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Ecocentric Consumption: Integrating North American Indigenous Agricultural Practices into Western Agribusiness across the U.S.

A thesis submitted to
Regis College
The Honors Program
in partial fulfillment of the requirements
For Graduation with Honors

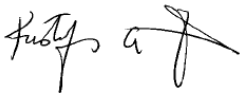
by

Eva Siath

Thesis Written by

Eva Siath

Approved by:

 _____ Thesis Advisor

 Thesis Reader

Accepted by:

_____  _____Director, Regis College Honors Program

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Abstract

Name: Eva Siath, Major: Environmental Science, Minor: Biology

A PURSUIT TOWARDS ECOCENTRISM: DECONSTRUCTING PRECONCIEVED OBLIGATIONS TO NATURE AND INTEGRATING NORTH AMERICAN INDIGENOUS AGRICULTURAL PRACTICES INTO WESTERN AGRIBUSINESSES ACROSS THE U.S.

Advisor's Name: Dr. Kristofor Voss

Reader's Name: Dr. Anandita Mukherji

Humanity's displacement from nature is overwhelmingly prevalent in the United States due to centuries of westernization and colonialism, and it largely dwells in the idea of anthropocentrism. While anthropocentrism is often characterized by entitlement to the resources that nature provides, causing massive displacement from the necessary interdependence between humanity and nature, ecocentrism promotes reciprocal interactions between humanity and nature and restores the dynamic exchange necessary for thriving ecosystems. Through comparing North American Indigenous and Westernized European agricultural practices in the United States, this thesis seeks to find the intersection between preconceived ethical obligations to nature and the agricultural interactions and technologies humans use to cultivate crops. This thesis seeks to reintegrate North American Indigenous farming techniques such as intercropping, permacultures, agroforestry, and the Honorable Harvest to modern westernized agribusiness in the United States; a societal shift towards ecocentrism in the agricultural industrial complex in the United States is necessary due to the extensive habitat fragmentation and environmental degradation associated with western industrialized agriculture.

Acknowledgements

I express my deepest gratitude to the Indigenous stewards of Earth for sharing such valuable, sacred knowledge. Being able to not only live but also receive education on the ancestral homelands of the Ute, Cheyenne, and Arapaho Nations is an insurmountable privilege, and we owe the Indigenous Peoples of North America far more than physical reparations could ever suffice. I thank Dr. Wall Kimmerer and Dr. Hernandez for writing such prolific books like *Braiding Sweetgrass* and *Fresh Banana Leaves* that inspire ecocentrism and co-productions of knowledge.

I offer my thanks to my friends and family for supporting me during this process. Through not only the vibrant community of the Regis College Honors Program, but also the challenges and triumphs in writing this thesis over the past year, I am endlessly grateful for the individuals in my life who have offered endless encouragement. I am especially thankful for Dr. Narcisi, Dr. Schreier, and Deb Preston for being such supportive presences, regardless of the circumstances.

I would also like to thank my reader, Dr. Mukherji, for offering such keen advice in enhancing my philosophical arguments around ecocentrism and anthropocentrism. Despite difficulties throughout the year, she never failed to send me intentional feedback on every draft of this thesis.

Finally, I am unabatingly appreciative of my advisor, Dr. Voss, and all the effort he has put into refining this thesis, from overarching themes to sentence structures and word choice. Offering both personal and academic reassurance and support, I cannot thank him enough for the time and energy he has put into clarifying and reinforcing my arguments.

Introduction:

Through comparing North American Indigenous and Westernized European agricultural practices in the United States, this thesis seeks to find the intersection between preconceived ethical obligations to nature and the agricultural interactions and technologies humans use to cultivate crops. The cultural origins of both Westernized and North American Indigenous Peoples reflect competing viewpoints about their relationships with the environment: anthropocentrism vs. ecocentrism. While anthropocentrism is often characterized by entitlement to the resources that nature provides, causing massive displacement from the necessary interdependence between humanity and nature, ecocentrism promotes reciprocal interactions between humanity and nature and restores the dynamic exchange between trophic levels. This thesis seeks to reintegrate North American Indigenous farming techniques to modern westernized agribusiness in the United States; a societal shift towards ecocentrism in the agricultural industrial complex in the United States is necessary due to the extensive habitat fragmentation and environmental degradation associated with western industrialized agriculture.

Chapter 1: To what degree are ecocentric and anthropocentric paradigms reflected in the relationships that Western European colonists and North American Indigenous peoples have with their environment?

"Every landscape reflects the history and culture of the people who inhabit it…" (Kimmerer & Lake 2001

Humankind's displacement from nature is overwhelmingly prevalent in the United States due to centuries of westernization and colonialism, and it ultimately dwells in the idea of anthropocentrism. While the word 'westernization' is often used in the academic setting, it is important to provide specific context for the term. With the massive presence of globalization, westernization refers to influences from Western Europe, especially in the context of colonization. These influences appear in terms of social conventions, traditions, religious and cultural beliefs, political systems, and especially ethical values (Mohamed 2012). Often when legal reporters from the United States refer to the development of non-western parts of the world such as Asia, Africa, and the Americas, they measure progress in terms of 'westernization' (Lau 2013). Specific qualities of Western development include the establishment of scientific and educational institutions, the rise of nationalism, and strong political culture and leadership in the country. This inherently elevates Eurocentrism and disregards progress outside of standards set by Western Europe. As Eurocentrism is uplifted, so is the underlying ethical methodology of anthropocentrism: the belief that intrinsic value is human-centered.

An important way of understanding one's place in the world is to consider where and how different types of value are assigned. The extent to which humans place instrumental, intrinsic, and moral values on other non-human entities and objects varies considerably.

Instrumental value is applied to objects and beings that may help one achieve a desirable end, like appliances and tools (Westacott 2019). Intrinsic value is applied to objects and beings that are valuable for their own sakes- they are the *ends* rather than the means; moral value is assigned to beings with free moral judgment, the capability to know and enact right from wrong (Westacott 2019).

In the anthropocentric view, non-humans are typically stripped of moral value, which leaves room for humans, who are self-proclaimed to possess moral value, to use other aspects of their environment as they see fit. The idea of moral value is completely reliant on the existence and persistence of humankind, centralizing human superiority. Because we are the only species capable of communicating right from wrong, we automatically assume we can dictate the moral value of non-humans. Thus, moral value is innately linked with anthropocentrism. In the anthropocentric view, nature deserves moral consideration and protection to the extent of which it aids or harms humans (Kortenkamp & Moore 2002). Thus, non-human entities, both abiotic and biotic, only have instrumental value. The underlying implications are that humans alone possess intrinsic value and are the most significant entities on Earth (Goralnik & Nelson 2012). Other living beings and ecological systems are simply means to human ends. Centralizing humanity insinuates that deciding to protect or destroy a non-human entity for the good of humanity is of the utmost importance, because the intrinsic value of non-human factors is vastly discounted. By asserting that humans alone have moral value and that only the instrumental value of non-humans matters, the anthropocentric viewpoint sets no precedent for preserving other entities outside of humankind for the sake of their own autonomy and respect (Goralnik & Nelson 2012).

Ecocentrism, on the other hand, recognizes the intrinsic value of all organisms and the abiotic components that support them in an ecosystem. Non-human nature has irreplaceable value separate from human preferences and needs. Elements of the ecosphere have coevolved and intertwined to create massively complex systems for millennia before the emergence of humans (Washington et al. 2017). In the ecocentric view, there is inherent value in non-human lifeforms and the abiotic entities with which they interact, completely separate from the moral value assigned by humans. Considering that life on earth has been around for 3.7 billion years and humans only emerged 2 million years ago, it is important to note the fallacy of human centrism in evolutionary terms (Koch 2019 & Little 2021). To put this in perspective, humankind has only been present for 0.05% of the total time of life on Earth. All life on Earth derived from a common ancestor, kickstarting the immense web of life from which humans emerged. Intrinsic and moral value cannot be decisively applied at any point in this timeline. Because all life on Earth possesses biological kinship, it reasonably follows that all life on Earth should secure moral and intrinsic value as well. Acknowledging the fundamental intrinsic value in every being promotes a plenary, reciprocal relationship between all life.

