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DEVELOPING RESILIENCE THROUGH LOCAL FOOD

A Thesis

Presented in

**Partial Fulfillment of the
Requirements for the Degree of
Master of Arts**

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BY

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Developing Resilience through Local Food

Resilient food systems are integrated into the natural ecosystem where together with people they flourish. Brian Walker and David Salt are authors of the two-book series, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, and *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*. In *Resilience Thinking*, the authors state that: “[i]ncreasingly cracks are appearing in the capacity of communities, ecosystems, and landscapes to provide the goods and services that sustain our planet’s well-being” (2007, p. xiii). Using resilience from the perspective of the two-book series, the following is an illustration of how the conventional food system, in the way its production is disconnected from the local environment and the people it serves, exemplifies the use of earth’s resources that creates instability and uncertainty in that which we depend on for our survival. Following the discussion on understanding the unstable nature of the industrial model and its impact on our well-being, is a portrait of an alternative approach based on people connected to the ecosystem through the cultivation of food where in which fissures begin to shrink between earth and what it can provide to people in terms of food. Those models that link people to food at the local level and that which is absent in the industrial system illustrate the eco-social principle upon which resilience is based.

1) Local Food Scholars-

Food production in industrial agriculture is a model that is integrated artificially into the environment on landscapes far removed from the people it serves. We can look to scholars of local food for ways to rethink the conventional paradigm in an approach where access to what we eat connects people to food and the environment. These scholars that have devoted their lives

to re-envisioning how we get our food include Wendell Berry, Mark Winne, Thomas Lyson, Jo Robinson, and Darrin Nordahl. The following is a synopsis of each of their perspectives on the reasons for reworking the industrial system and their approach that is based on food production embedded in the local community.

We begin with Wendell Berry and his book, *Bringing it to the Table* (2009). Berry's viewpoint is as a farmer in Kentucky beginning in the 1940s. As Berry explains it, early on in his career, growing food was part of the local environment where farmers were dependent on the natural ecosystem of their immediate surroundings for its production. Berry illustrates what comes later in industrial agriculture with synthetic chemicals, large machinery and farming that takes place on distant landscapes, equated to relinquishing knowledge for growing food using the resources of the natural landscape. An example of people having maintained that connection to the local earth are the Amish that grow crops in tandem with the services of nature. Because of their religion that requires them not to take governmental subsidies typically used to cover the cost of the tools of conventional farming, the community instead relies on the fertility of the land following practices of farming on smaller plots on which they seasonably rotate a variety of complementary food plants on soil amended with local compost and tilled with gentle horse-drawn plowing. Berry argues this approach puts them in a secure place into the future related to food because they maintain a continued evolving understanding of sustainable cultivation of the land for its production. He argues farming up close harkens back to earlier times when farmers blended the "wilderness" with the "agrarian" (2009, p. 67) by mimicking the "evolutionary adaptive process of nature that [is] the inherently cyclical, capable of regeneration and reproducing indefinitely" (p. 23).

As a veteran farmer and local conservationist, Berry explains that scale is an essential component for farming for long-term resilience. Farmers who cultivate plots closer in size to what we think of as a garden allow for them to be intimately connected to the ecosystem entrusted to their care. With respect to food production on a larger-scale, these farmers who sustainably labor an individually plot of land would then be interconnected through a network of other small farms of that farming community. As he explains it, as a collective, the network of farmers is known to be more productive than a machine-driven chemically enhanced agricultural landscape of equal size. For example, small farming communities in China are noted as having a higher productivity compared to their conventional counterpart in America. Berry quotes Secretary of Agriculture Bob Bergland under Jimmy Carter as saying, “they get nine times as many calories per acre as we do in the United States” (2009, p. 25). Berry’s ultimate message is that well-managed small farms where farmers integrate what takes place in the native environment into growing food will be more productive over time when compared to large-farm industrialization.

Berry advocated an ecological approach to building resilience in food production through knowledge of the local environment through its cultivation borne out of his experience as a farmer in Kentucky in the 1940s. A decade later for his neighbor to the north, Mark Winne’s call for a local alternative was in response to what was available to eat for the people of his community that came from the supermarket. In his book, *Closing the Food Gap* (2008), he begins his story in the context of suburban New Jersey where the people of his neighborhood were disengaging with the environment in that they were using the synthetic insecticides Rachel Carson warned would silence of the sounds of spring, the nearby apple orchard was sterilized, and malls and parking lots began to populate the landscape. At the same time in the area grocery

stores, packaged foods were said to free the middle-class from thinking about food plants and cooking them from scratch in the kitchen. Symbolic of that era, Winne points to the work of Procter and Gamble who would invest five million dollars to develop specialty packaging for its Pringles line of potato chips. The artificial approach to life in suburban America in the 1950s led him to search for an authentic way for food to be produced and drew him to an urban community that did not have access to the same supermarket system as he did in his community. Lacking access to food of the well-stocked grocery store, here was a place he could focus his energies on developing a local approach to food acquisition.

Armed with a college education and a keen sense for the superficiality that began to emerge out of what was a bucolic childhood, Winne's desire to participate in an alternative food movement are what let him to Hartford, Connecticut and the Hartford Food Project in 1979. In a position he would hold for the next 25 years, he was tasked with "increase[ing] the food self-reliance of the city's low-income families and improve the livelihoods of Connecticut's farmers" (2008, p. 13). Coupled with reaching out to the local farmers of Connecticut that were also struggling in the conventional food economy, Winne's plan was to fill the gap by bringing food from the rural Connecticut farmers into Hartford to sell at local farmer's markets and through community supported agriculture, coupled with urban gardens, local facilities to process food, and co-op food stores. His work was to create a system to get food to the people and support small-scale farming in the region while at the same time creating jobs for the local community. Winne explains that people of urban areas struggling economically and small-farm establishments in America were hard hit by the way in which food was produced and distributed in the federally-supported system.

Industrial agriculture calls for food production to take place on vast landscapes at distant locations, processed at assembly plants, and delivered to grocery stores across America where it can be sold at a profit. Studies show that this way of food distribution has led to an overall decrease in access to food compared to what had been small farming communities of the former American landscape. Food became cost prohibitive under the new model for the less affluent suburbanite, while at the same those food stores tended not to reach poorer urban communities. Furthermore, as explained by the author, for people that did not have access to food of relative quality, they were also hard hit with the reduction in food assistance under Reagan's presidential policies. The situation led to the fact that the Emergency Food System (EFS) could not keep up with demand. For example, EFS distributed nationwide in 1990, 450 million pounds of food, up from 25 million in 1979. In a study of the community of Hartford, it was documented that 41% of the people were regularly experiencing hunger because of the lack of access to nutritious and affordable food (2008, p. 31).

Like the people of Hartford that lived in what is described as a food desert environment in that they lacked access to affordable foods of the conventional grocery store, Winne references a similar study on the other side of the country in California to illustrate people's experience with food hardship that was present throughout poor urban communities in America. In a study of a neighborhood in Los Angeles, of a region of the world with great monetary wealth, Ashman, et al. (1993) from UCLA discovered the conditions that led to violent riots and looting of food stores in South-Central Los Angeles (SCLA) after the acquittal of police officers in the taped beating of Rodney King was related to their having extreme scarcity of food. The researchers reported twenty-seven percent of the residents averaged five days per month when they did not eat, and when they had food, what they had to eat was of poor quality. The study

was an exhaustive account of the conditions that create food deserts such as the pervasiveness of expensive small and medium sized convenience stores that sell primarily low-quality processed food, compared to large chain supermarkets in neighboring districts that offer higher quality relative to cost.

The authors found that residents of SCLA also did not have the means or access to patron food stores outside the community. Furthermore, the cost of food took up a larger fraction of their income compared to their suburban neighbors. The urban poor were found to be spending thirty-five percent of their income on food, compared to half that percentage for those that had access to higher quality food that was less expensive, creating a widening gap in quality of life between the two groups. In their research as they determined there was no hope for bringing in a franchised supermarket, they concluded that social instability could only be alleviated by instituting a network of local food (1993).

The phenomenon known as living in a food desert could be found on both sides of the United States at the time of Winne's book. Because the people of Hartford were excluded from the food system in that there were no supermarkets of comparable quality like that of more affluent suburban neighborhoods, it made sense to look for an alternative in partnership with local farmers. Given his passion for the movement to bring local food to the community, however hard he tried to get the program to work, after two and a half decades on the job he came to realize his was not the right approach to remedy the situation. He concluded his lack of success was because the needs of the community were different than those that brought him to the project. From his perspective, the pursuit of freshly harvested, sustainably grown food close to home through a network of local farmers, would be an alternative to the foods of the nationalized supermarket, whereas for the people of Hartford the alternative approach would

have to address having been excluded from the conventional system of the economy. These diverging perspectives hit home as he was helping to build a food garden one day late into his tenure at Hartford. He writes although access to food was limited in that there were no well-stocked grocery stores in the immediate area, they were in the unique situation due to a kind of abandonment in that they were left with undeveloped land in the urban landscape that could be used to grow food. He came to realize that it could be them within the landscape of their own community to bring food to Hartford (2008).

Born in 1948 in Illinois, like our scholars Winne and Berry, Thomas Lyson was also an advocate for local food. At his post at Cornell University, his focus was on the impact on people by the practices of conventional agriculture that he argued was symbolic of the alienation created out of the economy of the industrial complex. In response to what he argued was an experience of estrangement with respect to food production, he called for an approach where people were connected to its production as part of the local economy. In support of the initiative, he developed a program modeled after the university's land-grant mission that combined research, outreach, and teaching to support local participation in food production coupled with documenting the effects of the ways in which the local response to economic development enhanced the experiences of the community. His work culminated in his influential book entitled *Civic Agriculture: Reconnecting Farm, Food, and Community* (Gillespie, et al., 2018).

In *Civic Agriculture* (2004), Lyson presents a picture of modern America as being shaped by "Western Style industrialization" compared to what had been tight-knit interactions based on the local economy of pre-industrial communities. For example, in 1870 in northern New England, civic relations revolved around the likes of the flour miller, the blacksmith, the wagon maker, the shoe cobbler, and other shops that required the work of skilled artisans who created "a

diverse array of goods for local markets” (2004, p. 10-11). He explains what followed during the industrial revolution was that the artisan craft maker was replaced with the factory worker of whom fewer were required to manufacture standardized products of which generated higher short-term profit and less outlay of initial cost. He concludes that without the local economy the community began to be disconnected developing an overall collective apathy.

