sustainable. Density and space limitations will bring about the most creative designs as permaculture is all about scale and design. Dave's response was an outlier, saying that pre-existing infrastructure may limit implementing permaculture in urban areas. He did not say it was impossible, though, just pointed out that it may not be easy due to the pre-existing design of the space. He mentioned that functionality and best use of spaces might not be achievable with pre-existing infrastructural conditions of urban areas. Permaculture, as outlined by Mollison, inherently has an ethic that each component part of the system serves multiple purposes, but this may be sacrificed due to pre-existing conditions. Though Christine felt that "small changes can have a domino effect," and that the city is where permaculture "gets creative. It's all about space and design." She promotes asking questions about the design while creating a permaculture design, such as: is the design building soils and promoting well-being?

Table 7. Examples of Urban Permaculture Practices

List of ideas for urban permaculture:
Eat local
Bike more, drive less, utilize public transportation when possible
Create at home gardens, "victory" gardens
Participate in community gardens
Greywater systems, water conservation
Roof top gardens, grow food on balcony
Spiral herb gardens
Herb and vine fences, vertical herb gardens
Rainwater collection
Wicking beds, self-watering beds, aquaponics
Tool sharing, car sharing
Tearing down fences, combining land space
Composting

Table 7. Continued

Urban animals: chickens, rabbits, doves, fish ponds
Renewable energy

Both the cities and suburbs can adopt permaculture. The cities are densely packed, so word-of-mouth will be quicker, but suburbs offer the land space. "Same practice, different space," as Christine pointed out. Dave touched on this as well, by commenting that permaculture has "universal principles." Although Bob felt permaculture could in theory be practiced anywhere, he did feel that government control may be an issue for both urban and suburban permaculture. Similarly, Mary had said earlier in the interview, that bureaucracy can be one of the greatest impediments for implementing permaculture. This kind of loops back to the beginning of the results section—permaculturalists in this study felt that certain challenges or disappointments present themselves when choosing to lead a life engaging in a permaculture worldview. Recall that interviewees felt "isolated," because permaculture is not mainstream enough, and people who are not aware of permaculture often don't understand the practice and sometimes associate the community of permaculture with a negative "commune" connotation. Thus social adoption of permaculture could be difficult. Additionally, both Joe and George mentioned that because of how many conveniences and technologies we have in the United States, adopting a simpler lifestyle is a far more difficult.

Most interviewees did not feel there would be too many long-term limitations to urban permaculture, though there may be some upfront obstacles that would have to be overcome. People's aesthetic ideas will have to shift to recognize the beauty of native plants and grasses that are drought-tolerant. Christine mentioned specifically that permaculture design is beautiful, though it may not be "mainstream beauty." Many interviewees hinted that implementing

widespread permaculture may at first push people out of their comfort zones and they may feel privacy is being compromised, but every individual who participated in my study felt that permaculture benefits outweigh any challenges and disappointments. Other challenges at first would be design. Since permaculture is all about finding the best working design for the space, implementing it at first might have to be somewhat of a 'trial and error' approach. With the knowledge of expert permaculturalists, hopefully this would help reduce errors. Joe advises to not create clutter, to keep the design neat and attractive, by starting off small and expanding over time. George thinks one of the greatest limitations to urban permaculture is that most people don't want to get their hands dirty and grow their own food. Additionally, proper techniques can take years to learn, and many people are just too busy for this kind of time. To summarize these ideas, the greatest challenge to urban or suburban permaculture would be getting people on board, for people to change their aesthetics from the lush, green lawn, to a food forest, and to actually want to work towards growing some of their own food. There may be other challenges, especially bureaucratic challenges of local government and homeowners associations against gardens, but most interviewees felt that with enough social movement, urban permaculture would overcome these hurdles.

The participants of this study thought that urban areas might prove useful for the spread of permaculture, because ideas can proliferate quickly in densely packed areas. However, both Paul and George talked about how the environmental movement needs to change in order for permaculture and other ecofriendly ethics to catch on and become mainstream. The current approach of the environmental movement isn't intriguing enough for the average person. This is one of the obstacles permaculture faces, how to overcome the negative connotations of growing one's own food, in order to become a more commonly accepted worldview.

Since there may be initial resistance by the average person to adopt permaculture into his or her lifestyle, I asked my interviewees about the depth of individual involvement needed in order to cultivate environmental ethics. The term I used was "partially engaged" to mean that practicing permaculture is more of a hobby, rather than living on a permaculture site and eating mostly from one's own garden and that type of lifestyle. Many interviewees felt that it was all you can ask of people, that each individual has to start somewhere, so little by little people could gain more involvement. Joe said that partial engagement is the reality of community garden. It is a start, most permaculturalists responded. Christine said, "Partially engaged is the edge of a cliff. Breaking habit is difficult, but it can happen slowly. It really depends on how much you want to learn, but it is good enough." This is the beauty of permaculture; it is all about scale and design. For Paul, we need every level of engagement possible and we should meet people where they're at. Let people be involved how best fits their life, so that they are comfortable with their practice. Mary commented to this point as well, saying, "Any little bit goes a long way."

5. DISCUSSION

One of the two central questions my study was constructed to investigate is "What environmental ethics are associated with permaculture?" By interviewing nine permaculture practitioners of Central Texas, it became apparent that environmental ethics is the foundation for people to practice permaculture. I found that interviewees each adhered to different environmental ethics—some aligned more with social ecology, while others supported deep ecology. Rarely did the interviewees express tenets of both social ecology and deep ecology, but some participants expressed overlapping ethics with the land ethic and either social ecology or deep ecology. Not all interviewees fell into just one category. In this way, the land ethic might blur the dichotomy between anthropocentrism and ecocentrism. I will explore this further, after first discussing social ecological and deep ecological perspectives in this study.

It also became evident that permaculture is in itself an environmental ethic, that incorporates other ethics such as social ecology, and ethics of deep ecology, and most definitely Aldo Leopold's land ethic. Permaculture is a lifestyle, permeating into one's actions and behaviors, habits, and way of viewing the world. Although each had different personal motivations to be involved, overarching patterns and themes emerged of community, sustainability, and responsibility to take care of the local ecosystem—human and nonhuman community alike.

5.1 SOCIAL ECOLOGICAL PERSPECTIVE

Themes of social ecology were present, as interviewees valued harmonic and democratic social relations. Social ecology is the focus on how harmonious human relationships can improve the relationship between humans and nature. Recognizing inherent relationships within a system is a deep foundation to permaculture. Paul spoke about the engrained competitive

nature of the United States, and how it is ultimately a barrier to permaculture because permaculture is so much about community. Paul stated, "There is a recognition, at least from permaculturalists, that we need to work together if we are going to continue to inhabit the planet." This statement exemplifies how harmonic social relations are paramount for a sustainable relationship between humans and nature. With the competitive economic worldview that dominates American culture, community and environmental awareness are downplayed compared to individual prosperity. Community interaction is how permaculture knowledge spreads, so community is imperative for a permaculture movement. Paul felt that "permaculture reconnects us to nature," which does contain an ecocentric undertone, but this aligns with social ecology's tenet that a harmonious relationship between humans and nature will come from improved social relations.

Mary also emphasized how crucial social relations are to greater implementation of permaculture. Mary discussed how in her experience, bureaucracy, or a social hierarchy, has been one of the greatest barriers to implementing permaculture. As mentioned earlier, her local university group has hit a bureaucratic barrier to implementing a permaculture site on-campus as a demonstration of sustainability. Social ecology theorizes that social hierarchy is the root of environmental degradation. Bob also felt that government could be a social impediment to the spread of permaculture, because "governments want to make a code for it…permaculture is not about control, it's about practice." In this way, he expresses that a top-down approach and 'one-size-fits-all' is not going to work for implementing urban permaculture. This poses an interesting problem, it seems from both Bob and Mary's point of view that social hierarchy is currently an impediment to the spread of permaculture; but the participants in this study that align with social ecology imply that permaculture is necessary for better social relations and that more democratic relations would in turn lead to a more widespread practice of permaculture. Like social ecology,

these permaculture practitioners critiqued the current 'business-as-usual' social and political models, which can be impediments to implementing non-mainstream behaviors.