Looking at the United States, anthropocentrism prevails in modern westernized agriculture, as humans assign moral value and respect traditionally in beings that possess a communicable cognitive ability and more specifically, human cognitive ability. Because non-human entities do not possess the same communicable cognitive ability, they are often exploited, especially in the context of agriculture. Because the cultivation of crops is so deeply linked with the foundation of human society, it follows that agriculture is innate to the establishment of human civilization, marking the transition from the Paleolithic to the Neolithic age. How different communities approach agriculture in methodology and practice speaks greatly to their

own values as a society. In the anthropocentric view, because non-human entities are seen as means to human ends, it becomes very easy to exploit agriculture with the underlying sense of entitlement. The thriving culture of individualism in westernized societies also encourages mass consumption without gratitude (Ying et al. 2022), assuming humanity has supreme authority over nature. This has led to the rise of industrialized agriculture with the development of technology, seeking short-term solutions for such exponential human population growth rates. With unsustainable and extremely harmful farming practices in industrialized agriculture, we now see severe long-term problems with environmental and soil degradation, loss of plant biodiversity, and even food safety issues (Labao & Stofferahn 2006; Lindwall 2022).

This essay seeks to decentralize Western European anthropocentric standards of environmental and agricultural policy and create a co-production of knowledge. Westernization prioritizes individualism: that all values, responsibilities, and rights originate and center around individuals, rather than a collective, reciprocal union. Westernized influences are inherently embedded in US environmental policies towards agricultural practices, conservation, and restoration as one byproduct of colonialism (Knobloch 1996). On the other hand, a unifying belief in ecocentrism prevails in North American Indigenous communities, demanding human stewardship for non-human life (Kimmerer 2013). While it is difficult to understand the reciprocal relationship between humanity and nature without personification, I argue that it is critical to acknowledge their coevolution on Earth. Several North American Indigenous environmentalists such as Dr. Robin Kimmerer and Dr. Jessica Hernandez go back to the phrase, *when you take care of nature, nature takes care of you.* Ultimately, both views are reflected in fundamental origin stories of these peoples. Origin stories are extremely significant for understanding different cultures' ontologies and epistemologies: the body of knowledge

developed, as well as the nature of human's existence. Paying attention to subliminal messages in origin stories reveals a broader perspective of what a society or culture prioritizes. Providing guidance in the form of parables and etiological stories explains how this state of life came to be and what this ever-rotating Earth should progress towards.

Western Europe is deeply rooted in Christianity, and colonial powers frequently cited the Bible as justification for exploitation. Looking at the Geneva Bible used by colonists during the age of colonial expansion, the story of Adam and Eve uncovers significant connotations linking nature and man. For example, Genesis 1:28-29 says, "And God blessed them, and God said to them, Bring forth fruite and multiplie, and fill the earth, and subdue it, and rule ouer the fish of the sea, and ouer the foule of the heauen, and ouer euery beast that moueth vpon the earth. 29 And God said, Beholde, I haue giuen vnto you euery herbe bearing seede, which is vpon al the earth, and euery tree, wherein is the fruite of a tree bearing seede: that shall be to you for meate" (Geneva Bible 1590). Here, the Western God establishes mankind's ownership and entitlement to nature, beckoning humans to 'subdue' the earth. Every beast upon the earth, every herb and seed, every fruit and tree are all in place to humankind's use. The term 'meate' is unfamiliar in our modern vocabulary, but it roughly translates to something taken in as nourishment. Analyzing the connotations of this word choice, mankind is divinely destined to perceive relationships with nature as primarily instrumental and nonreciprocal. This line of thinking connects with several western regimes influenced by colonialism, such as the Manifest Destiny in North America.

Looking further at the next updated edition after the Geneva Bible, the King James Bible reveals even more about Westernized interactions with nature. Perhaps influenced by colonialism, the King James Bible features deeper characterization of absolute human rulership

over nature, “And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth” (King James Bible, Genesis 1:26). The value of using these two versions of the Bible depicts the progression of colonial mindsets, even in religious texts. The word dominion specifically refers to control and sovereignty, meaning Adam and Eve (and more broadly, humankind) are the monarchs of the Earth, given the right and power from God to rule as they see fit. This automatically puts mankind on a pedestal, implying that human life is superior to any other kind of life on Earth, as God only created these other biotic and abiotic components to sustain human life. Looking further down the passage, God uses the term ‘creeping things’ to refer to most of the other species besides fish, fowl, and cattle. To creep is to move slowly with the body close to the ground. Some definitions even include descriptors such as ‘timid’ and ‘cautious’ (Merriam-Webster 2022). While it is difficult to pinpoint the precise connotations of the word in its time, the connotations modern humans use are important to regard, especially considering how humans’ perceptions of non-human entities prevail in tangible ways. Despite the size of the animal, this vocabulary choice implies that not only is it unimportant to acknowledge the autonomy and individuality of other life, but also that humankind has more importance over the Earth as well. Suggesting that all other life on Earth, separate from humanity, must be subservient to one species ultimately threatens ecosystems; for one species to dominate the existence and autonomy of all others without any knowledge or respect for their existence may result in degradation to non-human abiotic and biotic factors. The significance of using these two versions of the Bible next to one another is that Western European colonists transition from merely subduing the Earth to completely ruling over the Earth as their dominion. While both

editions feature verbiage of control, the King James Bible develops to proclaim the intentions of colonialism with it: making land that truly owes colonists nothing their God-given domain.

Another form of Western entitlement to non-human entities is the United States' Manifest Destiny. Manifest Destiny in the U.S. was originally coined in 1845, and it was the idea that the U.S. was destined, by God, to expand its dominion in order to spread democracy and capitalism across North America (History 2019). This philosophy drove U.S. territorial expansion in the nineteenth century, and it was used to justify the horrendous removal and assimilation of local Indigenous communities and other non-European occupants. Sparking the Mexican-American War until 1848, the Manifest Destiny inspired and incentivized white colonizers to settle to modern California, Arizona, Colorado, New Mexico, Nevada, Utah, and Wyoming (History 2019). At the same time, the rapid expansion of U.S. territory also intensified the ongoing problem of slavery, as people stolen from Africa were enslaved and exploited for free labor. Manifest Destiny paralleled rhetoric used in original colonization of the Americas, especially given the main motivations of European colonization began with God, gold, and glory. The faulty idealism of the Manifest Destiny underlines the pernicious effects of anthropocentrism and colonization, especially when it is implemented under such drastic measures. Not only land, but also other human beings, were regarded as easily disposable and exploitable commodities under western colonizing mindsets.

Some Indigenous creation stories offer a sharp contrast to the idea of Manifest Destiny. For example, the Algonquian and Iroquoian-speaking Indigenous Nations including the Iroquois, the Potawatomi, the Ojibwe, the Haudenosanee, and many more, all refer to North America as Turtle Island (Kimmerer 2013; Shenandoah & George-Kanentiio 1998; Robinson 2018). While there are minor discrepancies in the story's details across the different nations, the creation of

Turtle Island does follow a rudimentary plotline: Sky Woman falls from Sky World, a land above the heavens. She falls deep through space until her trajectory leads to the completely flooded Earth. Several birds carry Sky Woman down to an enormous turtle's back as she breaches the atmosphere. In some legends, Sky Woman already has mud in the palm of her hand, but in others, the animals dive to the depths of the ocean to collect mud for Sky Woman to live on Earth. In the Potawatomi story, all the creatures were unsuccessful in attaining the mud except the muskrat (Kimmerer 2013). The muskrat's lifeless body floats to the surface of the water with mud clutched tightly in its paw; Sky Woman weeps and mourns the death of the muskrat, spreading the mud on the back of the turtle's shell and forming the land we reside on today.

Turtle Island is important in both creation and title, as both consistently acknowledge the multiplicity of life found on the continent. The Turtle is living, and every aspect of its existence possesses life. This continuously connects North American Indigenous Peoples to their land, environment, and history. Whether viewing the birds in the sky, the streams in the forests, or the rocks in the earth, each aspect of North American ecosystems is incredibly important to uphold and respect. In several Indigenous languages, both abiotic and biotic factors of ecosystems are attributed to a state of being and living. Thus, every part of the land has unconditional intrinsic and moral value. This ancient vernacular is critical to understanding humanity's place on Earth. Because North American Indigenous Peoples see the complete value of life in the world around them, they establish societies founded in gratitude. Not only is reciprocal living fundamental to communities, but also to nature, itself. The living world around humans offers us gifts, and the ecocentric principle ingrained in several North American Indigenous epistemologies prioritizes the human responsibility of giving back to nature. However, Westernization specifically

displaces itself from nature. To utilize any part of nature in a selfish, disruptive manner is ultimately disrespectful to the history and integrity of Turtle Island.