A similar evolution took place in food production that was modelled after the standardization of products. Lyson explains that although environmental conditions were different in terms of soil and climate, farming enterprises managed by skilled labor began to look like prototypes of standardization. As the skilled artisan shifted over to industrial factory work, farmers began “mimicking . . . mass-production . . . to grow food using . . . less labor entirely removed from the context of the sectors that existed between people at the local level” (2004, p. 18). Lyson argues it was the Morrill Act of 1862 that was the engine of mass production of food in the way that through government mandate federally owned land be granted free of charge to states for the purpose of building establishments deemed ‘land-grant universities.’ From these institutions farm production modelled after factory-based efficiency systems would be studied and specialists would share their research at designated outreach or “extension” posts from where farmers would take the information back to their farms to experiment. He argues it was through the land-grant model that small-scale farmers began to specialize in one product and there became a concentrated number of farmers producing an overall larger share of fewer agricultural products. Although sustainable agriculture was later introduced into the work of land-grant universities, in its inception, support through the land-grant system engendered the modification of seed genetics, subsidies for agricultural machinery, and allocation of the

synthetic chemicals to farmers left over from WWII. With these tools between the years 1950-1980 those crops of focus were said to have yielded an increase of nearly seventy-five percent.

Although there was larger quantity of food that required less labor to produce, the industrial model was at the expense of plant diversity and an understanding for where food comes from and how it is produced. The food industry reflected the national and multinational character of the industrial marketplace in its concentrated approach where a small handful of large companies were in control of a majority of consumer production. The structural organization of corporations took on a similar approach where decisions were made unilaterally to merge, acquire and divest within and between companies, accountable only to its shareholders, not the workers or consumers affected by their decision making. Further streamlining the industry, farmers were under contractual agreement for what food to produce. For example, Green Giant, which began as a local food canning company, went through the circuitry of absorptions and divestitures, at one point being owned by a multinational company out of the U.K., while its canned food was on the shelves of the American marketplace. Ultimately the company was divested of all but its commercial name in that outsourcing to the farmers and canners meant there was no direct link between workers and the brand, and by extension to the people who consumed its food. Lyson's assessment is that the many layered distancing of its production created a culture where food was alien to people. From this perspective, he argued the response was to move to a local food economy (2004).

Connected to food at all levels of production: from the farmer who has a working relationship with sustaining the land, the consumer that has access to a variety of freshly harvested local produce, to preparing and eating those foods for oneself, when taken together offers multi-faceted protectorate and thus a foundation for developing resilience in our food

system. But how do we create those connections at the local level when the distant landscape of the industrial model is inextricably tied to America's political, economic, and educational system? With the publication of *Public Produce*, Darrin Nordahl (2009) from his position as a community planner in Davenport, Iowa describes the potential for municipal governments to institute policies in support of a local food economy. Coupled with what was developing within a national conversation critical of the corporate food system dating back to the 1970s, from his post he saw city officials as having the resources and power to support a food system that is local in their communities.

For Nordahl, the reason for integrating food at the local level was as an alternative to the unreliability of the corporate system such as manifested in infestations of bacteria and salmonella in large centralized fields of produce where people were sickened that was nearly impossible to trace its origins. Unpredictable weather systems have also undermined the viability of large-scale agricultural products as in where food production is centralized in California and Florida where large crops are susceptible to extreme climate conditions and what can create unpredictable fluctuation in price. Furthermore, because of the need to transport food long distances and the machinery of industrial production is dependent on gas, variation in the cost and availability of fossil fuels can add to the unpredictable nature of the commercial food system. Expansive fields of singular food plants upon which farmers are dependent for their livelihood can also be a target of foreign governments critical of American politics (2009). A recent example are tensions around the 'trade wars' initiated by America that has led the Chinese government to target soybean farmers who had been dependent on them for the sale of their product (Rappeport, 2018).

The unreliable nature of corporate farming also touches people who do not have access to mainstream sources like those that live in the food desert. Nordahl explains how decentralizing access to food would enhance its reach to those communities through which the local government could support through the development of local food programs. He provides the example of the power of the local municipality with respect to food resources within the thirty-two square miles inhabited by half a million people in South-Central Los Angeles that had dismal options that led to a documented decline in the health where in which they stepped in with a moratorium on fast food restaurants in that district. Though controversial in that fast food is better than no food, it is an example of government reaching out to help people with what resources of food they have access to. With that power he suggests going beyond moratoriums and zoning for and providing city resources to produce good food locally. Well-tended orchards, gardens, and grapevines in public areas, vacant lots and along the street landscape would not only foster a sense well-being, but a lush display of food plants would be beautiful where people could see up close growing fruits and vegetables in the local community. The author cites as exemplary the work in Detroit that as an expansive food desert vacant spaces are being cultivated by the inhabitants of the city to grow food gardens (2009).

Edible plants that are native to the environment are shown not only to be the easiest to grow, but of the most nutritious. Born in 1947, Jo Robinson is a food journalist who at the time of publishing her book, *Eating on the Wild Side, The Missing Link to Optimal Health* (2013), had spent fifteen years researching varieties of fruits and vegetables where she found that food plants related more closely to their wild ancestors are high in nutrients. Her work comes out of a desire to preserve the genetic diversity of fruits and vegetables and to bring back to the American palate nutrient density present in those foods missing from the foods of industrial farming. Robinson

lives on Vashon Island in Washington, where in addition to her research, she experiments with growing those plants of the wild species. She traced the plants she grows to the hunter-gathering era when humans moved thousands of years ago with the seasonal availability of fruits, nuts and vegetables. She explains the nomadic forager would have consumed genetic qualities that would have enabled those plants to persist in that environment. For example, compared to the commercially grown tomato, its native ancestor holds a higher level of lycopene, a pigment that acts as protection from the damaging effects of the sun.

The domestication of people and food plants are said to have occurred simultaneously. Archeologists found remnants of an olive grove in Palestine dated seven thousand years ago as an example of the finer characteristics of domesticated food such as the cultivation of delicate skin, and elevated levels of sugar, fat and carbohydrates. Those traits continued to be cultivated as agricultural skill improved in domesticated food, while at the same time the internal chemicals of the native environment such as phytonutrients that protect against the environment such as harsh weather, pests, disease and animal grazing became less present in the plant. In contrast to the olives cultivated in ancient Palestine, plants with higher levels of phytonutrients have tougher skin and are more pronounced taste. Remnants of the wild edible can be found in our soils today. For example, the dandelion has “eight times” more phytonutrients than spinach. The author suggests picking and eating a dandelion leaf and allowing time to appreciate its taste and qualities such as its numbing effects and to learn to prepare it in soups and stews (2013, p. 23). Phytonutrients that number in the hundreds in wild species are passed on by protecting against inflammation, loss of eyesight, aging, and reduced brain function. Increasing the consumption of bioavailable nutrients of plant chemicals can also enhance the immune response.

What began as selecting for domesticity, today's food plants are genetically modified to meet the demands of industrial agriculture. Food plants that are expected to travel long distances after they are harvested are designed to withstand being picked prematurely and stored for an extended time, the most vulnerable of which are those that transpire quickly. For example, to get the most taste and nutrients from asparagus, it is best to eat the vegetable immediately after it has been picked; those qualities of flavor and nutrition that have already been reduced in its genetics to suit the needs of the industrial complex. To entice the consumer to eat plant foods whose taste and nutrient complexity is reduced, they are cultivated to be an enlarged version of their native self. Wild asparagus is more like a grass than the stalk we get from the supermarket. Robison argues that the best tasting, and most nutritious foods will come from native seeds grown close to home harvested at full maturity and consumed or processed quickly thereafter (2013).

2) The Theory of Resilience-

Food production as a resilient system is dependent on an approach where people and nature come together as a local community. The potential of the foods we eat to be of a thriving eco-social environment is related to the connections we make with each other and our environment in how we grow food. Walker and Salt explain the depth at which resilience takes place is in the relative co-mingling between the earth and its inhabitants that thrive together as we grow. The more connections we make between each other and with earth, the greater is our capacity for resilience. Our local food scholars have illustrated the people/earth connection in the way that food is produced. Berry advocated coming to know how to use earth's resources designed as an evolutionary cyclical system for the purpose of providing continual nourishment for the propagation of food plants. After two and a half decades of working in a food desert,

Winne comes to realize the most promise is to have the food cultivated by the people of the community. Lyson's work demonstrated that community thrives when food production takes place in the local economy. Robinson's work on plants shows the resiliency traits of food plants of the local environment are passed on to the consumer in terms of health. Nordahl argues with the support of municipal government, community gardens would foster greater connections within the community. In response to that which severs people from the environment, our scholars show us that resilience is based on cultivating connections between community and nature.

Walker and Salt describe the nine pillars that are the foundation of resilience. Based on people coming together with the environment, the first is cultivating diversity within the comingling of those local interactions. Maintaining diversity allows for productive responses within the local eco-social environment that has the capacity internally to adapt to an evolving eco-social system. For example, in contrast to the standardization of an industrial landscape based on a single species managed to maintain a fixed state, plants of a diversified habitat of a poly-cultural landscape are designed to meet the evolutionary challenges of a growing and changing environment. Having that first pillar in place, the second tenant of resilience is met when the diversified habitat are those plants of the native ecosystem that have evolved to persist in that environment. For example, a food plant of the cold-tolerant Brassica Family was studied with respect to its expressed traits when grown in and out of its native environment. One of the Brassica was grown at room temperature and the other at freezing point. In the latter case, the plant responded with the activation of plant antifreeze proteins and that which enabled it to thrive in the cold and that of its native environment. Whereas when cultivated at a mild temperature, the plant did not develop the additional protein (Meza-Basso et al., 1986). The example

illustrates that plants that evolve within local conditions have the capacity to develop persistence in those landscapes. The first two pillars of resilience are related to the presence of a diversified system evolving out of adaptation to the local environment enabling persistence of that community.

The third pillar of resilience is recognition of the importance of maintaining independent ecological communities of those local spaces. Components of ecosystems are systems self-organized, independent, and adapted to the local environment, the individual stability of which is part of a network that makes up the greater ecosystem. For example, the likes of which where farmers are attune to the local landscape where they grow food on small plots of land each of whom works within an ecological niche of the greater farming collective. The fourth pillar acknowledges the connectivity between the boundaries of these modules that is measured in the individual system's capacity to absorb internal disturbance that acts as a protective barrier from reverberating out into the external topography of the greater landscape. An industrial landscape of a single plant where one plant is infected by a pest would lack a protective barrier to keep the nuisance from moving outward into the greater landscape of that same species. In contrast, were a single species to be infected in a collective diversity of plants, the polyculture would enable protection from reverberation of the infection out into the greater landscape reducing the risk of collapse of the greater landscape from a localized disturbance. In an agricultural design that mimics nature, the overlapping of different kinds of food plants act as protection from disturbance within the system. The third and fourth pillars illustrate that resilient systems have the capacity to maintain internal independence while overlapping in networks of protective patronage.