Likewise, Sally also seemed to align with a more social ecological perspective, discussing several times the implications of social relations on community and how important it is to have social community in permaculture. She said she thought it wouldn't be difficult for individuals to grow some of their own food or implement rainwater catchments. The real problems for permaculture would be democratic solutions, "Most permaculture is based on consensus type community decision making… how do you do that in a city that is inevitably based bureaucracy? I think it's possible, but it would definitely take a lot of work to figure out, and that's something that permaculture is just getting into." Sally also mentioned, similarly to Paul, that one of the issues with environmental ethics in our country is that environmental awareness is just not something we are taught in the United States. When I asked, "Do you think the core values [you seen in permaculture] are values that can be accepted by the general population of Austin?" she responded, "I don't think it's engrained in our education enough, we don't learn about it. People tend to be completely unaware or ignorant, which is not their fault, but they just ignore it because they don't really know what to do and they don't feel any real connection to it." In this way, Sally points out that the lack of social relationship to the natural environment really comes from our education system. Paul touches the same issue. In response to the same question, he says, "Everyone has ethics." He told the story of teaching in a workshop and asking students to think about their ethics, and how some students are completely taken aback by this question. He said he has noticed that "Ethics are the bedrock of how we work together, and they form the beliefs and the behaviors of everything we do in the world. Yet no time is spent on what they are or how they inform us. We have this massive shared group of ethics in this country, that nobody has spent the time to ask people about or helped define them." Bob, Mary, Paul, and Sally all

express a social ecological perspective as they critique the social relationships that exist in our country now, and point out that because of our damaging social relationships we have a lack of a relationship with the natural environment.

5.2 LAND ETHIC

The land ethic extends one's ethics to include nonhuman nature, to change the human position from conqueror to community member, and expresses respect for the enlarged community. Being a part of a community was a common response to my question "what is the biggest reward of practicing permaculture?" The focus on community implies harmonic social relations, which is an aspect of social ecology. Community is also very much a part of the land ethic. The difference is that Aldo Leopold's community extends beyond just the human community and actually incorporates the nonhuman world of plants, soil, and animals. This definitely was a present ethic in some of the permaculture practitioners in this study. George felt that one of the core values to permaculture was "seeing nature as an extension of ourselves." Lauren said one way that permaculture is different from industrial agriculture is because "human well-being is woven into the landscape." Furthermore, like Leopold's "plain member and citizen" of the biotic community, Lauren talked about how "we are just one of many species." Paul said in response to "do you think agriculture should be for the benefit of humans, the environment, or both?" "They're one and the same," indicating that agriculture should produce a positive well being for human and nonhuman nature alike. Community was highly emphasized by all interviewees as an integral part of permaculture.

Permaculture is not just about human community, though, and this is really where the land ethic is exhibited, because permaculture is about people care **and** earth care. Earth care, as explored above, is an extension of the things permaculturalists choose to take care of. This is

one of the foundations of permaculture and Leopold's land ethic, that community extend beyond just humans, and that we take care of the soil, plants, and animals in our community. People come together to share experiences while gardening and farming in a sustainable practice. Christine gives the example of New York City as nature, because "it's all about the relationship of elements within the space," and the "design within given spaces." This focus on relationships between the human and non-human component parts, even if those parts are not alive, such as buildings and public transportation, is a reflection of Leopold's land ethic, in which one recognizes such inevitable relationships. Christine also said the biggest reward of practicing permaculture is recognizing that she is a part of something bigger, that she is connected to the system. When describing her view of the relationship between humans and nature, she said "there is no separation…I see humans as nature. The separation is an illusion. New York City is nature. It's all about the relationship of elements within the space." Lauren adhered to a land ethic as she discussed the importance of the relationship of components within a design. "In a broader sense of responsibility, I feel I need to uphold permaculture design principles in my life. It's really easy to have blind spots, even for permaculture-trained people. I feel a strong responsibility to speak up if I see it's not the best design." "Even if it's awkward," Lauren feels responsible to speak on behalf of efficient design and efficient energy use in permaculture. She gives the example of a permaculture group she volunteered with that was given free plants, and decided to plant them far away from where people lived to take care of the plants. She felt this was not a good use of the plants or the energy. "People said, 'we got these plants for free,' and I felt that we weren't even considering care of the earth, care of the planet. These plants are living things. They were free, it didn't matter if they die or not. This to me was very anti-permaculture." Here Lauren is extending her ethics to nonhuman nature based on her understanding of permaculture. The plants need to be taken care of, and Lauren recognized the

lack of zone one design (placing the garden near frequented places) the plants would not be well tended to. Furthermore, she recognized the plants as living things, and wanted them to thrive, for she cared about their existence.

Aldo Leopold's land ethic goes beyond just seeing relationships, to embodying an ecological conscience. Permaculture practitioners in this study each expressed an ecological conscience, with their deep awareness of the environmental problems in the world and how practicing permaculture reduces their negative impact on the planet. All interviewees expressed concern for the natural environment, especially the Central Texas environment, where drought is a serious problem. An ecological conscience doesn't just recognize the serious issue of environmental degradation, but also tries to be proactive and do something to change it. This goes back to Joe's comment, which all practitioners in this study pointed to at some point, and that is a responsibility to "tread lightly on the planet." Overall, there was the recognition that the current economic and individualistic worldview is causing destruction to the natural environment. A shift in this mindset to a permaculture worldview can change the way humans interact with the natural environment, by extending our ethics to how we treat the nonhuman world. Several of the practitioners who teach permaculture, Paul, Joe and Christine, all mentioned that when this "clicks" with their students of Permaculture Design Courses, that permaculture is an entire lifestyle, these students change their lives to give back to the planet. Permaculture drives people to do better for their planet and their community; a new responsibility falls upon them to "tread lightly." In this way, the human role shifts from conqueror or dominator of nature, to an equal community member, a foundation to Leopold's land ethic. Furthermore, and this is exactly what Leopold states, Joe said that, "all other beings have the same rights as humans." So he also recognizes humans as just a "plain member and citizen" of the community.

In this way, I think aspects of the land ethic stand out amongst most interviewees, more so than the other ethics, simply because permaculture practitioners recognize the importance of preserving the integrity of the biotic community (including humans). Though not everyone blatantly expressed their role of "plain member and citizen" of the community, everyone expressed respect for nature, and understanding that earth care and people care are fundamentals to practicing permaculture. Permaculture design inherently includes humans as a part of the functionality of the system, which is part of Leopold's framework for the extended community.

5.3 DEEP ECOLOGY

Deep ecology also emerges from several interviewees. To answer question number nine of the interview, "Can you please describe how you view the relationship between humans and nature?" unanimously my interviewees responded, "We are nature." One of the tenets of the deep ecology viewpoint is viewing oneself and nature as one and the same, equally existing and coinciding on the same planet. George, in particular, spoke of many deep ecology ideas. When asked about the greatest reward of practicing permaculture, he responded, "Seeing the beauty of how nature works…as humans are a part of nature… In society, we tend to ignore that nature complements us… its nice to know it's all a natural process." Furthermore he commented that "trying to view myself the same as nature is a really nice humbling way to go through life." Many interviewees discussed how excessive our American culture is, and how practicing permaculture also means living more simply. Lauren commented that she chooses a lifestyle of "voluntary simplicity." Christine's philosophy is "remembering [practicing permaculture] is on nature's time, which is much slower [than human time]," which reflects a deep ecology mindset, in that with her practice she cannot rush the natural way of things. She also said that through her

permaculture practices she has come to realize just how highly interconnected systems truly are and that each component part of the system has value.