While Sky Woman created the Earth in communion with all aspects of the ecosystem, the Western God did it separately and unilaterally. Adam and Eve were simply *given* the world, while Skywoman *created* the world in union with all other life. This implicitly depicts the fundamental differences between existing as a part *of* nature and existing apart *from* nature. As Sky Woman intertwined the world with humankind without any conditions, Adam and Eve were banished from Eden and doomed to suffer through life, carrying their displacement from nature alongside themselves. The way the Christian God left Adam and Eve was without consideration for the land, "In order to eat, [Eve] was instructed to subdue the wilderness into which she was cast" (Kimmerer 7). An important distinction between ownership and stewardship emerges between anthropocentrism and ecocentrism: while the Western God gave Adam and Eve the Earth to possess and do with as they pleased, Skywoman was entrusted with the responsibility of caring for the growing world. As reflected by their origin stories, Western European culture values individualism, while Indigenous culture values unity and harmony among all living and non-living beings. These origin stories outline both Indigenous and Westernized perceptions and obligations to nature, which also speak to the cascading outcomes that have led us to the necessity of conservation on Earth and specifically, the United States.

It is important to acknowledge the specific ways western European colonization regimes erased and brutalized North American Indigenous cultures, languages, Peoples, and future generations. This led to not only devastating loss of traditional ecological knowledge, but also the centralization of western European colonial influences in politics, education, science, language, and society; settler societies originating from Western Europe like the United States

have a history of both rejecting and integrating European imperialist ideologies through systemic measures (Hickling-Hudson & Ahlquist 2003; Hernandez 2021). In this thesis, I seek to centralize Indigenous voices, dismantle western European standards in the U.S., encourage more ecocentric approaches to human interactions with nature, and expose the intersectionality between the U.S.'s current social and agricultural priorities.

Chapter 2: Indigenous Farming and Ecocentrism: In what ways can Indigenous agricultural policies and principles realign humanity with nature, and what does realignment with nature even look like?

"The worldview of a society is often written more truthfully on the land than in its documents…"

(Kimmerer & Lake 2001)

A. Value Systems in an Agricultural Context

To preface this section, it is important to acknowledge that North American Indigenous communities are not a monolith in any way; every Indigenous nation and entity comes with their own languages, traditions, ancestral knowledge, and agricultural practices. As each Indigenous entity has resided on its own sacred land, it also intimately knows the environment and has developed a knowledge base according to this cherished connection. According to the International Work Group for Indigenous Affairs (IWGIA), there are 567 tribal entities federally recognized in the United States, although there are hundreds of others not yet recognized. As Dr. Hernandez discusses in the preface to her brilliant book, *Fresh Banana Leaves* (2021), the centralization of whiteness has caused massive erasure of important distinctions between not only Indigenous communities across North America, but also separate countries in Mesoamerica. Due to the deep roots of white supremacy in the United States' foundation, governmental structures were formed to erase Indigenous Peoples and force westernized assimilation upon survivors (Black 2002). North American westernized conservation, itself, is also deeply entangled with the forced displacement and mass genocide of Indigenous Peoples. Because there

are millions of Indigenous communities globally, the specific nation will be identified and attributed to any Indigenous practice mentioned further in this thesis.

Several North American Indigenous communities approach interactions with the environment from a more ecocentric mindset (Kimmerer 2013; Hernandez 2021). Like any species that consumes others for sustenance, humans inherently depend on the lives of others to survive. With the objectification and commodification of Earth's resources, whether living or unliving, western colonial mindsets have excluded these resources from the realm of moral value. Across countless North American Indigenous communities, every part of the Earth possesses autonomy, meaning it has inherent value. The intrinsic value of every living and nonliving entity highlights the fundamental principle of ecocentrism. Recognizing the autonomy of these entities does not immediately negate the act of consumption, but rather calls for accountability to the resources we use.

Before the explosion of technology in terms of industrialized agriculture, environmental practices culturally coevolved with qualitative, moral belief systems (Gadgil et al. 1993). In countless North American Indigenous Nations, taking care of the land was and continues to be a sacred tradition that connects individuals with one another, previous generations, and the land itself. Ecocentrism is a fundamental factor driving these knowledge bases, as practices include total protection of biological communities such as ponds, rivers, meadows, and forests: individuals of all plant and animal species are worthy of total protection (Dawson et al. 2021; Gadgil et al. 1993). Each component of the ecosystem plays an integral part to the dynamic exchange of materials within and productivity of the ecosystem. On top of total protection, special protection is given to species at certain vulnerable stages of development and crops are

harvested in large waves with the entire community's consent (Dawson et al. 2021; Gadgil et al. 1993).

Traditional ecological knowledge (TEK) develops from a integration of ethnoscience and human ecology, the implementation of scientific knowledge into cultural practice (Ackerly 1982; Berkes 2018). Indigenous TEK includes both ethnobiology, identifying and naming species, and the study of ecological processes as functional relationships, thereby expanding people's own perceptions of their roles within environmental systems (Berkes 2018). Rooted in ethnoecology, TEK, as defined by Toledo 1992, includes four main branches of knowledge: ethnobiology, agroecology, ethnoscience/anthropology, and environmental geography. It is inherently interdisciplinary, blurring the boundaries between seemingly separate curricula. Indigenous ethnoecology centers around linkages between kosmos (beliefs and symbolic representations, such as origin stories and cultural practices), corpus (environmental knowledge built from generational observations), and praxis (the practical operations through which physical appropriation of nature occurs) (WinklerPrins & Barrera-Bassols 2004). All human groups depend on careful observations of the natural world; the practice of Indigenous knowledge is the story of how social and cultural systems adapt to specific ecosystems (Berkes 2018). Subsistence practices are interlaced with culture, because cultures develop in part as responses to their natural environments (Steward 1955; Pawluk et al. 1992). This combination of scientific, cultural, and religious significance creates not only a much more intimate connection with Earth, but also a deeper understanding of the ecosystem itself.

Indigenous agricultural knowledge systems are comprehensive understandings of local environments; these systems develop wehen local communities strive to meet subsistence goals in particular environments (Pawluk et al. 1992). As acute observations of the local environment

are gathered over time, they accumulate over generations to assemble into complex and integrative understanding of vital natural resources and ecological processes. Through the process of successive observation and implementation over several generations, these knowledge systems become intertwined with cultural value systems. In this way, agricultural practices have importance beyond their physical, instrumental value, but as ethical, spiritual, and personal significance interlaced with traditional ecological science different Indigenous communities utilize their own cultural stories and teachings to embody ecological knowledge based on their local environments. (Pawluk et al. 1992; Kimmerer 2013; Berkes 2018).

B. Indigenous agricultural practices & environmental effects

Soil and water conservation are two of the main principles underlying several Indigenous farming methods (O'Connell & Lewis 1974; Bird et al. 2008; Natcher et al. 2009; Berkes 2018). Oftentimes there is a false, romanticized belief that non-western local communities live in a state of harmony with nature; however, Kelsey Ducheneaux-Scott, a fourth generation South Dakota cattle rancher from the Cheyenne River Sioux Reservation, says, "nature craves disturbance" (Slabaugh & Ducheneaux-Scott 2021). Nature interacts with dynamic exchanges between systems and resources, and it can be impacted by human intervention and natural disturbance. Our ecosystems have evolved via a complex interplay of abiotic and biotic factors, and when the system is not resistant to disturbance, the integrity of the ecosystem can collapse when a vital part is drastically displaced, neglected, or exploited. TEK from Indigenous Peoples across North America is deeply rooted in understanding the cyclic disturbances that further aid in specific ecosystems' productivities.

For example, many Indigenous groups intentionally burn the land for a variety of reasons, including tree felling, stimulating vegetative growth, clearing travel corridors, and fireproofing settlements (Lewis 1993; Kimmerer & Lake 2001). The Anishinaabe (Ojibwa) of northwest Ontario, for instance, burn boreal forests to stimulate berry production and small-scale cultivation (Davidson-Hunt & Miller 2010; Berkes 2018). In California, the Chumash and the Kumeyaay have long histories of burning chaparral to open corridors and fire yards, preparing areas for planting (O'Connell & Lewis 1974; Berkes 2018). Chaparral is a fire-prone, shrub-dominated vegetation type commonly found in the hills of southern California that experience a Mediterranean climate. Although the chaparral does not have significant production value, its high flammability stabilizes slopes, vegetation cover across watersheds, wildlife habitats, and nutrient cycling; both the Chumash and the Kumeyaay in Southern California cultivated an extinct form of grain harvesting until the late 1800s: burning the stubble and dispersing seeds of both grain and other leafy vegetables to produce a biodiverse field (Barro & Conard 1991; Beyers & Wakeman 1997).

In Alaska, the Gwich'in burn plots of grass during the early springtime, clearing the underbrush and travel lanes to ultimately stimulate new growth for the coming season (Natcher et al. 2009; Berkes 2018). Burning the grass not only increases biodiversity of plant species, but it also fertilizes the soil and increases the land's carrying capacity for animals. In addition, it is a carbon-neutral practice because the soil contains low amounts of carbohydrates at this time of year; however, if the same fire was lit even just a month later, it would be extremely destructive for plant structures and animal migration (Alexander & Fernandes 2020). Recognizing that grass burning must be conducted within a narrow timeframe speaks to the deep body of knowledge that the Gwich'in have intimately curated within their local environments.