The fifth pillar is the measure of a modules' magnitude for "tight feedback loops" (Walker & Salt, 2006, p. 146). It is the relative capacity of the mode to withstand variability and its ability to recalibrate to a stable state without affecting the greater socio-ecological system in times of change. For example, as illustrated in recent events in the American economy, soybean farming has shown itself to be vulnerable to shifts in the global political environment that has required external subsidies to protect it from financial collapse. In this case, financial support from the federal government has acted as a protection to the soybean farming industry while also to peripheral economies that would have been impacted were that system of the economy to collapse within the marketplace. The case illustrates that which is not resilient, as Walker and Salt argue, in that dependence on external subsidies is indicative of system that has yet to develop an internal capacity to protect itself and negative reverberation to the greater community. Which leads to the sixth and seventh requirements of resilience that are measured in the presence of "social capital" through which networks of people including the leadership have the power to respond to disturbance in ways that foster "innovation" (p. 147). That is, for people to have the tools for addressing the organization of a system differently than that of which more of the same would have proven to be unsuccessful. For example, using the authors' resilience theory, it would be prudent to restructure conventional American soybean farming in a way that would enable it to be free of the disturbances of the global economy. These seven support structures when taken together display the eighth pillar of resilience that is "overlap in governance" that allow for adaptive evolution to take place within the multiple layers of a socio-ecological environment that is in constant fluctuation. Lastly, and in its grand scale, resilience is supported by incorporating the "ecosystem services" of the environment by integrating the machinery of nature into community development (p. 148). Wendell Berry's using nature as a measure in agriculture is an

example of incorporating the free services of the environment into the growing practices of the food industry, in contrast to the practice of external high-input synthetics that damages the environment. Resilience is established when people connect with the local environment and grow as an eco-social community.

3) The un-resilience of Industrial Agriculture-

Because an ecological community of an evolved ecosystem will have adapted to thrive in the local environment, when those developed connections are severed, that community in turn is vulnerable to instability with the loss of those connected relationships. Agricultural practice that removes a developed ecosystem reduces the environment's capacity for a stable earth community. To illustrate the removal of an ecologically adapted ecosystem and its repercussions, are the actions of Big Sugar in the Florida Everglades of whom the dominant players are Pepe and Alfy Fagul, whose companies include Florida Crystals (Staletovich, 2016; Filkins, 2016). In order for them to grow sugarcane in the Florida peninsula, the natural water patterns of the landscape including the hydrology of the marshes and change the historic chemical structure of the soil have had to be radically shifted (Frederick, 2016). Through that process put at risk is the rare ecological system and endemic species such as the alligator, and wading birds like the heron (Staletovich, 2016).

The actions of industrial agriculture indicative of the sugarcane industry in the wetland peninsula have led to the rapid spread of invasive species that led Congress to approve in 2000 a \$10.5 billion (USD) grant over the span of 35 years. The "Comprehensive Everglades Restoration Plan" (CERP) is the "largest ecological restoration project in the world" (Frederick). Despite these costs paid for by the American taxpayer for environmental restoration in Florida,

sugar prices remain propped up by federal subsidies and regulation of the industry remains muted. The lack of concern for the historic wetland by the American government has been directly equated to the billionaire Fagul brothers who regularly contribute to both political parties at all levels of the American political spectrum (Engler, 2003; Filkins, 2016). Big Sugar is taking in big money at the expense of the American taxpayer and what is a major and distinctive wetland that provides important ecosystem services to the world (Major Wetands, no date). Concentration of wealth that is subsidized by abuse of the ecosystem and paid for by taxpayers leads to the suppression of communal values that are shown to promote conflict and distress between people, whereas resilient systems are designed to cultivate meaningful interactions based on community equity (Walker & Salt, 2006; Mineo 2017). Walker and Salt argue it is an illusion to think we can take from the natural world in ways that debilitate its functions while at the same time building a stable earth community.

Florida's wetland peninsula illustrates the phenomenon of a habitat having evolved out of the local environment that for this region started with the rise in sea level said to have occurred ten thousand years ago. In addition to being a water-based environment, its climate alternates between long subtropical weather systems; warm and humid with heavy rains from May through November, and mildly temperate and dry from December through April (Everglades, no date). Following patterns of being adjusted to the native landscape, fish would migrate to deeper pools of water during the dry season that became a concentrated food source for other species such as the alligator and wading birds that would nest in nearby dried vegetation to have their young. When the rains returned, the now more abundant in wildlife would then migrate out to what became the flourishing wetland. Although early explorers were said to have been awestruck by the lush beauty and the abundant wildlife of the region, they and those that have followed, have

had to overcome unfathomably costly and almost constant and insurmountable obstacles in their quest to take over and manage the region for the purpose of human development (Frederick 2016; Walker & Salt, 2006).

Located at the southern tip of the state, Walker and Salt describe the habitat of the Everglades as having been shaped by the flow of water. Underneath its flow of water, the land of the Everglades is of limestone bedrock that gradually decreases in depth creating a slight decline that allows for gradual movement downward. In its historic design, coming in from the headwaters above, during the rainy season water would collect and lower through the large and shallow Lake Okeechobee, located at the top of the peninsula. With the annual influx of large amounts of rain coupled with the sloping of the land, the southern side of the lake would historically flood, those waters then moving slowly through what was known as ‘a river of grass’ that was a sawgrass prairie. The freshwater that flowed through the marshy habitat that measured 50 miles wide and 100 miles in length was ultimately in route to the salty water of the sea.

Believing the swath of lush prairie that began south of Lake Okeechobee grew out of richly endowed soil, the tall grass habitat was subsequently drained of its water and clear-cut to grow plants for agricultural purposes. The clearing made way for the designated Everglades Agricultural Area (EAA). The EAA covers just over a quarter of the landscape of the historic Everglades and is home to the largest production of sugarcane in the United States (Walker & Salt, 2006). It was believed clearing and draining the wetland would reveal fertile ground based on what could be seen of the abundant prairie of the native ecosystem. However, what the naked eye could not see was the sawgrass had adapted to the nutrients of the fresh slow-moving waters and a thin layer of nutrient-poor soil. Like other species that had developed traits to persist in the

Everglades, the wetland prairie plant had a physiology that met the needs to live in that ecosystem (Brix, et al., 2010).

After learning that the plant was not thriving as expected in the existing soil, they began treating the landscape in ways that would enable sugarcane to grow (McCormick, et al., 1999). While researchers of the region have come to know that the native habitat persists at very low levels of phosphorous and defined as historically oligotrophic, it has been measured up to thirty times that amount due to agricultural inputs to the region (Belanger, et al., 1989). While on the surface a change in the chemical structure of the soil seemed to work as a farming strategy, ultimately eutrophication caused the oligotrophic nature of the Everglades to tip into imbalance.

The imbalance started with the yearly deluge of rain and the annual flooding of Lake Okeechobee and due to the gentle downward sloping of the land, the water that would naturally migrate downward to the newly razed, drained and treated agricultural area. When oversaturated with water, the phosphoric landscape of the EAA required pumping waters back up into the lake. The now enriched waters caused the plant-like, blue-green algae to dominate (Walker & Salt, 2006) that inhibited sunlight and consuming related levels of oxygen as it decomposed, causing loss of life in the lake (Havens, 2008). Management of the hydrology of the landscape more broadly was needed to protect the people and towns that began to surround the lake after what were recorded the worst natural disasters in American history that killed thousands of people and livestock in hurricanes, flash flooding and long droughts. Holding tanks, rerouted waterways, and high sea walls were built around the lake to protect its constituents from the intensity of fluctuations in weather and to provide a more consistent hydrological landscape (Walker & Salt, 2006; Staletovich, 2016).

While historically a diversity of abundant species co-evolved within the fresh-water oligotrophic environment, the change to a water-managed, eutrophic landscape has led to the takeover of species that dominate in disturbed ecosystems. The proliferation of the invasive species across the landscape has reduced ecosystem diversity having led to food scarcity within the wetland (Rivero, 2017). The algal blooms in Lake Okeechobee exemplify how the altered chemical structure of the environment has enabled a single species to choke out other life in the body of water, thus reducing overall diversity of the lake ecosystem. Though overtime pumping the enriched water upward from the EAA to Okeechobee has ceased, due to the tilting of the geological landscape in a southern direction down to the sea, the eutrophic waters of the EAA naturally flowed downstream to the freshwater prairie that met up with its border to the south.

On the southern side of the EAA, the now eutrophic water that moved through the low-lying freshwaters of the habitat, there also grew algal blooms (a bacteria) that took over as the primary phytoplankton ('drifting food plants') in that ecosystem. A food source whose abundance was once checked and shared with algal diatoms (Gaiser, et al., 2011; Shaw, et al., 2009). The bacterial blooms in turn have disrupted the internal cycling of the biome because they are too large in comparison to algal diatoms (that are micro algae) for the micro-zooplankton (who are tiny animals) to eat. At the same time, for the (larger) macro-zooplankton, the food of the bloom is not digested as efficiently as the diatom so therefore provides less nutrients. The disappearance of the algal diatom in the waters of the sawgrass prairie, of the oldest organisms found on earth, affect the upward mobility of other species of the greater ecosystem, species that are dependent on the food sources of the native environment (Comparison, 2001; Everglades; Havens, 2007). Chemical enhancement of the environment for the purpose of growing sugarcane

has led to the weakening of resiliency of the environment by reducing species diversity that would drive the trophic cycling of the Everglades.

Historically, seventy percent of the historic Everglades was of the shallow freshwater sawgrass prairie habitat of which twenty-five percent of the overall Everglades has been repurposed for sugarcane farming. The prairie's abundance as a primary producer in the environment related to its overall high percentage was related to the plant's capacity to slowly and steadily uptake nutrients in the oligotrophic water-based landscape. With the inflow of its waters redirected for agricultural pursuits, coupled with the introduction of phosphorus into the landscape, the now drier and nutrient-enriched environment has created ideal conditions for the pervasive takeover the cattail. In a landscape that had restricted its growth, the cattail has come to be the dominant species (Maio, et al., 1998; Newman, et al., 1997) of the Everglades, its proliferation related to its ability to quickly absorb nutrients of wetlands that grow rapidly on eutrophic soil (Miao, et al., 1998). Cattail dominated habitats are indicative of disturbed landscapes of habitats infused with industrial chemicals (Elergsma, et al., 2017; Gucker, 2008). What had been an iconic ecosystem evolved over the course of time, has been pushed into a managed landscape that is suspended in a state of succession indicative of a disturbed ecosystem. Sugarcane farming illustrates how landscape alteration of industrial agriculture has led to undoing diversification that would have been based on developed adaptation to the environment upon which resilience is based.

4) Plant Community as a response to Earth's Nutrient Limitation-

Why should we grow food within a developed ecosystem of the native environment? The answer to that question has come out of a movement in Europe to show that food plants of the

native environment provide higher nutrition and are better tasting than those grown out of the industrial landscape. While Hopkins and Holz found that agricultural plants grown within the natural patterns of the grassland habitat are more advantageous to its consumer, they also found that this method of farming also preserves the environment in which the food is grown (2006). For farmers of the continent who practice this kind of farming that is described as low-impact, they have found monetary support for their work through the protective programs of the EU (The EU Biodiversity, 2016).