Arne Naess and George Sessions put forth in the deep ecology platform that "humans have no right to reduce richness and diversity except for vital needs,"[61] much like the "tread lightly" theme that emerged from the interviewees. Both George and Joe said they had a responsibility to "tread lightly." Furthermore, another deep ecology aspect is that the current way humans intervene with the natural world is excessive, causing degradation. For deep ecologists, this excessive use must decrease. Excessively using nature leads to vast environmental degradation and is unsustainable. In permaculture, simplicity is a way of life. Most interviewees discussed that permaculture incorporated all "other ecofriendly behaviors" and daily habits of conservation and mindfulness are a part of permaculture. This aligns with the deep ecology tenet that the dominant culture consumes excessively and doesn't appreciate quality of life over materialist wealth. Lauren noted several times that right livelihood is so essential to permaculture, aligning with deep ecology's tenet to appreciate quality of life. Permaculture incorporates people care and earth care, which is ensuring both humans and nonhumans are healthy and thriving.

There are other tenets of deep ecology, like a decrease in human population is a necessity for nature to thrive, and that government policies must change to recognize the importance of nature.[62] These tenets were not explicitly mentioned in the interview process. However, several permaculture practitioners, such as George, Joe, and Lauren expressed the absolute need to live more simply in order to appreciate quality of life for both humans and nonhumans. They felt

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[61] Naess and Sessions, 1993, "Deep Ecology Platform."
[62] Naess and Sessions, 1993, "Deep Ecology Platform."

that they had an obligation to not lead a high-consumption lifestyle, because the present human interaction with the environment is degrading nature. By expressing recognizing one's self as a part of nature, and that the human realm is also part of nature, they express tenets of the deep ecological perspective.

5.4 INTEGRATIVE SUSTAINABILITY ETHIC

Ideas from anthropocentrism and ecocentrism are both illustrated in Aldo Leopold's "The Land Ethic," in which he develops a moral consideration for the relationship between humans and the environment. Leopold develops the notion of the "ecological conscience," or the idea that humans can think ecologically by having constant awareness of our integral role in ecosystems. Thus, ecosystems are not outside of ourselves; we are a part of them. The land ethic simply extends our social ethics to include an enlarged community, "soils, waters, plants, and animals, or collectively: the land."[63] This extension of our social ethics can be thought of as a link between anthropocentrism and ecocentrism, in which our values as humans are not sacrificed for the environment, nor is the environment sacrificed for human life. "A land ethic changes the role of Homo sapiens for conqueror of the land-community to plain member and citizen of it."[64] Thus Leopold by no means opposes human interaction with nature, in fact he advocates for integrated social-ecological systems. However, as humans are just plain members of this greater community, we do not have the right to throw the whole system off-balance, "a thing is right when it preserves the integrity, stability, and beauty of the biotic community. It is

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[63] Leopold, 1949, p. 39.
[64] Leopold, 1949, p. 39.

wrong if it tends otherwise."[65] As humans are just one component part of the greater ecosystem, our actions have impacts whose ramifications we don't fully understand.

Through this study, it seems that the practice of permaculture may actually blur the dichotomy of anthropocentricm and ecocentrism. Although some practitioners aligned with social ecology tenets because they see human relations as impacting the relationship humans have with nature, they still reported that they view "humans as nature." Permaculture both in practice and in theory seems to refuse to divorce humans from nature. Permaculture blends humans with nature, much like the land ethic, but individual practitioners may align with social ecology or deep ecology, and yet still participate in a community together. Despite any philosophical differences, they practice permaculture to advance a sustainable lifestyle. Permaculture and sustainability blur the dichotomy between anthropocentrism and ecocentrism, by not placing more emphasis on humans or nature, but rather positioning both as integral to the design of the permaculture system.

Another theme that emerged that I have not previously discussed was a theme of sustainability, in which people stated that permaculture was the ultimate sustainability. There is one interviewee who did not seem to 'perfectly' align with any of the aforementioned environmental ethics, who is Dave. He really expressed the importance of eating healthy, as well as eating local and organic foods that are created through a sustainable relationship with nature, as they would offer the most nutrition to both people and to soils. He also expressed that the greatest reward of practicing permaculture is "being able to improve on the way things are now" to become more sustainable. Furthermore, he expressed that it is extremely important to

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[65] Leopold, 1949, p. 46.

"recreate balance," implying the importance of sustainability in all walks of life. In this way, he expresses two of the three ethical foundations to permaculture: People Care and Earth Care. Because he sees "permaculture as a design system for sustainability," and observing nature is one of the most important aspects of permaculture, he seems to align with a sustainability ethic.

A sustainability ethic proved to be a theme throughout all of the interviews during my thesis. Several permaculturalists I interacted with even stated that permaculture was beyond just sustainability they felt permaculture is regenerative. Either way, permaculture's prevalent design approach to gardening, focus on biodiversity, and empowering community makes it sustainable for ethical reasons—to give more than we take, or "tread lightly on the planet," as Joe responded. An underlying theme that emerges from this study is that permaculture makes a more sustainable human-nature relationship, one that is open for adaptation and modifying the design, as necessary.

Sustainability also aligns with Leopold's idea that "a thing is right when it preserves the integrity, stability, and beauty,"[66] though sustainability was not a buzzword when Leopold was writing in 1949. As permaculture strives to preserve integrity, stability, beauty, and resilience in a system, it must be "right" as according to Aldo Leopold. Permaculture practitioners obtain an ecological conscience through their practice, as they view themselves as part of the system. Likewise, they view nature as an integral part of the permaculture system too, and because nature is so important to the system, they extend their ethics to the biotic community. Permaculture embodies Earth Care, People Care, and Fair Share. Equality between the environment, society,

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[66] Leopold, 1949, p. 46.

and the economy is also key to sustainability. Therefore, permaculture and sustainability are seemingly synonymous, and are great demonstrations of Leopold's land ethic.

5.5 DISCUSSION OF URBAN PERMACULTURE

The second question my study was constructed to investigate is "How might permaculture practices translate into an urban setting?" I set out on this project not fully aware of all the permaculture "happenings" in Central Texas, but quickly became aware that this is a full-blown grassroots movement in Austin. Urban permaculture is an active and lively movement happening around the city of Austin, with many different groups and individuals engaging in the permaculture movement and practicing permaculture. Every interviewee felt that permaculture, or aspects of it, could be enacted in a place like downtown Austin (answer to question number 23). A frequent comment was that permaculture is all about scale and design; it can function anywhere if implemented well. Currently in Austin, there are rural farms on the outskirts of Austin located in the Central Texas region, that are of larger scale and incorporate more zone 4 and 5 aspects, such as large livestock and large plots of natural wilderness. Many of these farms exist on the Eastside of Austin (east of I-35), where there is less human development. There are also some smaller farms located within the city limits. Moving into downtown Austin, people are practicing permaculture on a smaller scale—victory gardens and backyard food forests. This type of practice is more of zones one and two. These types of permaculture gardens are much more focused on edible foods, maximizing space, and designing efficiently. Particular practices one might see in a zone one and two backyard garden, include: raised beds, keyhole gardens, spiral herb gardens, potted plants, vines or herbs growing on/in fences, hugelkultur, and wicking beds. Lauren feels that there is a lot of wasted space in the urban areas that could be used in better

ways, reused with permaculture design, thus expressing faith in permaculture to create sustainability.