Another example of a prevailing agricultural practice used by different North American Indigenous communities is 'the Three Sisters': intercropping of maize, beans, and squash. Originating from the Haudenosaunee (Iroquois), the Three Sisters are intentionally planted, cultivated, and harvested to increase productivity of crop yields (Carnegie Museum of Natural History 2018). Different North American Indigenous nations have varying specifics throughout their stories, but the central theme is that the Three Sisters are stronger together than apart (Paden 2021). Indigenous Peoples from the Northeast to the Southwest through the Plains and the Southwest U.S. plant these crops to grow symbiotically in a shared space through "intercropping" or "companion planting" (Marsh 2021). Each plant aids in the growth of one another, and the cropping methods showcase a deep understanding of ecological knowledge.

First, someone places several corn kernels in a hole; around two or three weeks later, after the kernels germinated, someone plants bean seeds in the same mounds (Kimmerer 2013; Marsh 2021; Paden 2021). Due to the symbiotic relationship with nitrogen-fixing soil bacteria, planting the beans introduces more nitrogen to the soil, which is an essential element for amino acids, which are the building blocks of proteins and enzymes for cell functions. At the same time, the cornstalks provide a pole for the vining bean plants to grow on. Between the mounds of corn and beans, someone cultivates a low-growing plant like squash; this serves the relationship because the large leaves shade the ground, resulting in higher moisture retention and weed growth prevention. Each crop also attracts beneficial insects and pollinators that further protect the sisters by feeding on other insects that are harmful to each plant. In addition to the ecological symbiosis, the three plants create a nutritious, balanced meal when eaten together. While corn is low in protein and rich in carbohydrates, beans are rich in protein and provide important amino

acids. Squash also introduces different vitamins and minerals that corn and beans lack (Kimmerer 2013; Marsh 2021; Paden 2021).

Corn had been an agricultural staple across the vastly varying climates in the Americas for more than 8,000 years before European colonization. In the colder regions of Canada and the South American Andean highlands, Indigenous communities domesticated quickly growing breeds of corn; the Inca of Peru grew corn on terraced hillsides of the Andes, and Hopi farmers irrigated extensive fields of corn in the Southwest to combat the intense dry heat (Carnegie Museum of Natural History; Marsh 2021). The agricultural practices used for cultivating corn across different terrains showcases the individual knowledge bases of Indigenous entities that link the environment with the community; because the climates and terrains differ so dramatically, ranging from the mountainous Andean highlands to the hot, dry Southwestern desert, it is remarkable that so many different Indigenous communities developed specialized growing practices for the same plant species. This highlights the concept of living *with* the land rather than living *off* the land.

Enthnopedology, the study of local knowledge of soil and land management from an ecological perspective, is incredibly important to study because it is necessary for subsistence production and the long-term sustainability of ecosystems (Pawluk et al., 1992; WinklerPrins & Barrera-Bassols 2004). In Mesoamerica, several Indigenous Peoples use weirs, dams, or terrace walls to slow runoff and foster the deposition of upland sediments, rehabilitating previously eroded slopes as topsoil builds up behind structures; Indigenous communities in the southwestern United States have successfully farmed in precarious arid and semiarid environments using local knowledge. The Zuni harvested water and sediment from drainages to positively influence soil moisture, nutrient status, and soil texture of local plots. Farmers must monitor soil changes

induced by cultivation, cropping, and other agricultural practices because soil is partially a nonrenewable resource, especially within the span of humanity's time scale (Pawluk et al., 1992; WinklerPrins & Barrera-Bassols 2004).

Another example of an important North American Indigenous agricultural practice is the Honorable Harvest (Kimmerer 2013). In describing the Potawatomi's teachings of the Honorable Harvest, Dr. Kimmerer reflects on the dichotomy of thought that emerges when harvesting a plant species in a certain area; one must consider both the empirical signs of health in the patch as well as the intuitive subliminal message of consent, "Asking permission shows respect for the personhood of the plant, but it is also an assessment of the well-being of the population" (Kimmerer 178). Dr. Kimmerer creates a list of directives to follow when harvesting:

1) Ask permission and abide by the answer
2) Never take the first, and never take the last
3) Harvest in a way that minimizes harm
4) Use everything that is taken
5) Take only what is given
6) Share what you have taken
7) Be grateful
8) Reciprocate the gift- sustain the entities that sustain you.

The Honorable Harvest represents a covenant, a sacred agreement between humanity and Earth. Although the Earth has flourished with abundant resources and diverse ecosystems, the U.S. and other countries birthed from colonialism incessantly muster ways to take even more. The current state of westernized agriculture dishonorably exploits the vital resources necessary for Earth's prosperity.

C. Delineation between Indigenous and Westernized agricultural practices

North American Indigenous ecological knowledge is such an important resource for maintaining local environments; agricultural methodologies and epistemologies may briefly overlap across communities, but each knowledge base is distinct to the local community's intimate knowledge of the land. One ubiquitous agricultural policy does not accommodate every agricultural site and environmental biome across the U.S.; the specific interactions within each ecosystem are unique to the area and should be regarded as such. Local Indigenous communities are intertwined with their local environments, meaning different cultures have developed detailed classifications of elements and species that are most locally relevant. Ecocentrism seeks to reconceptualize human and non-human relationships, while anthropocentric colonialism results in vast shifts in ontological and epistemological differences between human and non-human entities on Earth (Huggan & Tiffin 2010; Indrivanto 2020).

Since the initial colonization of North America, forests have experienced a transition from the cyclic disturbance of Indigenous fire regimes to persistent fire suppression (Kimmerer & Lake 2001). Throughout North America, fire suppression has not only led to denser forests and alterations in regeneration patterns, but also has resulted in lower stand diversity; homogenous stands are much more vulnerable to widespread mortality due to insects and disease because of the lack of genetic and species diversity (Barrett 2000). Burning is a vital practice because it creates a mosaic of ecosystem patches that ensure food security be increasing biodiversity and productivity; individual patches of heterogenous resources also make ecosystems more resistant and resilient to natural disturbances (Lewis 1985; Williams 2000; Kimmerer & Lake 2001).

Unfortunately, fire suppression is not the only mechanism through which western agricultural practices willfully negate Indigenous values and subsequently harm ecosystems. In taxonomic classification systems, the order by which species are organized reflects the relevant priorities and distinctions of the creators of the system (Pawluk et al. 1992). Traditional agricultural systems are often fundamentally different from industrialized agricultural systems, especially regarding corresponding cultural and ecological contexts. Almost all major domesticated species of plants and animals predate western science, meaning ecological and biological knowledge existed and progressed without western intervention.

The current state of modern agriculture in the U.S. has been molded by social, political, and economic discourse, making its construction inherently interdisciplinary. This knowledge has been intentionally ignored and dismissed for a very long time due to westernized colonialism and white supremacy (Prawluk et al. 1992). For example, in Sir Alfred Ellis's Gold Coast guidebook of 1887, he attributed local peoples with having more communication skills, saying, "There is, as is commonly the case with the language of the lower races, a great paucity of abstract terms". Cultural bias and white supremacy inhibit traditional western thinkers from truly honoring and acknowledging the knowledge bases of local communities. By viewing Indigenous Peoples as inferior, and the Earth as something to conquer, ecocentric values have been drastically displaced by western colonialism. Due to this systemic oppression, widespread agriculture in the U.S. has circulated around Ecocentric values, shaping both the country's priorities and the physical landscape, itself.

Chapter 3: Western Environmental Policy and Anthropocentric Origins: How did this presumed separation between civilization and the natural world affect both early westernized environmentalism and the industrialized agricultural system in the United States?

"… The current American landscape represents the historical legacy of one worldview superimposed on another, the colonial overlaying the Indigenous…" (Kimmerer & Lake 2001)

A. Value Systems in an Agricultural Context

The fundamental problems with westernized agriculture in the United States are overharvesting, overexploitation, entitlement, and capitalization of living entities, and short-term solutions to dynamic ecological issues. Each of these issues are rooted in anthropocentric and utilitarian assumptions of humanity's place on Earth. Western anthropocentrism is linked with colonialism and ecological degradation through intense disruption of the socio-historical condition of the colonized world, as well as significant alterations to the landscape, itself (Indrivanto 2020). Anthropocentric and utilitarian views of agricultural purposes and methods drive changes in the U.S. and result in significant environmental degradation; agriculture is seen and treated as capital, as commodities to buy, sell, and own (Indriyanto 2020). In addition, the U.S. produces mass amounts of agricultural products across the nation and to global markets; however, the food distribution system is also based in capitalism, meaning several communities do not profit from industrialized agriculture, yet suffer a disproportionate majority of its environmental effects (Labao & Stofferahn 2006). Furthermore, there is a spatial disconnection of means of production and the effects of pollution on local communities.