The authors describe the call for agriculture to protect the grasslands as related to the work of Darwin who found complex polyculture habitats to be more fecund when compared to single-species pastures. They report from similar studies that came to the same conclusion where multiple edible grasses when grown together including legumes were shown to provide higher levels of food production that persisted independently when compared to those traits that were lacking in single-species pastures, with older and more diverse mixtures being the most stable. In addition, when chemicals were added to the landscape in single-species pastures, eutrophication of the soil ultimately led to conditions where cattail could dominate if it were not managed. The proliferation of the pioneer plant is indicative of the process through which a degraded landscape goes through in an early state of succession of immature and undeveloped plant communities. Through the study researchers came to the conclusion that self-sufficient perennial polycultures are those that arrive in later stages of the evolutionary process having developed the energy-intensive features as adapted to the native environment.

The purpose of the report was to illustrate when mimicking the features of an evolved ecosystem such as with native and of diversified establishing as a collective at different states of maturity, those plants of the agricultural landscape were found to offer higher range of plant-

derived carbohydrates, fiber, and tannins compared to those of conventional pastures. Furthermore, a diet of plants grown to mimic an evolved ecosystem equated to having a biochemical composition of unsaturated fats, protective fatty acids, as well as minerals and antioxidants. While the study was meant to enhance a commitment to sustainable agricultural policy in support of the people of the EU, it also illustrates the comparative resilience of stable perennial food polycultures compared to those foods grown out of eutrophic landscapes (Hopkins & Holz, 2006). (I don't see the government as an autonomous machine that works separate from the people of the community in which it is meant to serve. It can serve the people most effectively when in communication with the people of the community to learn from them when decisions are made of impact to them.)

Eutrophication of the landscape causes that habitat to unravel into the domination of rapidly producing species that proliferate on disturbed environments, as illustrated in the case of the Everglades and the grasslands of Europe. The fact that over-abundance of nutrients on these landscapes led to the proliferation of early-successive species has been tied not only to these examples, but illustrates a more general phenomenon that earth's landscape is limited in nutrients. Elzer, et al. sum up the global nature of earth's limitation as "growth and reproduction of photosynthetic biota as well as large-scale ecosystem primary production [as] frequently limited by supplies of nitrogen (N) and phosphorous (P) in freshwater, marine and terrestrial environments" (2007, p. 1135). That eutrophication leads to the breakdown of natively evolved environments is related to the limiting nature of earth's landscape, while the community plants of a developed ecosystem are adaptation to those limitations.

Elzer et al. found that while nutrient limitation is a feature of the globe, the chemistry of each of its geological features is unique to the landscape of that environment. For example, the

level of limitation of phosphorous (P) is related to its gradual sequestration in soils older than 10,000 years, making P more highly limited than nitrogen (N) in terrestrial habitats. At the same time land-based environments undisturbed by glaciation have allowed for the most sequestration over time and therefore are more highly limited in P. Those ecological communities of a particular ecosystem have developed a symbiotic flow of energy as an adaptation to the limitations of the landscape upon which they dwell (2007). While there are differences in the physical chemistry of earth's biomes, the authors argue that what eutrophication of the landscape does to its plant habitat is "surprisingly similar." For example, although the chemistry is different between the physical structure of an ancient wetland and a landscape undisturbed by glaciation, the flora of its enriched soil will respond in the same way to chemical alternation and as such are equally vulnerable to the takeover of early successive species such as the cattail. The similar response of dominance of early-evolving species to nutrient infusion although they are different kinds of landscapes, is thought to be related to the shared "biochemical machinery" of the plant kingdom, including algae and bacteria (2007, p. 1136). Elzer, et al. show with eutrophication occurring across the globe with increased levels in nitrogen and phosphorous estimated at 100% and 400% respectively, it is causing to tip into imbalance the capacity of the earth community to provide food from its environment upon which is based on diversity of species and that which with the dominance of early-successive single species is dismantled (2007).

The deep-rooted and sturdy structures of trees and symbiotic relationships within old growth forests exemplify what enables a community eco-structure of species to thrive for thousands of years in marginal soils. Rennenberg and Schmidt link the perennial nature of the plant with growing together a variety of species as an adaptation to the nutrient limitation of the

floor of the forest. The authors gathered evidence that suggests a forest's ability to persist with soil restrictions of N and P is related to reciprocal relationships between a multiplicity of the species and the tree's intercellular, molecular, and whole plant features that draw in and share nutrients throughout the habitat. Symbiosis linking between the statuesque species in its root system coupled with the help of the organisms that live alongside the trees such as fungi and bacteria enable adaptive strategies of co-evolution to build ecosystem stability in the landscape (2010). The examples of the old growth forest, the historic freshwater Florida Everglades, and established polyculture grasslands of Europe illustrate how each thrives as an ecological community using the resources of the local environment. Although they are different in their ecological features, they share in having developed an internal symbiotic flow organized locally and connected in a diversified community so as to ensure the resilience of the ecosystem.

5) Regenerative Landscapes with Perennial Food Polycultures in Woody and Prairie Ecosystems-

Mark Sheppard as a restoration farmer has learned to tap into the energy flow of the native Wisconsin forest for the purpose of growing food. Sheppard has restored the forest with edible woody food plants from what had been clear-cut for the annual plants of soy and corn that required chemical inputs for them to grow in what had been the soil of the forest. As a person who grows food using ecosystem resources of the native environment, his approach as a farmer is based on the principles of permaculture. A system originally coined by Australian ecologists Bill Mollison and David Holmgren, they joined together the words, 'permanent' and 'agriculture' in 1978 to describe patterns in natural ecosystems designed to be self-sustaining with respect to growing food that recurs perennially in nature (Permaculture, 2018). Overtime,

the movement grew to include three principles of ethics: care of the earth, care of people, and fair share (Holmgren, 2010). Sheppard is certified in permaculture and a teacher and researcher of the discipline (Sheppard, 2013).

Through the lens of permaculture, the Wisconsin farmer explains the benefits of developing an edible woody polyculture of the forest ecosystem in the way the plants come together as different sizes and shapes for the purpose of collective self-sustainment. In contrast to the uniform design of the landscape of conventional agriculture, a textured diversified polyculture offers multi-layered functionality enabling the capture of comparably greater amounts of sunlight and atmospheric gases per surface area, the modulation of temperature and humidity, and a canopy for the protection of soil erosion. The plant community is offers a collective protection to the habitat. Compared to a landscape of annual mono-species dependent on external chemicals for it to be maintained, food forests have the capacity to live self-sufficiently for thousands of years on marginal soils. For example, of the oldest tree that thrives within forest ecosystems of North America is the food-bearing chestnut (Shepard, 2013).

Sheppard explains the process in refurbishing the forest ecosystem from annual-style farming with edible woody polycultures revolves around determining those plants that would thrive in that environment. The first step is to determine the undergirding bedrock upon which early successive annual plants would have grown for the purpose of building the nutrients in the soil upon which longer-living species of the successive process would have developed symbiotic relationships as established native plant communities. The next step is to identify the largest species of that environment. He argues coming to know the environment that enabled large plants to establish is related to their ability to capture resources over a greater surface area and that which allows for what plants will grow around it. A polyculture designed around the biggest

tree is related to its root system that penetrates underground breaking up the bedrock and pulling up nutrients through an interconnected network that includes microscopic fungi and bacteria that excretes chemicals to keep away competing species requiring nutrients from its soil. For example, the Juglandaceae family excrete juglones, a naturally occurring herbicide that excludes plants outside that family (2013). Juglandaceae species include walnut and pecan trees. Food bearing species surrounding a walnut tree also of that family include black cherry, plum and apricots trees (Joybilee Farm).

Sheppard's approach in his food forest is to grow the edible plants of the oak savannah. This forest of the Fagaceae family overlaps with species of the Juglandaceae in that they are of the same Order. Food-bearing species of these families include (from largest to shortest): oak, chestnut and beech, apple, hazelnut, cherry, plum, peach, raspberry, blackberry, grape, as well as fungi and grasses for ruminating domesticated animals. Sheppard's goal is to mimic the historic wild savannah with food-bearing species he believes are economically feasible in today's cultural environment. Although he acknowledges some woody food-plants would require creative integration into the community such as with the tradition in Spain of free-range pigs feeding on the acorn of local oak forests from which they cultivate a high-quality ham, he also suggests the nut be pressed for its oil, or ground to make tortillas and granola bars because of its high level of protein (2013).

Edible foods of perennial polyculture, permaculture, agroforestry, and restoration agriculture are all models that employ growing together perennial plants that mimic the structure and function of the native ecosystem. The Woody Perennial Polyculture (WPP) site at the University of Illinois at Urbana-Champaign is a similarly designated where researchers are studying the feasibility of plant-based polycultures that are "practical for human consumption."

Like Sheppard's, the project is in the spirit of the Midwestern oak savannah as a model to restore chemically laden landscapes of mono-cultural farming such as for growing corn and soybean. The team at the university at a five-acre location on campus has recreated the savannah by growing trees with edible characteristics of the ecological niche scattered throughout the landscape with an understory of woody perennials useful for food production. Instead of the oak tree that Sheppard uses as the primary species, they use the chestnut tree as a central feature as their analysis suggest the nuts of the tree will be more readily consumed on the market. Lifespan and productivity are taken into consideration in choosing the understory at the WPP. Currant bushes have a productive life of fifty years, the grape vine seventy, an apple tree can grow for up to eighty years, while the life of the raspberry and apricot is indefinite. Harvests from the farm are provided as food to the campus community. The approach at the WPP as with Sheppard's is to experiment with growing foods that are economically feasible whose presence restores the habitat and sequesters carbon from the atmosphere (Woody, 2017).

At the Land Institute they are also experimenting with growing food using nature as a measure. Defined as *Natural Systems Agriculture*, like that of permaculture, they are experimenting with growing food mimicking the native tall grass prairies of Kansas where the Institute is located. Like that of Sheppard's and of the WPP food forests, the purpose of their work is to restore the landscape from annual-style farming to its native landscape. Through this process they are cultivating perennial food plants that mimic the Kansas prairie such as grains, legumes and oilseed crops. Wes Jackson founded the Institute in 1976 and has degrees in biology, botany, and genetics (Our Work, 2018).

My family and I visited the Institute where we were given a tour of the fields and labs of its campus and learned of the approach to establishing food plants that follow the patterns of the

native prairie. Here they experiment with growing together perennial herbaceous species that hold the internal capacity to suppress disturbance that as a collective are productively self-sustaining. The hearty nature of the plant community is related to the presence of nutrients in the soil from the decomposed matter of its dense root structure that are perpetually recycled back into the plant habitat. The root system known for its extravagantly long length also allow for access to water and minerals deeper into the soil (Ecological Intensification, 2018; Ryan, et al., 2018; Tooker & Frank, 2012).