I will explain here hugelkultur and wicking beds, as these practices were new to me and introduced by various permaculturalists I met during my thesis. Hugelkultur is a form of raised gardening bed, where you build the raised bed out of old logs, creating a pile of large logs on bottom, and smaller logs on top, leaving air pockets for roots of the plants you will be planting. Next, pack dirt around the logs, letting dirt loosely fill in places between the piled logs. After letting the hugelkultur beds sit for a week or so, you can begin planting plants along the sides and top of the bed. The logs on the inside will eventually rot away, providing great nutrients to the plants.[67] Like a keyhole garden, a hugelkultur bed is self-composting. It also retains water very well because of all the wood in the pile. The picture below shows a hugelkultur bed after one month, with sod planted around it. In my experience in central Texas, I saw hugelkultur beds with mulch instead of sod, to better retain water as the summer heat came. We dug our hands around the edges, finding pockets to plant our plants. Eventually, the wood will rot, and the roots of the plants will grow, filling in the center of the bed.

[67] Wheaton, Paul. "hugelkultur: the ultimate raised garden beds." Rich Soil, Permaculture articles. Online. http://www.richsoil.com/hugelkultur/ Last accessed: 18 September 2013.

Figure 8. Hugelkultur Bed After One Month

Wicking beds were also introduced to me during my interviews. They are self-watering beds, and Mary felt that they may be good for permaculture "beginners" because they are low maintenance, can be made to any size, and would do well in an urban setting. Wicking beds are typically created in a rectangular box with gravel, liners, soil, a water intake, and a drainage spout. They are called "wicking," because the wick works like capillary action and the water "climbs" up the gravel and keeps the soil moist.[68] Because the water is stored at the bottom, there is no surface water lost to evaporation. Another advantage to a wicking bed versus traditional potted plants is the drainage pipe allows water to escape in event of over-watering the plants. Please reference Rob Avis and The Permaculture Institute's guide to building a wicking bed for further information about how to create one.[68]

[68] Avis, Rob. "From the Bottom Up: a DIY Guide to Wicking Beds." The Permaculture Institute. Online. http://permaculturenews.org/2011/06/20/from-the-bottom-up-a-diy-guide-to-wicking-beds/ Last accessed: 18 September 2013.

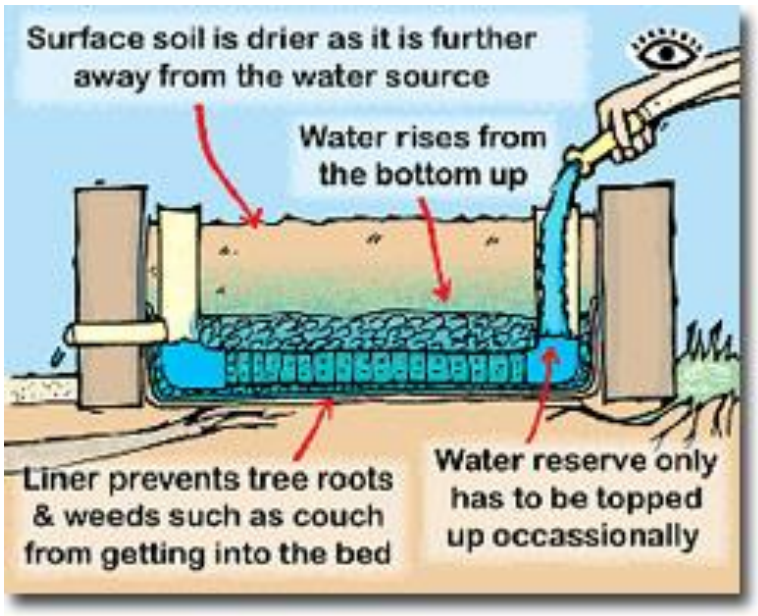

Figure 9. DIY Wicking Beds

Thinking more about the future of permaculture in Austin, downtown would remain zones one and two, depending upon space limitations. Interviewees suggested many different aspects of permaculture that could be incorporated, such as community gardens, rooftop gardens, and "victory" gardens. Empty parking lots and unused concrete spaces could be converted into gardens. Such gardens could enact different designs of permaculture, like the spiral herb garden, hugelkultur beds, or wicking beds that are designed to retain water. Downtown Austin has great vertical space that could be used for vertical herb gardens. Suburbs could incorporate zone three, as there is more land for larger gardens, such as in the first example in section four. Paul suggested removing fences between yards to allow for more space and greater design.

Interestingly, all of my interviewees discussed aspects of permaculture that could be enacted in urban spaces that were not limited to agriculture. Permaculture, due to its name, seems to be solely about agriculture. However, practitioners feel that it is beyond just growing

food, but rather is about reducing your impact on the planet. Paul responded to my question, "Besides permaculture, are there other ways that you practice ecofriendly behavior?" "That's an interesting question, because it kind of puts a border on what permaculture is or isn't. One of the things that I like about permaculture is it is so broad and encompasses so many things." In this way, many practitioners responded that buying food from farmer's markets and eating local foods were ways that permaculture could "easily translate into urban areas." Also mentioned were riding a bike or public transportation, and reducing the dependency on the automobile, to reduce the city's overall environmental impact and cultivate more local culture.

Although these suggestions are good for the planet, I don't think that biking more frequently suddenly makes you a permaculturalist. The participants of this study suggested ideas, such as public transportation, biking, and farmer's markets, as ways Austinites could implement more sustainable behaviors. The key idea is that someone who is practicing permaculture—growing perennial edible plants through permaculture's sustainable gardening techniques—should also be reducing their environmental footprint in other ways. In order to be truly practicing permaculture, one must adhere to the inherent ethics in permaculture that is earth care, people care, and fair share. By growing organic food through strategies that maximize space and reduce external inputs, permaculture is really a way of living that involves efficient use of resources, care of the earth and care for the community. Based on this study, it appears that people practicing permaculture do not want to waste energy in other aspects of their lives, as many interviewees felt that their "other eco-friendly behaviors" were a part of their permaculture practices.

5.6 FURTHER DISCUSSION

No distinguished pattern by age or gender emerged and there were many similarities across the nine interviewees in many different ways. This is because permaculture is a worldview with an ethical foundation. Mollison and Holmgren designed the practice to contain an ethical way of looking at the world, an ethical way of treating humans and nonhumans alike. The nine practitioners I spoke with all shared permaculture's worldview of caring for the earth and people, while conserving energy and resources. Though they may have aligned with different environmental ethics in different ways, they still shared a similar underlying premise, which is to lead a less destructive life.

People engage in activities that interest them, so they are bound to meet other people who hold views similar to their own. Through this involvement, they can learn about other behaviors. The participants of this study all spoke about transferring permaculture knowledge through working together, participating in online groups, and through books about permaculture. By coming together, whether it is through volunteering their manual labor and time, attending permaculture design courses, or meeting at Farmer's Markets, they are able to share knowledge about permaculture. In this way, they spread permaculture.

Through participating in a local organization's online forum, I saw how people tell each other about permaculture techniques, what worked for them and what didn't. The community aspect of permaculture furthers the sustainability ethic, as permaculture incorporates Earth Care, People Care, and Fair Share, by recognizing equality in the environment, the society, and the economy. Furthermore, Joe, Dave, Christine, and Paul all talked about how they've witnessed people in permaculture design courses change the way they behave in their lives, because the new knowledge they gained from permaculture motivated the individuals to become more sustainable in every aspect of their lives. Thus it is possible for people to be heavily influenced

by others in the permaculture group they are involved with. In this way, being involved in a permaculture group can encourage individuals to continue practicing permaculture or engage in permaculture in new or different ways. Lauren said individuals in permaculture communities can "egg each other on." Similarly, Christine spoke about how participating in permaculture activities allows awareness of people care and earth care to spread. "Sometimes at our potlucks, one of us may not have time to make something, so we buy it from the store, and we always end up talking about where our food comes from at the potluck. So this is an example of awareness of carbon footprint. It creates consciousness; permaculture shines light on the way the world works." This exemplifies how the community aspect of permaculture allows for ethical awareness to spread. This "butterfly wing effect," as Paul refers to it, is not limited to permaculture, and does include other ecofriendly activities. In this way, permaculture creates a more sustainable way to live.