It is important to acknowledge that the U.S.'s industrialized agricultural complex originates from forced displacement of Indigenous communities and the trade and labor of enslaved people; people were stolen from their communities in Africa and the Americas, sold as commodities through transatlantic trade for centuries, and treated horrifically through forced, unpaid labor. In addition, the lands taken by the U.S. in sweeping acts of violence and prerogative were originally the homelands of hundreds of Indigenous communities that acted as stewards for the land. For example, who did the land for the Public Land Act of 1976, the Homestead Act of 1862, or even the entire western slope of the nation after the Treaty of Guadalupe Hidalgo of 1848 originally belong to (Dunbar-Ortiz 2014)? The federal government created initiatives for which cis-white male citizens to occupy stolen land to create capital through agriculture, which then aided in cash flow through the country and internationally; Agriculture in the U.S. not only began with the brutal displacement of Indigenous nations, but also with mass exploitation of people who built billions of dollars' worth of U.S. infrastructure without compensation (Dunbar-Ortiz 2014).

Farming in the U.S. has become systemically interlaced with the economy, and thus, capitalism itself. Capitalism is characterized by private and corporate ownership of capital goods that are distributed through competition in a free market, and it is heavily engrained in westernization and individualism. The means of production are held by private individuals or organizations, rather than the government. Goods are attributed value according to supply, demand, and competition, which applies to crops cultivated by agriculture. The perseverance of westernized agriculture is associated with the explosion of technological advances through the centuries, the rise and reliance of consumer influence in agricultural production, and the increasing integration of American farming into the global markets (Conklin et al. 2005).

Aligning the capitalistic economy with agricultural practices led to the commodification of crops, creating the concept of agribusinesses.

Capitalism and slavery were intentionally conjoined in the U.S., especially with the Industrial Revolution booming in the late nineteenth century; in the southern states, cotton grown and picked by enslaved people had become a major cash crop, because both national and global markets were dominated by demand for fabrics produced by industrial textile mills (Corbett et al. 2014). However, after the abolishment of slavery, the U.S. was forced to compensate for the sudden lapse of labor by latching onto the era of technological advancement. In addition, the U.S. capitalized from continued disenfranchisement of marginalized communities through the sharecropping system, poll taxes, literacy tests, grandfather clauses, and felony disenfranchisement laws (Evans 2021). I argue that the commodification of living entities like agriculture and other human beings further solidified capitalism into the U.S.'s socioeconomic structure, as well as incentivized technological advancements in industrialization.

The boom of industrialization and commodification of people and crops in agriculture has gradually deteriorated the environment; agriculture is seen and treated as capital due to the heightened roles of anthropocentrism, utilitarianism, and individualism exercised through a capitalistic viewpoint. Because output is the utmost priority in capitalism, the history of technological advancements in agriculture highlight entitlement towards the environment and human-centered consumerism. The more technologically advanced humanity gets, the more the U.S. can produce and expand to create revenue at the expense of its marginalized communities, nutrient and element cycles, and ecosystems. Through this entire history of western U.S. agricultural development, land is consistently viewed and utilized as a commodity without autonomy; it is regarded as an ever-abundant resource to be exploited as humanity sees fit.

B. History of westernized agriculture linked with anthropocentrism

Looking into technological development in agriculture reveals several layers of the U.S.'s perceptions of nature and its pervasive capitalistic mindset. The U.S. was founded in colonialism when British colonists took the land as their own, despite the significant Indigenous populations who already managed and supported the land. At the end of the eighteenth century, western colonists relied on animal labor to power wooden plows, and they used hand-held hoes to sow the fields. They used sickles to reap hay and grain, until the 1790s when the horse-drawn cradle and scythe were introduced (Bellis 2021). Small-scale farming on singular farms produced a wider variety of crops with more sustainable practices.

Inventions in the early nineteenth century were aimed at automation and preservation, especially as cotton began to replace tobacco as the central southern cash crop with the rise of westernized textile factories across the globe (Corbett 2014; Bellis 2021). Automated innovations such as factories, steamboats, and extensive railroad systems started to dominate both national and global markets; steel plows, reapers, and threshing machines increased the farmers' need for cash and encouraged commercial farming (Corbett 2014; Bellis 2021). With the increased industrialization of transportation and factories, there was also a higher demand for fossil fuels that would only become more and more insatiable due to the U.S.'s increased reliance on industrialization.

In 1840, farming made up sixty-nine percent of the U.S. labor force, a proportion that steadily decreased with the explosion of industrialized agriculture (Bellis 2021). Because it was becoming easier to cultivate higher quantities of crops, larger plots of land required fewer individual farmers. In the 1840s, grain drills and elevators were invented to efficiently handle the

increases in crop yields achieved by introduction of mixed chemical fertilizers. In the 1850s, commercial corn and wheat belts became more prominent with the perseverance of Manifest Destiny in U.S. politics; newer, cheaper land in the American west was stolen from local Indigenous communities to encouraged prairie farming and relocation by white citizens. The federal government pushed western settlement to claim more land and increase cash crops in the free market; the Manifest Destiny was a form of intra-national colonization, especially with the underlying implications that a divine entity destined white settlers to claim land that was not rightfully theirs. The 1880s marked heavy agricultural settlement on the Great Plains, allowing for an explosion of the cattle industry; because farmers and ranchers were generally unknowledgeable of environmental conditions on the newly settled land and how they varied over time, the effects of disastrous droughts in the Great Plains were exacerbated by intense overgrazing. As the frontier settlement era ended in 1890, farmers eventually accounted for thirty-eight percent of the labor force while consumption of commercial fertilizer increased by over two million tons (Bellis 2021). This marks a new era of increased mechanization and commercialization of agriculture, especially with the introduction of the tractor in the 1920s.

Because industrialization occurred across countless sectors of the economy including communication, transportation, and innovation, modern technologies were becoming commonplace on farms in the 1940s: 58% of all farms had cars, 25% of all farms had telephones, and 33% of all farms had electricity (Bellis 2021). Labor hours were suddenly becoming exponentially more productive, especially when combining the gang plow, tractor, tandem disk, harrow, foot combine, and trucks; however, to power these technologies, fossil fuels like oil and coal needed to be mined and combusted, creating harmful pollution in the land and atmosphere.

By the 1940s, farmers only accounted for eighteen percent of the labor force, as many southern sharecroppers migrated to urbanized cities during World War II. At this point, the average annual consumption of commercial fertilizer was 13,590,466 tons, and farmers relied on herbicides and pesticides across agricultural fields to minimize losses to weeds and insect pests. The late 1950s and 1960s witnessed the chemical revolution in agricultural science; within a decade, 70.9% of all farms had cars, 49% of all farms had telephones, and 93% of all farms had electricity. Mechanical harvesting dominated agriculture in the late twentieth century, as singular farms increased from supplying 25.8 persons in the U.S. in 1960 to supplying 75.8 persons in the U.S. in 1970 (Bellis 2021).

Over the past century, much of the land in the central U.S. has been converted to distinctly simplified agricultural landscapes due to the increasing demand for faming products (Conklin et al. 2005; Burchfield et al. 2020). These small farms employed close to half the U.S. workforce, and they often produced about five different commodities. In 1790, farmers made up about ninety percent of the labor force (Bellis 2021). However, during the twenty-first century large, concentrated, specialized farms that reduced the workforce population and relied heavily on modernized technology became increasingly common. Between 1900 and 1960, the quantity of individual farms had fallen by 63 percent, while the average farm size had risen by 67 percent (Conklin et al. 2005). Technological developments in agriculture are characterized by mechanization, which circumvent a farm's resilience on physical labor from people and animals and the natural availability of nutrients. By 1970, tractors had almost completely replaced animal labor, and the mechanical harvesting of crops, like sugar beets, cotton, and tomatoes, had become normalized by the 1960s (Conklin et al. 2005).