At the Institute they have discovered our modern approach to agriculture requires removal of the native perennial habitat for the purpose of growing annual species that require management of the landscape that, were it not managed, would otherwise go through the evolutionary process of developing into stable plant community. The approach to agriculture at the Institute, in contrast, is to mimic nature's successive development at its later stages so as to build a habitat that holds the self-sustaining patterns of resilience. Modelling the patterns of an established prairie, the researchers are working to assemble plant communities suitable for human consumption by crossing annual and perennial species and domesticating native perennials in seeds for grain, legume and oilseed crops cultivated to be highly productive and of stable ecologies (Ecological Intensification).

At the Institute they have learned the native habitat of the prairie naturally comes together as a self-sustaining plant community. The environment of the perennial grasses that enables the resiliency features is different from the environment of a field of high-input agriculture that requires external management for its sustainment. To illustrate the features of the different landscapes they compared the below ground structures in two adjoining fields, each of which had been harvested over the span of seventy-five years. In the study they compared the soil structure

in each of their respective capacities to be internally “tightly regulated” related to the potential for assimilating nutrients of the atmosphere, mineral weathering, and decomposed material (1). With respect to assimilation of nutrients, because plants depend on the ecosystem services of the microbial community of the below ground species to aid in the breakdown of the soil nutrients for their absorption, relative fertility of the habitats was measured in the presence of the nematode species whose manifestation is based on the root-system upon which they dwell (Culman, et al., 2010). For example, the nematode species of the root feasting variety that reside in the soil of the native prairie that has nine times greater root mass than the plants of conventional agriculture are dependent on the presence of fungi. Thus along with breaking down the nutrients of the roots by the animal, this species co-evolved with fungi whose work is also as a decomposer, furthering elevating the absorbable mineralization for the plant. In contrast, the nematode species that dwells within chemically-treated soil, are those that can be found under annual plants with short roots of disturbed environments. Lacking in a substantial root system whose presence would have elevated the mineralization of the soil, they are a species that feeds on the plant, exemplifying the persistent needs of an unstable ecosystem that requires external management such as with pesticides and herbicides for its sustainment. In contrast, the native environment of the prairie is indicative of an ecosystem structured around internal self-sustaining stability and illustrates those features around which resilience is developed.

Food plants that exhibit behaviors of resilience like those of long and dense roots of the native prairie are cultivated at the Land Institute. For example, the Kernza has been trademarked by crossing an annual species of wheat traditionally used to make bread and pasta with that of a perennial wheatgrass. Currently grown on farms throughout the Midwest, Kernza can be found fermented in the beer Long Root Ale by Patagonia, and as a flour for making pasta and bread.

Large industrial farms are showing an interest in the work of regenerative farming and have contributing monetarily in support of the research taking place at the Institute (Lubofsky, 2016). Agricultural plants have the capacity to thrive in native landscapes when people come together to share in cultivating the resources of the local environment for the purpose of growing food. Farmers who follow the patterns of perennial polycultures are developing food systems in natural habitats as a response to the harms being done to the environment by industrial agriculture.

6) Preserving Genetic Diversity in Seed Banks-

At Land Institute, researchers are crossing seeds with native cousins to develop food plants that will grow independently in tandem with the services of nature. Food plants are chosen for their ability to persist independently in the local environment, of which those characteristics are cultivated out of in industrial agriculture for the purpose of being able to grow them in an artificial environment. In an effort to reintroduce native traits and thus slow their extinction from what is taking place in the food plants of industrial agriculture, seeds that hold the genetic diversity of native and local cultivars are being collected from locations around the world and stored at regional and international seed banks. Among the world programs to secure genetic diversity in food plants through sequestration and storage is that of the Global Crop Diversity Trust (Crop Trust).

What began as an agreement in 1983 at a meeting of the Food and Agriculture Organization (FAO) of the United Nations (UN), that pact was secured over a decade later when the Consultative Group on International Agricultural Research (CGIAR) formally agreed to hold genetically diverse seeds of the global environment in a trust on behalf of the world community. Although since the 1970s CGIAR has maintained regional seed banks and agricultural research

centers throughout the world for the purpose of securing genetic diversity, when it agreed to hold those seeds on behalf of the greater world community, it was also determined they were not in the position to meet that promise in perpetuity. So as to secure its work for people of the world with respect to securing food diversity, a year later in 1996, the UN developed a “Global Plan of Action (GPA)” that put CGIAR on secure footing by establishing a trust that would cover the cost of collecting and preserving native and landrace seed resources. So as to narrow the focus of those seeds of which their local cultivars and wild ancestors would be collected, the GPA established twenty-five of the most important crops of the world and support for traditional farming practices to grow these species. The foods of chosen significance include rice, corn, banana (and plantain), yam, coconut, wheat, barley, eggplant, apples and lentils (Strategic Work Plan).

Today CGIAR has 15 research centers that focus on sustainable agriculture through which indigenous farming techniques are practiced to cultivate its seeds. Eleven of its organizations are seed banks, with further presence in 70 countries and partnerships with more than 3,000 institutions. CGIAR’s strategy is to follow the UN’s 17 “Sustainable Development Goals” that include preserving “life on land,” “reduced inequalities,” and “responsible consumption and production.” The overall emphasis of the project is on eradicating hunger through good health while building women’s leadership in farming for the purpose of improving the presence of world-wide resilience in agricultural (Strategy).

International law stipulates that CGIAR act as a food trust for the purpose of collecting, storing and cultivating diverse genomic species on behalf of the world community. The Svalbard Global Seed Vault was built as a backup to save duplicates of those resources collected through CGIAR. Hosted and funded by the Kingdom of Norway, the heavily protected vault was built on

a remote island of the Norwegian archipelago. At a cost of \$9 billion (USD) the structure was built in a rock of that climate enabling it to maintain a temperature of below freezing so as to ensure the preservation of its species. It was concluded the project would be most efficiently achieved under the directorship of a stable government like that of Norway's that can effectively coordinate with countries and institutions around the world to preserve its food resources. Svalbard opened in 2008 with a capacity to hold 500 copies of 4.5 million seed varieties.

The Crop Trust has identified six key areas of focus for the conservation of plant diversity. The first area of focus is on food security through which its collection of seeds is for the benefit of impoverished communities that are expected to increase as population levels rise and the effects of land degradation are compounded. What has been a trend in agriculture to cultivate food plants that produce high yields of uniform appearance has led to a reduction in diversity in seed genetics and a rise in those that are vulnerable to disease. Take the relatively low number of species of corn currently grown on the market. Originally cultivated from what were a vast number of native cultivars in South America, while the prolific nature of the plant led to its pervasiveness around the world, its genetic variety has since been reduced by 80%. The state of the omnipresent plant's vulnerability and that which people are dependent became glaringly clear when a fungal disease wiped out a substantial percentage of the crop in the United States in the 1970s. At that time corn could be traced back to single species later found to have had a genetic sequence susceptible to the fungus. Although there have been efforts to increase its variety, today only six breeds account for a substantial percentage of corn on the world market. It is for reasons of resistance that local cultivars and native species from Latin America are being collected and stored through the Crop Trust. From these collections seeds of

indigenous origin are being distributed to breeders who are reintegrating genetic variety of corn into the agricultural landscape (Bringing Diversity, 2014).

For the Trust, the second focus on cultivating genetic diversity is for the preservation of genetic sequencing adapted to environments of extreme climate for which these species are anticipated to meet the needs of people of undeveloped economies expected to be most affected by predicted recurring extreme weather events. In this respect, species reintroduced to food ecosystems would hold those traits to withstand harsh environmental conditions such as extreme heat, flooding and drought of that environment. For example, unanticipated shifts in the local environment are at the forefront in the minds of farmers in Rwanda. To reduce the effects of what has become instability in the ecosystem related to heavy rains, trees that had been cleared for agriculture are being reintroduced into the landscape that enable protective microclimates to preserve soil and water conservation. Here agroforestry has been taken up by the farmers where useful native tree species are planted alongside traditional food crops that has helped to stabilize the presence of food resources in the environment. The World Agroforestry Research Centre maintains a seed bank in Kenya where 800 varieties of native trees are collected with duplicates at Svaldbald (The Trees, 2016).

Reducing environmental degradation is the third reason for the collection and storage of diverse edible plant species through the Trust. To meet the goal, seeds are saved for their ability to thrive for long periods on existing landscapes so as to reduce the need to continually clear native environments for agricultural space. For example, native and landrace varieties are collected that are immune to local disease and have a rigorous deep root structure that endure in the environment. As was the need for those traits in their food plants for the people of Benin, Nigeria and the shrinking populations of endemic species such as the hippopotamus and scarce

primates that are dependent on the local forest ecosystem for their survival. While the yam is an essential crop to the Beninese, it had been susceptible to disease after a few years of harvest, requiring farmers continually to burn down sections of the forest to open new land for farming. Through the support of the Trust, a species yam has been identified for its long-term persistence in that landscape that has helped with halting the clearing of and preserving the existing woodlands. Conservation of more than a thousand local and native varieties of the root plant are being preserved that hold adaptive traits to native environment (Yam, 2014).

Increasing genetic variety in food crops that are high in minerals and nutrients are important for the maintenance of a person's health. Thus, species diversity of high-nutrient, culturally significant food plants are also collected on behalf of the Trust. For example, richly endowed with minerals and vitamins, legumes are an important food for many people of different cultures. Of legumes, lentils grow easily in poor soils and can be quickly prepared, an easy addition to the nutritional palate. It is for these reasons through the "Crop Wild Relatives Project" (CRW) that landraces of the lentil are being collected from various climates and stored regionally with duplicates at Svalbard. For example, drought tolerant natives have been identified for arid regions of the Middle East and North Africa where the small bean is grown for preparation in recipes as a staple food. The largest collection of lentil diversity is held at a CGIAR subsidiary, located at the International Center of Research in the Dry Areas in Syria (Lentils, 2014).

XThe last of the reasons for supporting the work of preserving food diversity is to reduce global poverty through the reintroduction of sustainable agriculture. Both are complementary features in that a plant of the native environment is chosen for its ability to be of monetary significance. For example, food plants can be chose that transpire more slowly so as to be fit to

store for future market sales, characteristics that can help with supporting the work of the subsistence farmer. Native species of the eggplant are also being reintroduced that persist in the growing environment of prolonged and recurring drought (Crop Diversity, 2018). The Crop Trust is a mechanism for preserving native species and the farming methods to produce them for the purpose of sustaining the long-term resiliency of food crops adapted to withstand the challenging environments of the world so as to help with ensuring the health of its people.