To cultivate an environmental ethic through practicing permaculture is really all about the interest one has and the intent of being involved with permaculture. If persons only have time to volunteer once a month, but are eager to learn and choose to take these lessons and apply them in their everyday life—whether that be driving less and biking more, or buying more local food—then they are cultivating an environmental ethic. Leading one's life by environmental ethics is not the exact same as engaging in permaculture. However, practicing permaculture, even if only "partially engaged," can help further cultivate environmentally ethical ways of thought. Permaculture is ultimately about systems, so one of the important tenets of permaculture for people who are "partially engaged" to learn from is that we exist in highly interconnected systems, so there are many ways in which we can impact humans and nature. Understanding this systems thinking view means enacting ecofriendly behaviors in many different ways. What I learned from this thesis project is that when the interest exists, and one chooses to become involved in local permaculture groups, then that interest can blossom into

something greater, having a greater meaning and impact within the person's life. One of the questions I asked was, "Do you see the values [you mentioned in the previous questions] as values that can be acceptable amongst the general population of central Texas?" Lauren responded that in addition to food and water security (which is one reason people may engage in permaculture) people are really beginning to notice community is lacking and this may encourage more community-centered practices, such as permaculture and community gardening.

6. CONCLUSIONS

Permaculture has an inherent ethical foundation that aligns with other environmental ethics, such as social ecology, deep ecology, and Aldo Leopold's the land ethic. Permaculture is sustainable, and many interviewees felt that it was more than just sustainable and is actually regenerative. When interviewees discussed how permaculture is regenerative, they focused on how it gives back more to the earth than it takes. For other interviewees, this is what sustainability means. Everyone agreed that the meticulous design approach to permaculture is what makes it sustainable (or regenerative) because a lot of thought *should* be put into the gardening techniques, in order to create the most successful permaculture site. As Bob said, permaculture "is not just about growing things, it's about systems." Permaculture differs from other sustainable agricultural practices because of the emphasis on relationships between the component parts within the system. The Permaculture Design Course teaches students how to view the world from a relational perspective. The participants in this study unanimously agreed that permaculture is a better practice for both humans and nature than industrial agriculture. Interviewees also felt that permaculture is a tool for reconnecting with the natural environment.

For this thesis, I wanted to discuss with my interviewees what urban permaculture in a city like Austin, Texas would look like in terms of specific practices that may be practiced in the city, and how more people may become involved in practicing permaculture. What I found was that urban permaculture is happening in Austin. It is a grassroots movement in the making already. The future of this movement is how to get more people involved. In this modern day, we face vast environmental degradation due to unsustainable use of our natural environment. Because of this urgent problem, developing an ethical foundation for meeting human needs while also preserving the health of the environment is important for the well being of future social and ecological systems.

6.1 LIMITATIONS AND RECONSIDERATIONS

There are definitely some limitations of this study, which I will discuss here. To begin, this study has a small sample population with only nine interviewees. Additionally, the interview was very in-depth, with interviews running from forty minutes to an hour and a half, so a lot of material was covered, some of it maybe not quite as pertinent to environmental ethics, sustainability, or urban permaculture, as other parts of the interview. A shorter interview could have been straight to the point and covered the same material. Not only was the sample size small, but the sample population comes only from the greater Austin area, not covering the entirety of Central Texas. A survey may have been able to gather more participation as it would have allowed for people to participate as their schedule permitted, instead of having to find convenient times that fit with my schedule, which proved to be a difficult task. Furthermore, this study cannot comment on the view permaculturalists have of using genetically modified crops, because I did not ask that question. However, it would be good information to gather, as genetic modification could potentially benefit a water-deprived area, such as Central Texas. This brings up a point that George had mentioned in his interview—he said that technology can get in the way of practicing permaculture. So, what types of technology are allowed in permaculture? In section 6.3, I will discuss the potential for future studies based on some of these limitations.

6.2 POLICY IMPLICATIONS

From a bigger picture perspective, scientists have concluded that climate change is a result of unsustainable human behaviors. Industrial activities pump billions of tons of carbon dioxide and methane into the atmosphere causing changes in the gaseous concentration of the atmosphere, which results in climatic changes. In order to abate some of the impacts of climate

change, we need to change such harmful human activities. Industrial agriculture and land-use changes are significant contributors to methane and carbon dioxide emissions, which are major causes of climate change.[69] Synthetic fertilizers and pesticides are also produced from oil, thus also contributing to climate change. Not to mention that industrial agriculture is causing desertification of land around the world, as well as depleting water resources, both of which will be further exacerbated by climate change. Furthermore, climactic changes will ultimately result in humans having to adjust agriculture to new climate zones, which only further begs for us to implement more adaptable agriculture sooner rather than later.

Turning more locally, to the City of Austin, which has been implementing local agricultural practices in the recent years, implementing more permaculture practices can assist with these efforts to make Austin more sustainable. The City of Austin wants to encourage local food security through implementing more urban farms and growing local produce, but it has recommended that water use be in line with conservation efforts, only organic fertilizers be used, and fewer carbon resources be used.[70, 71, 72] Although permaculture is not the only option for sustainable agriculture as outlined by the City's Sustainable Food Policy Board, there are definitely widespread implications for permaculture's unique design techniques, which emphasizes locally-adapted plants.

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[69] Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). 2007. "Human and Natural Drivers of Climate Change." *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Cambridge University, Cambridge, UK. Available online: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspm-human-and.html Last Accessed: 7 October 2013.

[70] City of Austin. "Sustainable Urban Agriculture." Online. http://austintexas.gov/department/sustainable-urban-agriculture Last accessed: 7 October 2013.

[71] City of Austin. "Sustainable Urban Agriculture and Community Garden Resolution: Resolution No. 20091119-065." Online. http://www.austintexas.gov/sites/default/files/files/Parks/communitygardens/resolution.pdf Last accessed: 12 October 2013.

[72] City of Austin. "Urban Farms Public Session #3: Byproducts, Environmental Health, Sustainability." Online. https://docs.google.com/file/d/0BxzylTILPsr2bnAyOXZPRzNXanM/edit?usp=sharing&pli=1 Last accessed: 7 October 2013.

Joe, who serves on the board of a local sustainable food organization, had many suggestions for policy implications of urban permaculture that I will share here. He said,

> Urban permaculture uses the same ethics, aims, principles, and techniques to address different landscapes, micro-climates, resources, and needs. It is more difficult than raw/virgin land, but permaculture loves challenges—like going up to rooftop gardens, planting in balcony containers and 'greening' with edible plants or vines on the whole south side of multi-story apartments or offices; like finding empty and abandoned city lots, doing guerilla gardens, pressuring city hall for land, water, space; like getting into green affordable housing; like working with homeless, low-income, and the disadvantaged for better nutrition and better life. Lots of good permaculture challenges, including stacking and packing to get big yields from small lots. Go outside of the U.S. to densely populated countries and each house has a garden, trellis, and hopefully forest gardens, in addition to the crop fields on the outskirts—both of these are brimming with permaculture potential. Community gardens, farm to market gardens in suburbs, urban animals (chickens, rabbits, doves, fish ponds)…

These are all aspects of permaculture that with the right design can be implemented in a place like the City of Austin. He especially points out the many ways City Council can implement permaculture practices into affordable housing, and helping the homeless and low-income populations in Austin with better nutrition. Many interviewees, such as Sally, Mary, and Bob, mentioned that bureaucracy, such as Homeowners Associations (HOAs) and City Council, may be an impediment for the spread of permaculture. Joe felt that there are ways for bureaucratic organizations to partner with the community, nonprofits, or private companies, and develop permaculture in the city. Permaculture can help with water conservation efforts, which can be beneficial to municipalities, and it can benefit the local economy through Farmer's Markets. The Texas 83rd Legislature had many proposals for water conservation efforts, and passed Senate Bill 198 to prevent HOAs from banning water-saving behaviors at the homeowner level, such as

xeriscaping.[73] Therefore, across Texas, where water is becoming increasingly scarce, permaculture should be an acceptable urban, suburban, and rural practice.