Agribusinesses boomed with the Agricultural Technological Revolution between 1945 and 1970, characterized by increasing yields and more specialized, *capital-intensive* farms. Agribusinesses in the U.S. are inherently linked with utilitarianism and anthropocentrism. Utilitarianism differentiates right from wrong by focusing on outcomes: the most ethical choice is the one that will produce the greatest utility for the greatest quantity (Ethics Unwrapped 2022). Utilitarianism argues that the ends justify the means. In the context of agriculture, subscribing to utilitarianism means that if crop yields are successful and bountiful, any harmful measures it took to obtain the crops are irrelevant. These external costs to the sustainability of the ecosystem come in countless forms such as genetically modified organisms (GMOs), harmful herbicides and pesticides, overuse of fertilizer, improper plowing and irrigation, and excessive pollution from fossil fuels that power farm machines. In addition to the harmful farming practices of industrialized agriculture, westernized farming in the U.S. also encourages over-production, leading to massive waste and overexploitation of nature (Zelikova 2020).

For example, during the disastrous Great Depression, President Franklin Roosevelt signed the Agricultural Adjustment Act to limit crop production, reduce stock numbers, and refinance mortgage terms for struggling farmers (Thompson 2016). With the development of agricultural technology, large agricultural surpluses during the 1920s caused prices for farm products to drop steadily after World War I. During the Great Depression, farmers were then paid to destroy crops and livestock to increase crop prices and reduce output. Thus, fields and crops were burned while animals were slaughtered to boost the economy. While this aided the farmers' income, it was devastating for the land and non-human entities; approaching agriculture with a utilitarian mindset uplifts anthropocentrism because nature is being selfishly utilized

specifically for human prosperity. Because western agriculture's main goal is to create as much crop capital as possible, this makes nature the means to humanity's ends.

Another example of anthropocentrism in western agriculture is the introduction of genetically modified agriculture. Private firms decode DNA sequences for genetic engineering to patent and claim ownership over the genetic combination (Wolf 2000). While humanity has domesticated plants and animals over several millennia through traditional breeding techniques like artificial selection, western scientists focusing on genetic modification. The motivation for genetic engineering originates in many places, but it ultimately centers around human benefit, such as optimizing agricultural utility or improving the production of pharmaceutical substances. The most prominent examples of genetic modification come from crop plants, farm animals, and soil bacteria (Phillips 2008). While some benefits of genetic engineering in agriculture include increased crop yields, reduced costs for production, reduced need for pesticides, enhanced nutrient composition and food quality, resistance to disease, and greater food security, the unknown consequences of tampering with gene expression can lead to horizontal and vertical gene transfers and ecological imbalances (Phillips 2008). Patenting a piece of machinery is very different from patenting a life form. Exploring this idea on an ethical level leads to utilitarian and anthropocentric debates: is it morally acceptable to change the DNA of a species, and subsequently permanently change the genetic composition of any descendants of this species? Is it morally acceptable to capitalize off changing another species' DNA? When is genetic modification regarded as an overreach into non-human autonomy? What are the moral implications of owning a living being, or owning the genetic code for changing the traits of a living being? Because genetic modification originated with the intention of agricultural efficiency and central human benefit, it subscribes to both utilitarianism and anthropocentrism.

Agribusinesses aim to profit on very large scales, despite environmental or public health. The shift from several small rural farms to enormous, industrialized agriculture is significant regarding both politics and the well-being of local communities. Between 1700 and 1980, the amount of land used for agriculture has increased almost six times over, and farming methods have become radically industrialized (Lindwall 2022). The combination of horizontal growth, meaning more physical land used for agriculture, and vertical expansion, the growth of more productive and efficient farming methods, has led to massive yields and food cost reductions (Lindwall 2022). Vertical integration of agriculture encourages specialization of crops on large farms, as it combines multiple stages of production that would normally be operated by different companies. Vertical integration saves money for farmers, although it increases risk by putting all resources and cultivation efforts into one or two products in bulk. Because capitalism utilizes the free market based on consumer demand, the value of these one or two agricultural products can change drastically. This stochastic variation in crop value can lead to unanticipated, catastrophic outcomes for farmers.

C. Environmental Impacts

Agriculture has gradually shifted towards intensely specialized farming systems characterized by concentrated production of a singular crop in a certain area; capitalistic and anthropocentric mentalities embedded in the U.S.'s agricultural approaches have driven this shift towards large-scale specialized agriculture. There are several negative impacts associated with increasing simplification of large plots of land, especially concerning vital ecosystem services; large-scale commercialization of agriculture has contributed to the reduction of crop species and genetic diversity worldwide (Khoury et al. 2014; Burchfield et al. 2020). Negative ecological

impacts associated with intensive crop production and loss of diversity due to landscape simplification include degradation of key ecosystem services that are essential to agricultural production, such as soil fertility, nutrient cycling, and genetic biodiversity (Horrigan et al. 2002; Benton et al. 2003; Burchfield et al. 2020). In addition, these plots of land deteriorate ecological regulating services, such as soil retention, pollination, natural pest control, and water purification (Tscharntke et al. 2005; Landis 2017; Burchfield et al. 2020).

When making a case against anthropocentric agribusiness due to the long-term effects of industrialized agriculture on the environment, it is vital to detail specific evidence, especially regarding technological industrialization and its consequential effects. The agricultural enterprise involves multiple components including raising, transporting, processing, and storing crops and animal products, the entire life cycle of agricultural products results in extreme side-effects to the environment itself. Agricultural pollution is the contamination humans release into the environment as a byproduct of growing and raising livestock, food crops, animal feed, and biofuel crops, and it is specifically linked with industrialized agriculture (Lindwall 2022). Important environmental indicators to account for agricultural pollution include quality of water, soil, air, energy usage, and environmentally related health conditions (Labao & Stofferahn 2006).

Agricultural pollution occurs from several different sources, but it is ultimately linked with human activity. Habitat conversion, fragmentation, and overexploitation are the main contributors to loss of biodiversity and ecosystem functions, along with human-induced climate change (Mbow et al. 2019). Given that the U.S. constitutes such a small portion of the global population while also representing a significant portion of the global ecological and carbon footprints, overexploitation of ecosystems is especially severe in the U.S. Human activities such

as the harvesting and combustion of fossil fuels are also major sources of pollution and climate change. Agricultural pollution is generally divided into two main categories: pollution from raising animals and pollution from growing crops, including animal feed, human food, and biofuel crops (Mbow et al. 2019; Lindwall 2022).

Agricultural pollution emerges from numerous activities that have become more prevalent with the rise of agribusiness. Nitrogen-based fertilizers not only produce potent greenhouse gases but can also pollute waterways with nutrients that lead to toxic algal blooms. Chemicals in pesticides and herbicides can contaminate the air, the groundwater, or even leave residues on food. Other kinds of pollutants are more indirect, like methane released from livestock digestion on massive scales. In animal agriculture, demand for animal products like meat, eggs, and dairy lead to feeding, slaughtering, and transporting billions of animals every year under horrific conditions. Livestock and poultry grown in the U.S. produce nearly 1.4 billion tons of manure annually, which is almost five times the waste of the entire U.S. population (Lindwall 2022). Unfortunately, this waste is disposed of by spreading it on land, completely untreated. Before manure is spread, it sits in a manure lagoon, which often grows to the size of a football field. These lagoons store waste laden with toxic substances, including antibiotic residues, nutrients, and bacteria; because industrialized farming happens on such an enormous scale, the lagoons are often prone to leakage or overflows during rain events that cause these chemicals to leach into the soil and groundwater. While operators are supposed to apply only the amount of manure that crops can use, there is often so much manure that it is applied beyond the agronomic rates of the crops receiving land application; this overapplication ultimately leads to further runoff of groundwater and surface water resources. Livestock and their subsequent waste production also pollute the air, as mentioned above. Manure emits

ammonia, which combines with other air pollutants to create tiny particles that are often ingested by humans (Lindwall 2022).

Even dating back to the year 2000 *U.S. National Water Quality Inventory*, states reported that agricultural nonpoint source (NPS) pollution was the leading source of water quality impacts on surveyed lakes and rivers, as well as a major contributor to ground water contamination and the second largest source of impairment to wetlands (EPA 2005). NPS pollution is caused by overgrazing, poorly located operations, improper plowing times and frequencies, improper use of pesticides, irrigation water, and overuse of fertilizer. Pollutants include sediment, nutrients, pathogens, pesticides, metals, and salts. Sedimentation from soil washed off fields is the most prevalent source of agricultural water pollution; too much sediment built up in nearby lakes or streams can cloud the water and reduce the amount of sunlight needed for aquatic plant photosynthesis, and it can also disrupt gill function in fish and invertebrates. Other pollutants used in U.S. agriculture like fertilizers, pesticides, and heavy metals are often attached to soil particles carried by agricultural runoff, leading to eutrophication and subsequent aquatic 'dead zones' and increased sediment toxicity to aquatic wildlife. With the widespread unsustainable exploitation of surface and ground water systems, most watersheds and coastal areas in the U.S. have witnessed declines in water quality and an increasing dependence on government and infrastructure to provide and treat water (Mbow et al. 2019).