7) Resilience in Local Farming-

Farmers who depend on the local environment for their livelihood that have an understanding for growing food from native plants in the context of the local environment is illustrated in remote regions of the world. In this context, the use of native species combined with knowledge of how to grow them in the local landscape helps farmers to sustain food plants for their subsistence. Terrace farming in the mountainous region of the Andes exemplifies how food is grown adapted to its geophysical landscape. For example, Andean farmers grow together more than one kind of potato in small plots in the harsh sloped ecosystem nestled throughout microenvironments that offer protection from freezing and drought and what can be a challenging climate to live and to grow food. While the tuber is native to the region, its genetic diversity has been greatly reduced from what are identified as more than 5,000 native varieties (Calliope, et al., 2018; International). However, native species adapted to and grown within the local ecosystem are known to provide antioxidant compounds that enable it to withstand the harsh mountainous climate. These genetic traits are then passed on to the consumer helping her to withstand the rigorous environment of the Andes. This interdependent relationship between

the people and the plants of the physical landscape exemplifies how resilience is collective, connective and local (Pandey, et al., 2009; Andre, et al., 2009; International).

Traditional agricultural practice utilizes knowledge for growing plants within the local environment. Rural farmers in Latin America who grow food on small plots of land make up forty one percent of the farmers who produce food for the region. Indigenous people of the Amazon and southern Mexico integrate food growing into the forests. In China it is estimated there are seventy-four million rice farmers who supply the rural population who practice agricultural methods that originated over one thousand years ago. Farmers who cultivate food plants in small spaces in tropical forests are known to integrate diverse edible species into the multi-layered environment. Although traditional agriculture is based on knowledge for growing food within a specific biophysical environment that can be different dependent on the climate of its location, there are a set of guidelines to follow for how to grow food within the local context. These include taking advantage of microclimates of the landscape for the protection of the food habitat; growing a diversity of locally adaptive species of differing successive states that cycle nutrients within the system; and exploiting interdependence between the biological processes of the environment that serves as an internal mechanism for maintaining its resilience and as a protection from it being disruptive to the greater ecosystem. The foundation of biology rests on genetic diversity, a function that allows for variable responses to changing environment, while resource sharing in multi-variable plant communities offers stability that is evolutionarily adaptable (Altieri et al., 2005).

Unlike traditional farming in small communities that requires knowledge for how to grow diverse edible species in native microcosms, population growth on the world stage is said to have led to the intensification and an overall “strong homogenization” of food resources. Between the

years 1960-2000, food production is said to have increased by two and a half times with the proliferation of conventional agriculture and the subsequent reduction of plant species for the purpose of annual-style monoculture. Furthermore, industrial agriculture because of its approach to removal of the native landscape has led to the diminishment of soils upon which growing food is ultimately dependent. As a response to what has become the approach to reduced genetic diversity, relinquishing knowledge of native landscapes, and the diminishment of soil, Duru et al. follow what has become a movement away from conventional agriculture to its most recent iteration and that of eco-intensive perennial polyculture as a model for growing food plants (2015).

While conventional agriculture requires large plots of land and “exogenous anthropogenic input” to grow food, the “eco-centric approach” takes place in condensed spaces and is dependent on nutrients of the environment for the cultivation of edible plants (2015, p. 1260). Bio-intensive farming such as with perennial polyculture is redundant, connective between biotic functions, and interactive between slow (water holding capacity) and fast (the flow of water) variables that comes together to build the system’s resiliency. A system that holds features of self-sufficiency enables “a complex network of ecological processes” developing into a flourishing environment of soil micro-biotic and mycorrhizae associations, functions that act to perpetuate the ecosystem services of the habitat (p. 1267). Described as the strong approach to farming, the ecological method requires knowledge of the processes between levels of the ecosystem and how that habitat fits the needs of the people that are dependent on it for food. Developing resilience through local food will come together in a community of people that integrates sources of sustenance into the local landscape (Duru et al., 2013).

To develop resilience requires understanding that protection of people and the environment are one in the same. Resilient models of food production are self-sufficient, connected and local. The ways in which a community comes together around those resources is also based on internal networking in the same way that a community of plants comes together in a self-sufficient design developed to maintain resiliency. Developing resilience through local food is a sociological-ecological endeavor where in which each are dependent on their individual capacity to flourish. How do we as a culture that is disconnected from the environment with respect to food through the industrial agricultural model begin to develop those connections through local food systems? There are models we can look to located within the landscapes of post-industrial America on the farms of Cleveland and Detroit where people have come together in the empty spaces of the city to integrate farming into the practices of the local community. As we come to recognize what has led to the social and environmental destabilization in our communities, we can begin to see how in Detroit and Cleveland they are beginning to rebuild with a vision for community stability through connective relationships in local spaces.

8) Developing Resilience in Local Food Communities in Cleveland and Detroit- CLEVELAND-

Community Development Corporations (CDCs) are neighborhood governing bodies that assist with the development of those districts. In Cleveland there are two urban farms that have benefitted from the support of the local CDC to develop the landscape in those districts for the purpose of growing food. Although neighborhood CDCs can be found throughout America and the work of the body will reflect the character of the people it represents, what stands out about the work in Cleveland is the connection to the umbrella organization “Neighborhood Progress”

(NP) for their development. NP was developed as a funding intermediary between the city and its CDCs for the purpose of supporting projects that meet its guiding principles. To receive support from NP those guidelines to follow are stipulated in its strategic plan for the years of 2017-2021. These include projects designed to remove barriers for “people of color from accessing opportunities, [. . . and to improve] equity for all people” by including the experience of the marginalized into decision making. A primary pursuit of NP includes building “climate resiliency and sustainability” by which vacant land throughout the city is reclaimed as green space (Strategic Work Plan). CDC projects funded through Cleveland’s NP foster equitable management of communities developed for resilience (Neighborhood).

A featured initiative of NP is “Re-Imagining a More Sustainable Cleveland,” the goal of which is to rebuild the natural ecosystem on emptied lots throughout the city. In response to the reduction in population in Cleveland from 914,808 (1950) to 385,285 (2017) and continued widespread land vacancy due to the mortgage crisis of 2008, there are about 3,300 acres of open land with approximately 15,000 vacant buildings within the city. As of 2008 an estimated additional 1,000 homes are taken down annually. The land is seen as a “raw asset” where stakeholders including that of NP and the city’s CDCs have taken the “non-traditional approach” to reimagining the city with open natural spaces (1). With the projected continued reduction in population and traditional forms of development expected to decrease in the foreseeable future, a working group of parties that have a stake in the ecological and sustainable development of the city and its watershed have come together to offer suggestions for its redevelopment. They include stream bed reconstruction, naturally remediating toxic landscapes, creating pocket parks, expanding public transportation that includes trails and pathways for walking and biking in the urban landscape, and developing a local food economy (Reimagining).

The initiative of NP for the support of projects that meet its sustainable and equitable policies is reinforced by the city's zoning ordinances. For example, in 2007 members of the local government adopted a code for areas of Cleveland to be designated as agricultural zones and related projects that enhance the city's ecological environment (Cleveland Zoning Code, Chapter 336). In 2010, zoning was expanded to go beyond specifically established areas to include all vacant residential lots on which it is permitted and encouraged to cultivate green space and/or a garden on which to grow and sell agricultural goods (Land Bank Guide). Residents of Cleveland can also apply for a permit to keep farm animals (Local Foods). Vacant lots residential lots throughout the city including those adjacent to a person's property are available to purchase for \$200 or for lease for \$1 with the intent to develop as green space (Land Bank).

Rid-All-

An urban farm that has benefitted from the sustainable initiatives of Cleveland is an agricultural landscape integrated into the fabric of the community (Davis, 2012). What led to the availability of a vast swath of green space to be used as a farm in the urban landscape can be traced back to the years between the early 1870s and the start of WWI and the city's location on the shores of Lake Erie. Early in its history related to its location on a key body of water, Cleveland was a major shipping port reinforced by a railway network enabling the transportation of goods in and out of the city. Coupled with an incoming community of immigrants from Eastern Europe of Jewish and Italian descent prior to WWI, burgeoning industry at that time included steel foundries, garment factories, and as the hub of petroleum refinery under John D. Rockefeller (Immigration; Industry). As labor demands increased with a developing economy and immigration from Europe waning with the start of the war, jobs opened for African Americans who began to come up from southern states to work in Cleveland (Immigration).

The people who came from the south to work in the city primarily settled in the Central and Kinsman neighborhoods along with those of the less the affluent Italian and Jewish of whom had previously integrated into the community of whose children initially went to school together. Langston Hughes who went to Central High School is quoted as saying he attended “nearly entirely a foreign-born school” in the late 1910s (Central). The availability of streetcar service along Kinsman Road allowed for the development of local business and for public transportation to get to work in other parts of the city and to patron downtown establishments (Urban Transportation). Overtime as the area became overcrowded and people could afford to move away from the district, African Americans were beginning to be excluded from industry, labor unions, schools and other public entities. As others were leaving, Black Americans remained in the Central/Kinsman as they were prohibited from equal participation as a people in the greater educational, social, and economic fabric of Cleveland. The area eventually deemed blighted became the target of urban renewal projects starting in the 1930s when segments of its residential and industrial infrastructure were razed and nearby segregated housing projects erected (Teaching, 2013).

Of the people that remain in Kinsman, a recent census estimates that ninety-six percent are African American who have a median household income of \$16,000, seventy percent of whose children live below the poverty line (Kinsman). Abandonment of the district over a long stretch of time is symbolized in a section of the neighborhood named the “forgotten triangle,” an area bounded by three streets that today is used only for those roadways used to get to other parts of the city (Ward 5, 2007). In a report by the CDC of Central/Kinsman, the authors documented the sparse presence of 148 homes within the triangle’s 392 acres, as well as a combined area of 121 acres of vacant residential lots due to razed homes and a block of land where the houses

burned down due to arson. In addition to its vacated landscape, open spaces of the neighborhood include cemeteries, existing parks, as well as abandoned and torn down industrial infrastructure where there remains contaminated soil. A section of the triangle, named for two of its streets called “Fort Higbee” is mostly depopulated and “remarkabl[y] green and wooded, seeming almost rural in places” (Ward 5, p. 12). The area symbolizes disinvestment in segregated African American communities displayed in its small pockets of housing and large tracts of vacant land (Kinsman, 2016). Since the early 1990s, the CDC of Kinsman/Central, has been working to alleviate the conditions of poverty through sustainable development of the neighborhood. Their work in collaboration with members of the community, the City of Cleveland with the support of Neighborhood Progress, includes enhancing public space with walking and bike paths, improving existing public transportation, and supporting sustainable environmental projects including building a local food economy (Burten, Bell, Carr).