Permaculturalists in this study felt that the infrastructure that is already in place in Austin can work for integrating urban permaculture, as people can grow food on their balconies, rooftops, or in self-watering containers, such as wicking beds. People can also grow small to large backyard permaculture gardens, or participate in local community gardens. Although Bob and Dave felt there might be some limitations due to pre-existing conditions of the city, and large livestock (horses, cattle) could not be used in a downtown permaculture site, permaculture is all about scale and design. Joe made the point to start small, with a clean design that can be redesigned if needed, and can be expanded if successful. If the design is too clustered with plants and animals, not only may it not thrive, but it can also be aesthetically displeasing. Many interviewees pointed out that aesthetics and the idea of beauty may have to be redefined by the local culture in order for permaculture to be implemented successfully. It may be difficult at first to recognize the locally-adapted landscape to be as aesthetically pleasing as the lush green suburban lawn, but eventually, with a shift in mindset, it could be adopted.

In order to mitigate climate change through agricultural practices or to create a more sustainable city, there is a need to change the mindsets of humans. We cannot continue to think of our planet as a dispensable plethora of resources put here for human purposes. At the very least, we need to recognize limitations to consumption and growth. Adopting an environmental ethic is one way to recognize such limitations, and permaculture may be a tool to understanding a more eco-centric perspective. As Sally pointed out, environmentalism is not engrained in our

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[73] Texas 83rd Legislature. Senate Bill 198. Online. http://www.legis.state.tx.us/BillLookup/History.aspx?LegSess=83R&Bill=SB198 Last accessed: 14 October 2013.

culture or our education in the United States, and without this 'socialization' of understanding nature, our culture lacks a relationship with the natural environment. Therefore, I think a great idea for permaculture in Central Texas is to implement small-scale designs at local schools, where students can have experiential learning opportunities about interrelating to nature and fellow gardeners/students.

Here I will suggest several policy ideas for permaculture in central Texas:

1. Create permaculture sites at local elementary, middle, and high schools where biology classes can study plant life, and home economics classes could study how to grow one's own food. Learning how to garden can benefit the students, as well as help the school conserve resources on the school grounds through water conservation techniques. Another benefit of gardening in school is teaching students about the importance of nutrition.

2. Team up with local permaculture organizations and begin after-school programs and summer programs that center around forming a permaculture community (these could even be coordinated with the permaculture sites on school campuses). This policy idea goes beyond just a semester or year-long class where the student is required to garden, but actually would form a community of students around gardening (much like a school club), where students are voluntarily participating in permaculture. The water utilities could offer discounts on water to the schools to incentivize permaculture clubs, though the permaculture techniques would not require a lot of water. Local seed banks and gardening stores could offer discounts to administrators of the school programs to make the program affordable for the school district.

3. Organize students of a local university to develop an on-campus permaculture site to model sustainability for the entire university. The university could team up with a local public school, such as elementary or middle school, and offer biology and ecology lessons for those

students. The permaculture site could also act as a model for the local community to learn more about how to integrate permaculture into their own lives.

4. Integrate permaculture into specific subdivisions, like Mueller in Austin, where the focus is "green living" through building energy efficient housing with mixed residential houses, apartments, retirement centers, and with grocery stores and shopping centers.[74] The subdivision could offer programs for homeowners to participate in the permaculture gardens and take home the vegetables that are grown. The garden could also act as a demonstration for other subdivisions and homeowners associations.

5. Create permaculture community gardens near homeless shelters by creating programs between local permaculture organizations and organizations like Salvation Army, where they can offer a work-for-food trade program. As homeless people help out in the garden, they can get food at the end of the day.

6. Many new residential mid-rises are being built in downtown Austin. The City could offer a tax-break to a mid-rise that creates rooftop and trellis gardens and requires residents to participate in these on-site permaculture gardens. The City could also offer property tax breaks or discounts on water to residents in the building as an incentive to participate in this type of residential living. A local seed bank or garden store could donate or offer a discount on the original supplies and then the building could advertise the store's business to new residents, as well as publicize the benefits of permaculture to the city. Additionally, this mid-rise should be built with energy efficient techniques, such as LEED certification, and with the infrastructure

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[74] Mueller. 2013. "About Mueller." Online. http://www.muelleraustin.com/about/about-mueller Last accessed: 10 October 2013.

for gardening. For example, if there is a terrace where the permaculture garden will be placed, the design should contain a tool shed and water tap with a water hose nearby.

7. Cities and HOAs could offer rebate programs for water conservation through implementing permaculture techniques at the homeowner level. They could offer rebates on compost or potting soil. They could offer free stones for building spiral herb gardens. They could even team up with teachers of Permaculture Design Courses and offer rebates for passing the certification and implementing permaculture design at the household level.

8. The City of Austin can create a partnership with the Lady Bird Johnson Wildflower Center for to create a permaculture site that could act as a model for other permaculture sites. It could be designed in such a way to model different designs for urban and suburban permaculture. Within one large site, the model could exemplify a food forest, spiral herb gardens and vine or trellis gardens, as well as demonstrate self-watering beds, aquaponic systems, and greenhouses.

At first, there may be opposition at many different levels, from bureaucratic to individual residents, to implementing permaculture in the urban and suburban areas of Central Texas. Many practitioners in this study felt that getting involved and experiencing permaculture is the ideal way for people to become more comfortable with permaculture. For several interviewees, the biggest reward of practicing permaculture was getting to experience growing one's own food and implementing a sustainable practice. The majority of interviewees felt that the urban area is where ideas can spread most quickly, and thought that the urban area was ideal for the social adoption of widespread permaculture. In order for permaculture to be implemented around the Central Texas region, people will have to begin practicing, whether that be at a nearby permaculture community garden or in their own backyards, and demonstrate to HOAs and City Council that there is a need for more permaculture practice. It is best in all of these instances to

engage the knowledge of local permaculture experts (certified in permaculture). It's also a good idea to start off with a small design and expand as the site is successful.

6.3 FUTURE STUDIES

There are many opportunities for future studies based on the results presented here. One future study would be to repeat this study with a greater sample population and cover more of the Central Texas area. This study could also be expanded by interviewing and observing permaculture communities and groups in other cities. Although these studies would be helpful in determining what environmental ethics align with permaculture, this thesis illustrates that permaculture has underlying environmental ethics of earth care, people care, and fair share. For Central Texas, I think other studies about permaculture would be ideal. A future study should focus their research question on: How can more people become involved in urban permaculture? Other studies, not limited to just Central Texas, could ask questions, such as: What other types of practices can cultivate an environmental ethic and create a more sustainable society?

Ultimately future studies about urban permaculture as community gardens, in individual's backyards, or as rooftop gardens would be beneficial for the study of sustainability. Society could benefit from further research about how permaculture could add to sustainability. Sustainability could also benefit from a study about influencing the youth to lead more sustainable lives, so that future generations learn how to become more sustainable, and break away from the modern worldview of nature as resources. A researcher could implement permaculture at a local middle school or high school and study how students' relationship with the environment and understanding of natural processes evolves. Permaculture has a lot to offer

for the study of sustainability. Because permaculture and sustainability are not mainstream ideas, a forward-thinking city like Austin, Texas can be a model for urban permaculture.