Pesticides and herbicides have been extremely popularized in the last half of the twentieth century. They are dangerous short-term solutions for controlling invasive pests and plant species that ultimately contaminate soil, water, and vegetation. These chemicals can even be toxic to untargeted host species, especially over time. Cheaply produced compounds such as diochloro-diphenyl-trichloroethane (DDT), hexachlorocyclohexane (HCH), and lindane are

environmentally persistent and leave chemical residues that contaminate food and disperse further in the environment (Carvalho 2006). The increased use of pesticides and herbicides in U.S. industrialized agriculture over the last forty years has led to increased crop yields, although this has come with a drastic cost to the ecological integrity of the water, soil, and atmosphere, Soil enzymes that fungi and bacteria use to cycle nutrients and maintain soil quality and fertility are met with mixtures of toxic chemicals that remain in the soil long-term and affect both plant and invertebrate growth in the soil (Laval et al. 2014). In addition, the U.S. uses more than 1 billion pounds of pesticides each year, but only 0.1% of the chemicals interact with the intended pest; the remainder resides in the soil, air, and groundwater (Donley 2021). Some harmful pesticides and herbicides used on crops and soil can remain in the soil for long periods of time damages the long-term capability of the soil to support life and leading to lingering biodiversity loss.

In addition, large-scale farming also has major adverse consequences for the community's quality of life; areas surrounding large, industrialized farms experience lower family incomes and higher community poverty, poorer quality public schools and services, fewer civic organizations, and less social control over public decisions (Labao & Stofferahn 2006). The political structure of the U.S. inadvertently encourages industrialized farming on large scales, because lobbyists and institutions fund politicians to promote their agendas, meaning only big businesses with copious amounts of money have representation in politics, especially regarding agriculture (Wolf 2000). Consequently, this leads to the elimination of sustainable farming practices and Indigenous ecological knowledge because the ecocentric means of production supposedly do not create enough yields to combat industrialized farming. In contrast to large-scale, industrialized agriculture, family-farming communities have a larger proportion of middle-

class families, better socioeconomic conditions, and higher community stability and civic participation (Labao & Stofferahn 2006).

A key consequence of agriculture simplification is its exacerbation of biodiversity loss, leading to significant reductions in ecosystem services; to support increasing yields, the intensification of homogenized production and increased technological inputs has led to harmful environmental effects on not only biodiversity, but also soil, water, and air qualities (Landis 2017). This disconnection of humanity from nature has led to a cascading effect of detrimental environmental outcomes, but Indigenous sustainable agriculture reintroduces important practices necessary to conserve the ecosystems already affected by western agribusiness.

Chapter 4: Reconciling modern agricultural practices across Indigenous and Western ideals

"If we are to manage forests with the intent of restoration of the pre-settlement condition, then it is imperative that we understand the role of Indigenous practices in shaping the landscape"

(Kimmerer & Lake 2001)

It is undeniable that Earth is losing vital resources to overharvesting and highly intensive agricultural practices seen in western industrialized agribusinesses (Pradhan et al. 2018). In fact, the severe damage occurring through modern agricultural practices can reduce agricultural production significantly; this is not something to take lightly, as the global demand for food will require that the agricultural sector's production increase by fifty percent as of 2012 (Food and Agriculture Organization – FAO 2017; Foguesatto et al. 2019). With the global human population continuing to grow, we cannot risk permanently damaging the ability of ecosystems to provide food for humanity. However, this dilemma brings up a key counterargument to promoting ecocentrism in practice; namely that, ecocentric values can come from a subliminally anthropocentric stance. For example, are we seeking to protect the Earth in order to selfishly preserve humanity? To what extent do we practice ecocentrism and preserve nature to meet our own needs? If in the future, Earth is met with a situation where the human species is forced to either save itself or another species, does pursuing an ecocentric solution not defy our own instincts of self-preservation? If ecocentrism is ideal for the long-term prosperity of Earth's ecosystems, do humans not benefit too?

Perhaps these questions reveal the convoluted, multifaceted relationship between humanity and nature. As described in several works from Indigenous authors like Kimmerer (2013) and Hernandez (2021), we need to refocus how we discuss humanity's ethical relationship with the Earth. There is a vast spectrum between ecocentrism and anthropocentrism, including biocentrism, the ethical belief that all *living* beings on Earth have inherent value, excluding abiotic factors such as environmental systems, and zoocentrism, the ethical belief that all *animals* have inherent value (Washington et al. 2017). If humanity is motivated to preserve ecosystems for the sake of survival, then we are applying instrumental value to nature; if humanity is motivated to preserve ecosystems regardless of the outcomes, even if it means its demise, we are applying intrinsic value to nature. For these reasons, nature has both intrinsic and instrumental value to humans. In some instances, we will be forced to make decisions between anthropocentrism and ecocentrism— should I kill the spider in my house because it is convenient, or should I take it outside because its life has intrinsic value?

Because we are consumers, we are intrinsically dependent on the lives of other beings; our existence is inherently anthropocentric due to our need to survive, but the ways we consider non-human entities can lie on a continuum between ethical consumption and exploitation. Agricultural practices based in anthropocentrism, such as industrialized agribusinesses commanded by capitalism, are self-undermining because they do not serve human interests in the long-term; destroying the Earth's landscape and ecosystems not only shows the complete lack of regard for non-human entities, but also the short-sighted, falsified nature of capitalism and agribusinesses. This concept is very convoluted, and the push towards ecocentrism comes with two underlying implications: ecocentrism is important for honoring the intrinsic value in non-human entities, and ecocentrism is important for human's best interests in the long run. While

both implications can be true at the same time, I believe ecocentrism should be applied regardless of the utilitarian benefits. Across countless Indigenous communities, different aspects of the ecosystem are attributed personhood and autonomy: this is the key between ecocentric consumption and anthropocentric consumption.

Given that the global human population is rising to 8 billion, and the magnitude and longevity of human-induced impacts is increasing, scientists believe the Earth is experiencing a human-dominated geological epoch called the Anthropocene. Because humans have globalized the Earth on such a massive scale, the impacts of human activity will most likely be observable in the geological structures millions of years in the future (Crutzen & Stoermer 2000; Steffen et al. 2007; Zalasiewicz 2008; Zalasiewicz et al. 2011; Lewis & Maslin 2015). While humans have always been consumers, and thus have always been reliant on nature to some degree, our population on Earth has never been this substantial; thus, human demand for agriculture has never been so severe either. To understand the planetary-scale impacts of human society on nature, the Anthropocene concept necessitates thorough analysis of social, political, economic, and cultural aspects as much as it does the ecological, scientific, geologic, and paleo-environmental components (Biermann et al. 2016). Understanding humanity's current condition on Earth, as well as its long-term impacts, requires social context due to the interdisciplinary nature of human-caused disturbance (Palsson et al. 2013; Castree et al. 2014; Biermann et al. 2016). Thus, we need to look at the sociopolitical climates that have warranted anthropocentric agribusinesses.

Regardless of their intentions, ecocentric practices are linked with sustainable agriculture which is an essential aspect of traditional Indigenous ecological knowledge (Kimmerer 2013; Manjaiah et al. 2019). Sustainable agriculture refers to the efficient use of natural and renewable

resources and practices without impeding the ability of farmland to provide future benefit. Industrialized agribusinesses are not going to disappear overnight, because the United States is systemically reliant on the commodification of agriculture. However, reformations towards sustainable agriculture could aid in conserving the environment we still have. How can traditional Indigenous ecological knowledge be brought into modern U.S. agriculture to minimize its devastating ecological impacts?

First and foremost, Indigenous ecological knowledge needs to centralize around the Indigenous communities and Peoples from which they originate, not from western scholars appropriating or romanticizing Indigenous belief systems. With systemic advantage benefitting settler colonization, education itself is dominated by whiteness, and Indigenous knowledge becomes objectified and palatable mainly for western audiences (Hernandez 2022). To learn about sustainable agriculture from different Indigenous communities, western scholars need to listen directly to Indigenous voices, rather than appropriated versions of Indigenous knowledge. In addition, we as individuals need to understand our positionality in the systems created from settler colonization. As Hernandez describes in her book *Fresh Banana Leaves*, positionality reflects both our places in society, and their subsequent advantages and disadvantages. Understanding these oppressive systems centered around whiteness opens the gates for deconstructing, dismantling, and progressively overcoming them (Hernandez 2022). To utilize TEK sufficiently, effectively, and respectfully in making a coproduction of knowledge for sustainable agriculture, we need to uplift Indigenous voices.