The local food economy is an import target for the work in Kinsman as disenfranchisement from other parts of the city and surrounding suburban communities has left its people without a centralized grocery store (Cuyahoga, 2017), typical of minority populations throughout urban America that have been excluded from mainstream food economy. This exclusion from the conventional economy has led to large tracts of naturalized open spaces in the urban topography on which local governmental entities are supporting its development as a sustainable landscape. In that spirit, twenty-eight acres alongside Fort Higbee has been designated as the “Urban Agricultural Innovative Zone” (UAIZ) (Urban Agriculture). The twenty-eight acres of UAIZ in the forgotten triangle is a place for the people of the neighborhood and its visitors to learn about sustainable systems built for resilience.

To date, established within the twenty-eight acres of the UAIZ is the urban farm of Rid-All Green Partnership and the the green infrastructure of Northeast Ohio Regional Sewer District (NEORS). In partnership with the local CDC, Rid-All, and a grant from The Ohio State University Extension and serving as a model for water filtration, NEORS's system flanks the east and west of the agricultural space and covers a total of 1.6 acres. It is a living machine that captures and filters storm water, each of the large natural bowl-like structures made of native plants, soil, and permeable materials designed to treat annually 12.4 million gallons of local storm water through filtering and holding capacity before entering the combined sewer system in route to Lake Erie (Projects). The project includes a neighborhood park with basketball hoops and an outdoor classroom where people can learn about natural water remediation that doubles as a habitat for "birds, butterflies, and pollinators." Completed in 2018, the project serves as a model for natural solutions to reduce pollution from entering the Great Lakes watershed (Projects, Rid-All).

The farm itself was also designed to demonstrate the process of developing self-sustaining ecosystems into the landscape of the neighborhood. Established in 2010, Randell McShepard is one of three boyhood friends who were instrumental in developing the land of the UAIZ and of the initial co-founders of Rid-All Green Partnership. Having grown up together in a nearby neighborhood, McShepard came to the project with two bachelor's and a master's degree, a past executive directorship of an establishment that served at-risk youth, and co-founder of a think tank "Policy Bridge," that informs state and federal policy on behalf of minority communities. His current employment is serving as a community liaison for an international company (Rupersburg, 2015; McShepard; Hunt, 2017). Co-founder, Kaymah Durden's work has taken him around the world to pursue his passion for sustainable living where he has been

involved in spiritual and ecological agricultural projects including in Israel and West Africa. In Cleveland he co-founded a vegetarian restaurant and is a practicing vegan. He shares his aptitude for cooking at events at the farm (Who We Are; Hunt, 2017). Damien Forshe, founder and owner of Rid-All Exterminating having won a contract with Cleveland's public housing division (Hampshire, 2018) and in search of finding meaning in his life with what started as having learned about 'green space' from a friend, instituted an alternative approach to pest management in his exterminating business to protect the tenants from harmful chemicals and taught them how to use strong herbs to manage pests. His commitment to green space and public health came to fruition upon his having connected with Will Allen. Renown through the enterprise Growing Power, Forshe learned from Allen how to make healthy soil on a contaminated land, extend the growing season through the winter in the protected environment of a hoop house, and to grow fish sustainably in a replicable aquaponics system. Long-time friend Marc S. White was recruited from abroad to come home and manage the farm. He who had spent two decades mostly in Israel growing food on a kibbutz (Lefkowitz, 2014). Together these Clevelanders have established a presence in Kinsman where they have created a model for developing healthy living through sustainable principles on a farm of an abandoned landscape. Their motto "greening the ghetto," Rid-All is an acronym for Redeem (free of distress) Integrity (the moral and ethical) and Determination (to have purpose) for All (Who We are; Hunt, 2017)

Rid-All is located on what had been an overgrown and bleak landscape used as an illegal dump for broken down automobiles, tires, appliances, and as a place to put the bodies of dead people (Soil Brothers, 2018). In an interview with a local NPR syndicate, McShepard said he learned early on that in this barren environment too many people were going hungry and not eating healthy (Civil Rights, 2017). To meet that need, he and his co-founders have developed

innovative ways to keep the farm running so as to fulfil its mission to improve the lives of the people who suffer five times the level of infant mortality and have a twenty year discrepancy in adult mortality compared to the national average (Hampshire, 2018). As of summer of 2017, they were able to generate an income from the sales of an estimated 21,000 farm-raised tilapia, fruit of twenty-one fruit trees, vegetables throughout the year, and as the city's only Ohio EPA certified composting facility (Civil Rights; Our Black Gold). As an educational facility they also have a fee-based schedule of programming where they teach students how to create a small-scale and independent sustainable food-system (Training Programs).

The work of Rid-All directed at the youth of the community include those in need of positive enterprise that can be found working at the farm in exchange for shoes and food (Soil Brothers, 2018). On a broader scale, the message gets out to young people through a comic book series where the heroes are everyday citizens that look like people in the neighborhood. The comic book "Green in the Ghetto" takes place in "Brink City," a community on the edge of destruction where the heroes share knowledge about cleaning up the neighborhood by embracing a healthy lifestyle through urban agriculture, environmental stewardship and recycling. The series illustrates the benefits of the natural environment with an emphasis on youth issues that recognize elements of anger, while sharing knowledge for combating food desert conditions through developing independent food systems alongside sustainable practices like generating healthy soil and awareness of protecting the Great Lakes watershed. The landscape in the books is attributable to decades of neglect related to racial segregation and of the vacant landscape of Kinsman that culminated in the arson of 1976 and nearby faulty hydrants that caused to burn down what was left of two city blocks. However tragic the circumstances, the abandonment of the area has led to the opportunity to embrace greening of the 'ghetto' (Kroll, 2007; Kerr, 2011).

In the NPR interview, McShepard says of the comic series “it’s a big hit, kids understand the message . . . they come back to us and say the book made a difference in their lives.” As he explains, youth take part in the series through essay contests at schools where they explain its message from their own perspective (Civil Rights, 2017). It is also given out at ‘buyback’ events for toy guns inspired by the events that led a 12-year old boy who was playing with a toy gun to be shot and killed by a Cleveland police officer (Dissell, 2015). With input from McShepard, the series was commissioned to a local artist and student of Cleveland Institute of Art who created its five books including its sixth and “special issue” entitled “Kids Lives Matter” that deals with issues of gun safety for youth (Davis, 2012). There is also a theater production based on the series adapted by a Los Angeles playwright whose work has been staged in both Cleveland and L.A. (Attina, 2012).

The success of the farm is attributed to being different from those projects led by people of privilege who have resources and a belief they hold the answers to helping communities in distress with whom they share little experience. By contrast, Rid-All is “homegrown” and “of that place.” A documentary tells of the impact of the project on the community through the eyes of its co-founders. In the movie ‘Soil Brothers’, they talk of the approach to urban agriculture in food desert communities from those of whom share that culture as “the next survival tool.” They believe local participation in farming and sustaining natural resource development in abandoned urban landscapes is “saving souls” in those communities (Soil Brothers, 2018).

The farm comes out of the desire for equitable voice to the African American perspective in the approach to development of the community. Its founding is attributed to McShepard’s Policy Bridge, the think tank that integrates African American experience into the language of governmental policy making, and his recommendation that urban agriculture be developed

within the blighted spaces of the African American community. Through the process of defining policy based on the African-American experience, he came to realize his own potential as a member of the black community to address the issue as he espoused and that which led him to establish the farm. Though there are many angles and depths to what brought Rid-All to the open land of the forgotten triangle, with respect to Policy Bridge, the farm is a model through which to inform governmental policy making for building community within blighted neighborhoods (Rupersburg, 2015; Policy Bridge).

The farm is not a solo operation hidden away in the greenspace of an abandoned community, but an outreach post for sharing knowledge about sustainable development through urban agriculture. By sharing knowledge of the transformative power that local farming can have on a community, Rid-All is designed as a teaching facility for how to build small-scale sustainably-designed agricultural spaces as a means for them to proliferate throughout the urban landscape. In addition to the estimated 5,000 people on an annual basis that come through the farm to learn about cultivating ecological use of local land, educational opportunities include an apprenticeship program for veterans, and five-month and weekend workshops. Charlie Heyman, a recent graduate of Urban Agriculture Entrepreneurial Education, explains the reason for his having signed up for the program as wanting to improve his health and those of the people around him. Heyman goes on to explain that what he learned went beyond learning about how to be healthy in that he also came to know how he is connected to the environment. He illustrates this connection using the analogy of the compost system, an essential component to the farm's approach to sustainability. He explains the 'com' (together) and 'post' (after) represent the cycle of life in that individual biodegradable resources come together after decomposition as a resource that cycles back into the fertility of the landscape. Compost represents the cycle of life

in that a tree drops its fruit and leaves to the ground where it merges with the soil to become nature's fertilizer that is then brought up through the plant to nourish its capacity for growth. He explains how the aquaponics system at the farm is also like the cycle of life in how it mimics its native ecosystem (Hayman, 2018). Hayman's educational experience at the farm illustrates resilience in his learning how to develop the eco-social relationship through the agricultural landscape.

The connection between people and nature and the cycle of life that is modelled at Rid-All is based on the work of Will Allen and the agricultural spaces of Growing Power designed for the purpose of empowering people of food desert communities through low-tech independent food systems (What We Do; Davis, 2011; Sweetgreen, 2016). Allen's project was initially modelled after the food deserts like those of his native New Jersey and designed to be replicable throughout those communities in America. Following his lead, farming takes place within the protected environment of the hoop house where healthy soil is developed on the contaminated landscape where vegetables are grown and fish is farmed. All of which those processes are integrated into the regenerative cycle of nature. As an outgrowth of Allen's model for developing independent, sustainable, and local food systems that are replicable and that which Rid-All is based, from Cleveland they have helped to create similar agricultural projects in Columbus, Buffalo, and Detroit. The work at Rid-All also includes collaborating with Ohio's Central State University that acquired land-grant status in 2014. As a Historical Black College, the school seeks to engage African-American people in agricultural training and through that process has partnered with Rid-All where they have built greenhouses and an aquaponics facility, teach classes on urban farming, and created an extension opportunity for students of the program to work at their location in Cleveland (Civil Rights, 2017; Gray, 2018). The collaboration between

Rid-All and Central State facilitates participation in alternative farming with the African American community of whom are learning to employ the energies of nature through agriculture.