APPENDIX A:

Informed Consent to Participate in Research

Environmental Ethics and Urban Permaculture in Central Texas

You are asked to participate in a research study conducted by Katie Samples, from the Philosophy department of Texas State University- San Marcos. This study is being conducted as a thesis as part of Katie's graduate program in Sustainability. Your participation in this study is entirely voluntary. Please read the information below and ask any questions about anything you do not understand, before deciding whether or not to participate. If you have further questions for Katie, you may contact her at sampleskt@yahoo.com or (512) 656-6497.

Purpose of Study

The purpose of this research is to gain an understanding of the philosophies that inform the way of life of people who participate with permaculture, and to discuss permaculture in the urban setting. This is a unique topic to study, as we face vast environmental degradation around the world. This research is being conducted in order to study different ethical relationships that exist in permaculture practices. You have been asked to participate in this research because of your involvement in permaculture practices in Central Texas.

Procedure of Study

If you volunteer to participate in this study, you will be asked to partake in an interview process. Katie will ask a series of prepared questions, which will take about 60 minutes of time. You may answer these questions in short or long responses. If you would like to give more anecdotal responses, that is welcomed too. The entire interview will be recorded with a tape recorder, which will not leave the hands of the researcher. You may choose to not answer a question at any time. Here is a sample of the questions that will be asked during the interview:

- How long have you been involved with permaculture?
- Do you think practicing permaculture is a good way of life for you personally?
- Are you familiar with the concept of sustainability?

Confidentiality

Any information that is gathered during this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Confidentiality will be maintained, as this study does not need any information other than your name, which you can choose a pseudonym if you would prefer, and your thoughts on permaculture practices. The answers you give in the interview process as well as the recording will be available only to Katie, the researcher. The audiotape will be kept for up to one year after the interview process with other research documentation at Katie's residency. This information will never be given out and will be used only for the purpose of this research project.

Participation and Withdrawal

Your participation in this study is entirely voluntary. If you choose to participate in this study, you may withdraw your participation at any time, without any penalty, and you and your answers will no longer be used in the study.

Rights of Research Participants

The Texas State University Institutional Review Board has reviewed the request to conduct this research. If you have any further questions or concerns about this study, you may contact the IRB chair, Dr. Jon Lasser (512-245-3413 – lasser@txstate.edu), or to Ms. Becky Northcut, Compliance Specialist (512-245-2102).

I, _____, understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____ _____

Signature of Participant Date

_____ _____

Signature of Researcher Date

APPENDIX B:

Interview Questions

Gender: M F

Occupation/ Age: 18-30 31-50 50+

Employment: Are you employed (other than permaculture)?

Questions

Personal engagement with permaculture:

1. How long have you been involved in permaculture?
    a. Are you certified in permaculture? Y / N
    b. Have you taken classes in permaculture?
2. In what ways do you engage in permaculture, i.e. live on a farm, engage in community gardens, etc?
3. What responsibilities do you have when volunteering/working with this community?
4. Did you grow up engaging in outdoor activities? If so, what kinds?
5. What is the biggest reward of practicing permaculture?
6. What is the biggest challenge or disappointment of practicing permaculture?
7. Do you consider yourself a social, political, or environmental activist?
8. Do you have a philosophy, a mantra, or a motto that informs your permaculture way of life?
    a. What motivates you to continue practicing permaculture?
9. Describe how you view the relationship between humans and nature.
10. Does practicing permaculture enlighten your view of the relationship between humans and nature?
11. Has your view of nature changed since you began practicing permaculture?

12. Are you familiar with the concept of sustainability? (*If no, then define as: environmental and social responsibility that allows the needs of the present generation to be met without compromising the needs of future generations*)
    a. Based on your understanding of sustainability, is permaculture a sustainable way of life?
13. Besides permaculture, are there other ways that you practice ecofriendly behavior?

On a scale of 1 to 5…

14. On a scale of 1 to 5, with 1 being not at all concerned, and 5 very concerned, how concerned are you about the state of the environment?

1	2	3	4	5
not at all concerned		moderately concerned		very concerned

    a. Local environment (central Texas)?
15. On a scale of 1 to 5, how concerned are you about global climate change?

1	2	3	4	5
not at all concerned		moderately concerned		very concerned

    a. On a scale of 1 to 5, with 1 being not at all urgent and 5 being very urgent, how urgent do you find the issue of global climate change?

1	2	3	4	5
not at all urgent		moderately urgent		very urgent

16. On a scale of 1 to 5, with 1 being not at all important and 5 being very important, how important do you think it is to live a sustainable lifestyle?

1	2	3	4	5
not at all important		moderately important		very important

Permaculture on a larger scale (open-ended):

17. The three foundations of permaculture are: Earth Care, People Care, and Fair Share. What do these mean to you?
18. Will you please compare/contrast permaculture and industrial agricultural practices?
19. Do you think agriculture should be for the benefit of humans, the environment, or both?
    a. Do you feel permaculture accomplishes <response to Q19>?
    b. Do you feel industrial agriculture accomplishes <response to Q19> ?
20. Are you familiar with Bill Mollison's book, Introduction to Permaculture? Y / N
21. Do you feel that being part of a permaculture community influences overall environmental awareness and behaviors of other people who practice permaculture that you have met? If so, how?
22. What are some of the core values that you see amongst other permaculturalists?
    a. Do you share some of these same values?
    b. Is this a set of values that you view as being acceptable amongst the general population in the Austin area?
    c. If you have been involved with other permaculture communities or groups, can you please elaborate on values that you see at those communities? Are they the same or are they different?
23. Do you think permaculture, or aspects of permaculture, can be enacted in urban areas, such as in urban gardens or urban homes?
    a. If so, are there any permaculture practices that you think can easily translate into the urban lifestyle?
        i. Do you see permaculture practices more easily translating into cities, suburbs, or both?

24. Do you think there are benefits of urban society adopting permaculture practices? Any negative implications?
25. Do you feel there are limits to urban gardening (as compared to a large, rural farm)?
26. Do you think being partially engaged in permaculture practices can help foster an environmental ethic?
    a. Or, do you think in order to cultivate an environmental ethic, people must be fully dedicated to practicing permaculture, such as living full-time on a rural permaculture farm?

This concludes the interview. Thank you very much for participating, it has been very interesting to hear about your perspective.

27. Do you have anything you would like to add?

BIBLIOGRAPHY

Acker, G. Elaine. 2012. "Keyhole Gardening: unlocking the secrets of drought-hardy gardens." *Texas Co-op Power.* Online. http://www.texascooppower.com/texas-stories/nature-outdoors/keyhole-gardening Last accessed: 13 October 2013.

Adams, W. W. 2007. "The Primacy of Interrelating." *Journal of Phenomenological Psychology 38 (1),* pp. 24-61.

Allen, Patricia L. and Carolyn E. Sachs. 1992. "The Poverty of Sustainability: An Analysis of Current Positions." *Agriculture and Human Values 4 (4),* pp. 29-35.

Austin, Texas, Municipal Code § 03-02-16.

Avis, Rob. "From the Bottom Up: a DIY Guide to Wicking Beds." The Permaculture Institute. Online. http://permaculturenews.org/2011/06/20/from-the-bottom-up-a-diy-guide-to-wicking-beds/ Last accessed: 18 September 2013.

Bardot, Jean. "15 Reasons to Build a Spiral Herb Garden for Your Permaculture Garden." Online: http://www.realfarmacy.com/15-reasons-to-build-an-herb-spiral-for-your-permaculture-garden/ Last accessed: 17 September 2013.