Indigenous knowledge systems are vastly dismissed in western academic settings due to the standardization of westernized language and systems; when students from non-western backgrounds share their own ways of understanding scientific or ecological processes, they are

often discounted due to deviations from western vocabulary (Lee 2001; Kimmerer 2013; Hernandez 2022). The United States' standardization of western culture in education deters students from non-western cultures and languages away from English-dominated academia (Curry & Lillis 2004; Elshakry 2010; Alogali 2018). In the U.S., these rigid rules for scientific education benefit those who succumb to western language and ideologies; consequentially, this gives individuals from western backgrounds an advantage in academia, perpetuating the standard of western thought and Eurocentrism (Curry & Lillis 2004; Elshakry 2010; Alogali 2018). Thus, because the languages we use to communicate often reflect our own cultural values, the linguistic paradigm in western science needs to transition towards more diverse cultures and languages (Kramsch 2014). When Eurocentrism is the standard in western science, it spills over to countless other domains, including agriculture; this disenfranchises communities with different cultural and linguistic background, as well as their own understandings of the same ecological and agricultural processes. Diverse modes of communication and deliberation are necessary to not only disrupt oppressive systems, but also to integrate different knowledge systems into more well-rounded understanding of agriculture; dismantling Eurocentric standards is necessary for creating a co-production of knowledge in U.S. agriculture (Armitage et al. 2011).

In addition to reframing the education system towards Indigenous voices, we also need to reform standards of western conservation and agriculture (Berkes 2018). Western conservation employs resource management strategies developed for a northern temperate ecosystem prototype. Because ecosystem conditions vary widely in the U.S., western resource management paradigms developed around a northern temperate ecosystem prototype might not adequately transfer to other ecological communities. Local Indigenous ecological knowledge is so vital in cases like this because each community has its own knowledge base that is intimately connected

with the land and local ecosystem. Traditional management systems can directly increase the productivity of the environment through active intervention based on these intimate connections, such as using fire habitat management (Berkes 2018). When executed properly, fire stewardship can decrease wildfire severity, increase ecosystem heterogeneity, and amplify biodiversity (Hoffman et al. 2021). Maintaining our ecosystems comes down to intimately knowing the local environment; by knowing local priorities, less effort needs to be spent providing irrelevant information and more effort can be spent providing useful information associated with the specific ecosystem. Indigenous knowledge systems can provide the link between universal science and the management concerns of farmers who work on small plots of land (Pawluk et al., 1992) because they amplify regeneration and resource management.

Converging threats of climate change, population growth, and unsustainable resource use are all intensifying the pressure to reform agricultural systems; long-term agricultural sustainability comes with short-term reductions in productivity, meaning active efforts from the U.S. are required for a successful transition towards sustainability (Beddington et al. 2011). According to the Commission on Sustainable Agriculture and Climate Change, federal governments can encourage sustainable agriculture and promote food production by establishing food security/sustainable agriculture into global/national policies, raising the level of global investment in sustainable agriculture in the long-term, developing programs to benefit specific sectors vulnerable to climate change according to their unique conditions, reducing waste in food systems by targeting infrastructure and agricultural practices, and creating integrative information systems encircling human and ecological dimensions (Beddington et al. 2011). Investing in both global sustainability policies and smaller scale farming on a national level would benefit the severe ecological degradation facing North America. Habitat loss and

fragmentation are the foremost threats to terrestrial biodiversity (Rogan & Lacher 2018); biodiversity is vital to protect for ecosystem functions such as fertilizing soil, recycling nutrients, regulating pests and disease, controlling erosion, and pollinating crops (U.S. Mission Geneva 2010), but also for the sake of preserving and valuing non-human entities.

Specific regenerative Indigenous practices that can be integrated into western agriculture include intercropping, polycultures, water management, agroforestry, and permaculture; intercropping is the intentional planting of specific crops that physically and chemically complement one another with minimal competition for resources (WinklerPrins & Barrera-Bassols 2004; Kimmerer 2013; Carnegie Museum of Natural History 2018; Heim 2020; Marsh 2021). Although western agribusiness plants monoculture of one crop species, monocultures are very rarely found in natural ecosystems. Farming methods such as the Three Sisters (the intercropping of corn, beans, and squash) are so important for efficient, plentiful harvests because the three crops grow stronger together rather than separate. To understand how intercropping might be implemented locally, farmers also need to intimately know the local ecosystem and the individual crop plants that complement one another and minimally compete for resources. When intercropping is successful, it can not only naturally reduce pests, weeds, and diseases, but can also improve local soil health, crop productivity, and crop yield stability over many years (Heim 2020). Thus, in localizing western agribusinesses, there needs to be a shift away from monocultures towards polycultures that plant multiple species of crops in the same area, as commonly seen in nature. Because they inherently increase the plant diversity in an area, planting crops in polyculture increases productivity and in efficient use of resources like nutrients, light, and water, while also providing resilience to disease and disturbances (Iverson et al. 2014; Heim 2020; Zelikova et al. 2020).

In a manner similar to intercropping, agroforestry and permacultures are significant North American Indigenous agricultural practices that bring similar ecosystem effects (Rossier & Lake 2014; Heim 2020). Agroforestry is the management of trees, crops, and animals, including practices like controlled forest burnings; permaculture refers to agricultural systems that mimic natural ecosystem patterns, such as planting nitrogen-fixing legumes in soils where nitrogen is the limiting factor for plant growth. Agroforestry is related to permaculture in the sense that both rely on a deep understanding of the local environment, working with the dynamic exchanges necessary for thriving ecosystems; using agroforestry and permacultures in agriculture increases soil carbon by reducing soil disturbances, changing plant rotations, double cropping (growing more than one crop during the growing season), reducing fertilizer use, and applying compost to fields (Rossier & Lake 2014; Heim 2020; Zelikova et al. 2020). Carbon is an important soil resource because it drives the fertility in soil by improving soil structure, increasing water infiltration, and aiding in releasing nutrients for plant growth; therefore, agroforestry and permacultures are such significant methods for improving agricultural ecosystems (Zelikova et al. 2020)

There are several examples of Indigenous Peoples improving agroforestry systems using TEK in the modern world. For example, the Haudenosaunee (Iroquois Six Nations) of the Mohawk Tribe are currently working with both the U.S. Fish and Wildlife Service and the New York State Department of Forestry to harvest maple syrup traditionally and to restore black ash trees; the Yakama Nation and Confederated Tribes of Warm Springs Reservation partner with the U.S. Forest Service to thin trees and enhance huckleberry growth in forest understories, particularly in the Gifford Pinchot National Forest in Washington and Mount Hood National Forest (Rossier & Lake 2014). In Northern California, the Karuk, Yurok, and Hoopa nations

manage tanoak and Douglas-fir dominated forests to clear thick underbrush to harvest resources like acorns, huckleberries, mushrooms, hazelnuts, and beargrass (Salberg 2006; Rossier & Lake 2014; Berkes 2018). TEK can aid in informing the most sustainable and least harmful practices for the long run, but it cannot be practiced honorably nor effectively without consulting Indigenous Peoples from where the practice originated.

To value traditional Indigenous ecological knowledge means the U.S. also needs to value the communities that created the knowledge. With such a cruel history of racism, exploitation, and assimilation, the U.S. has intentionally disenfranchised Indigenous voices to the detriment of the Earth (and the country). With such rich bases of ecological knowledge brutalized from the histories and mouths of Indigenous Peoples, the Earth has lost paramount stewardship of the land. It is impossible to recreate the traditional ecological knowledge lost from generations of genocide against Indigenous Peoples, because TEK is a cumulative body of knowledge specific to local, individual Indigenous cultures (Berkes 2018). It is of the utmost importance to empower Indigenous voices not only for the sake of humanity's prosperity, but more importantly for the sake of Earth's prosperity.

We, as humans, carry our cultures alongside us, influencing our beliefs and actions; it is our duty to be mindful of the ways we affect other entities around us, regardless of our cultural origins. If there is one thing that we as individuals can do to preserve our ecosystems and honor the life around us, it is to follow the directions of Dr. Kimmerer's Honorable Harvest, detailed in the second chapter. Outlining important rules to abide by while interacting with nature, the Honorable Harvest affirms the personhood of non-human entities and emphasizes the autonomy of every aspect of an ecosystem (Kimmerer 2013). The Earth is so much more than the water we use, the crops we grow, the oil we burn; we have an obligation to the entities we use for

sustenance to use their sacrifice in an honorable way. Ultimately, the Honorable Harvest enacts what it means to be an ecocentric consumer.

1) Ask permission and abide by the answer
2) Never take the first, and never take the last
3) Harvest in a way that minimizes harm
4) Use everything that is taken
5) Take only what is given
6) Share what you have taken
7) Be grateful
8) Reciprocate the gift- sustain the entities that sustain you.

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