Black, Dave. 2008. *Living off the Grid.* New York: Skyhorse Publishing.

Bookchin, Murray. 1987. "Social Ecology versus Deep Ecology: A Challenge for the Ecology Movement." Online. http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/socecovdeepeco.html Last accessed: 13 October 2013.

Brand, Stewart. 2009. *Whole Earth Discipline: Why Dense Cities, Nuclear Power, Transgenic Crops, Restored Wildlands, and Geoengineering are Necessary.* New York: Penguin Books.

Callicot, J. Baird. 2004. "Environmental Ethics: I. Overview." *Encyclopedia of Bioethics, 2.* Online. http://find.galegroup.com/gic/infomark.do?&contentSet=EBKS&idigest=fb720fd31d9036c1ed2d1f3a0500fcc2&type=retrieve&tabID=T001&prodId=GIC&docId=CX3402500165&source=gale&userGroupName=itsbtrial&version=1.0 Last accessed: 13 October 2013.

Catton, William R., Jr. 1987. "World's Most Polymorphic Species." *Bioscience 37,* pp. 413-419.

Capra, Frijtof. 1996. The Web of Life. New York: Anchor Books.

City of Austin. "Sustainable Urban Agriculture." Online. http://austintexas.gov/department/sustainable-urban-agriculture Last accessed: 7 October 2013.

City of Austin. "Sustainable Urban Agriculture and Community Garden Resolution: Resolution No. 20091119-065." Online. http://www.austintexas.gov/sites/default/files/files/Parks/communitygardens/resolution.pdf Last accessed: 12 October 2013.

City of Austin. "Urban Farms Public Session #3: Byproducts, Environmental Health, Sustainability." Online. https://docs.google.com/file/d/0BxzylTILPsr2bnAyOXZPRzNXanM/edit?usp=sharing&pli=1 Last accessed: 7 October 2013.

Goodland, Robert and Herman Daly. 1996. "Environmental Sustainability: Universal and Non-negotiable." *Ecological Applications 6 (4),* pp. 1002-1017.

Hammond, Debora. 2005. "Philosophical and Ethical Foundations of System's Thinking." *Triple C 3 (2),* pp. 20-27.

Holmgren, David. 2013. "About Permaculture." *Holmgren Design.* Online: http://holmgren.com.au/about-permaculture/ Last accessed: 29 September 2013.

Holmgren, David. 2002. *Permaculture: Principles and Pathways Beyond Sustainability.* Victoria, Australia: Holmgren Design Services.

Horrigan, Leo, Robert S. Lawrence, and Polly Walker. 2002. "How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture." *Environmental Health Perspectives 110 (5),* pp. 445-456.

Francis, Robyn. "Djanbung Gardens." Australia. Online: www.permaculture.com.au Last accessed: 20 September 2013.

Francis, Robyn. "Permaculture: Djanbung Gardens." Online: http://www.robynfrancis.com/category/permaculture/djanbung-gardens-permaculture/page/2/ Last accessed: 17 September 2013.

Francis, Robyn. 2010. "Learning from Cuba's Footprint." Permaculture College Australia. Online. http://www.permaculture.com.au/articles/permaculture-insights/learning-from-cubas-footprint.html Last accessed: 8 October 2013.

Jackson, Sego. 1984. "Permaculture: Sophisticated Ecological Understanding Blended with Common Sense Design Creates Productive Landscaping." *Living in the Land.* Context Institute. Online: http://www.context.org/ICLIB/IC08/Jackson.htm Last accessed: 9 December 2012.

Kemmis, Daniel and Matthew McKinney. 2011. *Collaboration and the Ecology of Democracy.* Kettering Foundation.

Kirschenmann, Frederick L. 2010. *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher.* Lexington, Kentucky: The University of Kentucky Press.

Leiserowitz, Anthony A. and Lisa O. Fernandez. 2007. "Towards a New Consciousness: Values to Sustain Human and Natural Communities." Yale School of Forestry and Environmental Studies.

Leisure Coast Permaculture Design. "Permaculture Visions Design Course." 2010. Online: http://permaculturevisions.com/courses/permaculture-design-course/ Last accessed: 18 December 2012.

Leopold, Aldo. 1949. *A Sand County Almanac: and Sketches Here and There.* London: Oxford University Press. pp. 38-47.

Lovelock, James and Lynn Margulis. 1974. "Atmospheric homeostasis by and for the biosphere: the gaia hypothesis." *Tellus 26 (1-2),* pp. 2-10.

Mackintosh, Craig. 2007. "Greening the Desert." *The Permaculture Research Institute.* Online: http://permaculturenews.org/2007/03/01/greening-the-desert-now-on-youtube/ Last Accessed: 29 September 2013.

McDonough, William and Michael Braungart. 2002. *Cradle to Cradle: Remaking the Way We Make Things.* New York: North Point Press.

Miller, Tyler G. and Scott Spoolman. 2010. *Environmental Science.* California: Books/Cole Cengage Learning.

Mollison, Bill. 1991. *Introduction to Permaculture.* New South Wales, Australia: Tagari Publication.

Mueller. 2013. "About Mueller." Online. http://www.muelleraustin.com/about/about-mueller Last accessed: 10 October 2013.

Naess, Arne and George Sessions. 1993. "Deep Ecology Platform." Green Web Publications. Online: http://home.ca.inter.net/~greenweb/DE-Platform.html Last accessed: 21 September 2013.

Palmer, Clare. 1997. *Contemporary Ethical Issues Environmental Ethics*. California: ABC-CLIO.

Permaculture Institute. 2013. "Sustainable Living, Practical Learning." Online: http://www.permaculture.org/nm/index.php/site/permaculture_design_course Last accessed: 29 September 2013.

Permie Taelor. "So, what is a food forest anyway?" Austin EcoNetwork. Online: http://www.austineconetwork.com/blog/so-what-food-forest-anyway Last accessed: 23 August 2013.

Quinn, Meagan. "The Power of Community: How Cuba Survived Peak Oil." Resilience.org. Online. http://www.resilience.org/stories/2006-02-25/power-community-how-cuba-survived-peak-oil Last accessed: 17 September 2013.

Regnerative Design Institute. "Robyn Francis." Online: http://www.regenerativedesign.org/robyn-francis Last accessed: 17 September 2013.

Rigby, D. and Cáceres, D. 2001. "Organic Farming and Sustainability of Agricultural Systems." *Agricultural Systems 68 (1),* pp. 21-40.

Rowe, Stan. 2003. "The Living Earth and Its Ethical Priority." *The Trumpeter 19 (2),* pp. 69- 82.

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). 2007. "Human and Natural Drivers of Climate Change." *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.* Cambridge University, Cambridge, UK. Available online: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspm-human-and.html Last Accessed: 7 October 2013.

Tagari Publications. "Bill's Journal." Online: http://www.tagari.com/bills_journal Last accessed: 29 September 2013.

Texas 83rd Legislature. Senate Bill 198. Online. http://www.legis.state.tx.us/BillLookup/History.aspx?LegSess=83R&Bill=SB198 Last accessed: 14 October 2013.

Wheaton, Paul. "hugelkultur: the ultimate raised garden beds." Rich Soil, Permaculture articles. Online: http://www.richsoil.com/hugelkultur/ Last accessed: 18 September 2013.

World Health Organization. 2013. "Food Safety: 20 Question on Genetically Modified Foods." Online. http://www.who.int/foodsafety/publications/biotech/20questions/en/ Last accessed: 9 October 2013.

Worldwide Permaculture Institute. 2010. "Worldwide Permaculture Projects." Online. http://www.permaculturegloba l.com/projects?utf8=✓&search=&type=&climate=&commit=Filter Last accessed: 13 October 2013.