Rid-All's approach is low-tech, designed to be self-sufficient by employing the ecosystem services of the environment to grow food in the local community (Sweetgreen, 2016). John Kohler of "Growingyourgreens.com" came to Rid-All where he travels around the county to showcase the techniques of sustainable food systems. In the episode posted on YouTube he walks the viewer through how at the farm they harness energy under the thick plastic and dome-shaped structures of the hoop houses and the additional natural heating that takes place within them from fifty-five-gallon barrels that hold rainfall having been warmed in the summer months, its thermal mass radiating when the temperature drops. The elevated barrels double as harvested unchlorinated water disseminated through a drip system to the veggies growing within its structures. At the same time a pile of compost known as a "hotmix," produces heat during the decomposition of wood chips mixed with spent grain and coffee grounds that have come from local breweries and cafes. Following the pattern of tapping into the energies of the ecosystem, a thick layer of wood chips covers the contaminated ground that creates its own natural heating blanket through the work of microbes, insects and tiny animals that simultaneously remediate the toxic soil that was once a dumping ground. The warm and remediating soil is then covered with an ample supply of house-cultivated soil in which the vegetables of cold-tolerant varieties such as collard greens, kale and Brussel sprouts are grown for the community. Outside the perennial fruit trees of the local forest ecosystem wait in dormancy for the start of spring to grow their fruit. All of which are teaching opportunities for how to develop independent food systems in food desert communities through the experimental process of creative use of the local environment (2012).

In addition to the work of soil remediation, compost is made at the farm by repurposing waste through vermiculture generated from worms as the animal digests a mixture of wood chips and food waste. As the castings accumulate, they are sifted out where they are collected and stored in containers as “black gold.” The mixture is used at the farm to grow food and sold as a resource to local gardeners. As Rid-All is also an Ohio EPA licensed compost facility, larger-scale composting takes place in four side by side bins, the size each of which would dwarf a large dump truck. Food waste is brought in to be composted at the facility from local supermarkets, food pantries, including from a business that serves to collect food resources from the cafes and restaurants of Cleveland’s near west side (Feed People). Fulfilling a niche in the local marketplace, at Rid-All they are profiting from the service of diverting material from the local landfill and cycling back those resources to generate fertility in the food cycle (Our Black Gold; Kohler, 2012).

Like the processes that are cultivated at the farm to develop internal sustainability and by extension its resilience, its aquaponics system is modelled after the cycle of life. Built from wood planks in two rectangular levels that are vertically stacked and covered in pond liner, the upper level is for holding edible plants such as moringa, watercress and cherry tomato that are saturated with the water infused with the nutrients of the fish waste while at the same time the plants act as a filter. That water in turn is pumped down to the lower level that serves as a fish tank bringing with it nutrients from the plants for the benefit of the fish, a cycle that is in constant motion. Outside of the warm environment of the hoop house that the fish require, is a pond where duckweed naturally generates as additional food for the animals (Kohler, 2012). Will Allen explained on a visit to Rid-All that the aquaponics system “replicat[es the cycle of] . . . a clean river stream” (DigitalVisualTV). The tender locally raised tilapia that is grown at the

farm in an environment free of the toxins of Lake Erie is sold fresh directly to the community and to nearby restaurants (Kohler, 2012; Who We Are). Like the replicable nature of growing produce that the farm models, the aquaponics design was created at that scale so as to be duplicated by members of food desert and contaminated fresh water environments. Based on principles of resilience, the way in which food those foods are produced is designed to address a local necessity that minimizes the need for resources external to the system.

When asked at what level the program is working to eradicate conditions of food disparity for the people of Kinsman, McShepard explains his focus is on getting people of the neighborhood to recognize the connection between quality of life and good health. He says people get it; they understand. He and his partners help make the connection between food, health and good living when they meal prepared for the community on Saturdays that is made fresh from the vegetables of the farm. As he explains, people who live in food deserts such as in the community where the farm is located, typically only have those foods that are available to them from the local gas station. What people who attend the gatherings come to learn is the possibility of what they can get from preparing a homemade meal from food grown locally. He says of the children, when they learn that vegetables come out of the ground and not from a package, they get excited. He enjoys making the connection between delicious fresh foods cultivated within the community and good health. (Civil Rights, 2017).

The Refugee Response-

Urban farms that have the potential for resilience are illustrated in those that are integrated into the local landscape of the community. The urban agricultural zone in Kinsman where Rid-All is located is designed to meet the needs of its people with what is available in the

immediate surroundings of the local landscape. The techniques of low-tech agriculture with the creative use of ecosystem services is a model for reclaiming and healing by turning what has become the abundance of local natural resources into community sustenance. The farm's self-sufficient approach to food production is replicable on vacant parcels of land throughout the area, where students of the agricultural model have the potential to proliferate the independent approach to farming in the food desert environment. In an adjacent neighborhood and representative of a different reason for local food integrated into the urban environment is that of the Refugee Empowerment Agricultural Program (REAP) of The Refugee Response (TRR) (Ohio City Farm).

Located in a community historically that had been its own municipality and originally known as the City of Ohio, Ohio City was annexed to Cleveland in 1854. The district reaches Lake Erie to its north, its boundary to the west side is of the Cuyahoga River. Also known as the 'near west side,' many of the historic structures of Ohio City still stand today. Located just over the bridge that adjoins the neighborhood to downtown, immigrants who settled here in the late 19th century were primarily of German, Hungarian and Irish descent, who would have found work in the brewing industry located on the banks of the Cuyahoga (Ohio City; Brewing). Although Ohio City went into decline after World War II, members of the community came together in the late 1960s and early 70s to charter what is now Ohio City, Inc., and the CDC of the neighborhood. The early efforts of the CDC having led to "more than 100 structures [being] refurbished" including the architecturally significant West Side Market (History), that today is the largest marketplace in the state and currently bustles with "100 vendors" selling everything from ethnically prepared meals to meats, produce, nuts and spices and baked goods (West Side Market in Cleveland). A neighborhood library of renowned design of 1910 today is the largest of

Cleveland's branches, as well as the historic campus of St. Ignatius, an all-boys Catholic school established in 1886 that was to serve the immigrant community that continues today as an elite parochial high school. These distinctive institutions sit alongside the densely packed historic homes of the neighborhood. Today within its 4.5 square miles, Ohio City is a multi-ethnic and socio-economically varied community that includes those immigrants of the 1970s of Hispanic, Asian, Native American and Appalachian origins (History). Most recent to the neighborhood are immigrants of The Refugee Response (TRR) through its Refugee Empowerment Agricultural Program (REAP) (Ohio City Farm).

TRR was established to help acclimate refugees after they are resettled to Cleveland. Youth of the program receive two-years of one-on-one mentorship and tutoring for two hours a week to help with homework and learning about the Cleveland community that is relevant to them (Home Mentoring). TRR also provides through philanthropic donations scholarships for students to attend private school (2018 Programs). For adults, the mentoring program includes literacy tutoring and to help with the logistics of living in America. Because of recent fleeing from violence in their home country, TRR recently received federal funding to help with resettlement of forty Afghans (Snook, 2018).

The Refugee Response was established in 2009 through the philanthropic pursuits of co-founders David Wallis and Paul Neundorfer. Neundorfer grew up in a nearby suburb who studied to be a landscape architect where he now has offices in Cleveland and San Francisco. His approach to landscape architecture is on developing the relationship between people and natural space. TRR comes out of his having supported schools in refugee camps where he spent time volunteering, as well as with resettling refugees in Cleveland. He also spent time in Africa when travelling with a group on an international mission where he later returned to design and help

establish an agricultural irrigation project. REAP is the employment arm of TRR as many of the refugees need a job upon their arrival to the United States and of whom primarily come from an agrarian background. The farm both serves as an opportunity for both employment for refugee resettlement as well as for developing access to local food for the community (Philanthropy).

The landscaping of the farm is a homage to the art of gardening having been originally tilled by a plow pulled by the draft horses of Amish farmers (Snook, 2010). The rows of mounded beds alternating with tidy dirt paths are arranged to fit with the curvatures of the land where the farmers are known for cultivating a bounty of produce alongside the carefully choreographed canopy of hops grown for the purpose of local beer production (Carr 2011; Hardman 2017; Philanthropy). What started with 2.5 acres, the farm has grown to six acres that at its inception was the largest contiguous urban farm in the United States. No longer holding the status as the largest urban agricultural landscape, the executive director of TRR is convinced its elegant design will not be outmatched (Snook, 2018).

In partnership with the neighborhood CDC, REAP was co-developed with the Great Lakes Brewing Company that located within the restaurant district where the farm is located. The farmers of the program grow produce and beer supplies on one acre of the farm for the restaurant that deliverable post-harvest to its location just a few blocks away (Snook, 2010). On the remaining five acres, they grow vegetables for other area restaurants, as shares for community supported agriculture (CSA) and to the community from a farm stand of retrofitted shipping containers donated by a local public art organization (Ohio City Farm Stand). The farm also sits behind the Cleveland Housing Authority's Riverview Tower, a public housing tenement. Riverview residents who are senior and low income are just steps from where they can purchase produce at a reduced rate or from the farmers that sell food once a month in the lobby where it is

paired with a tasting and recipe created by a locally-known chef (Fitzpatrick, 2008). The CDC of Ohio City envisions the Ohio City Farm as a long-term establishment within what is a regional hub of the local food economy as the farm is anchored by the busy West Side Market, renown farm-to-table restaurants, and a local community hungry for its produce. Furthermore, the location is fixed due to the land's status as undevelopable as it lies alongside a part of river that cannot safely support infrastructure (Snook, 2010).

REAP was established in 2010 as employment for the refugees that were of the countries of Burma, Bhutan, Somalia, Rwanda, Liberia and Burundi who came here because of an existing cultural network previously settled in Cleveland. On 2.5 acres in that first year they grew 5,000 pounds of produce while learning about growing food in a new climate, how to navigate the local food economy in Cleveland, and what it means to be employed as an American (Carr, 2011; Fitzpatrick, 2018). In 2017 it was reported that the farmers of REAP cultivated 22,000 pounds of produce, the program having expanded to those of Myanmar, Afghanistan and Nepal (Hardman, 2017). With the help of updated plumbing, a heated hoop house, and expansion of the farm to six acres, the farm at its current capacity can produce 60,000 pounds of vegetables annually that are distributed throughout the local community including through its CSA whose subscriptions has tripled over the course of a year that is now at 150 members (The Refugee Response). Although a third of its funding expenditure was not renewed under the Trump administration, the executive director expects the work of TRR to continue with philanthropic donations, revenue from the farm, and support from the local municipality (Snook & Chan, 2018).

The practice of small-scale farming can be therapeutic for the refugees as they typically have fled from countries in conflict often having lived most of their adult lives in camps who now are required to navigate a new culture (Hardman, 2017). It is also a way for them to share

their agricultural skills as they are chosen for the program for having an agrarian background and knowledge of small-scale organic farming. A former director of REAP voices his experience with the people that have come through the program in the example of the man in training in his late 70s took the till from him after he was too tired to continue and proceeded to work until the job was finished. He also tells of the excitement of a veteran farmer who recited facts about the American political system in his exuberance about now being able to vote after having received his citizenship the previous year. In these examples, the director illustrates the dedication to the community of those that have resettled in Cleveland through the refugee program (Schindler, 2015).

Through REAP on the Ohio City Farm not only is there a presence and an aptitude for growing food in the local community but also cultural knowledge about different kinds of plants. For example, as the farm is based on organic agriculture, marigolds used to repel pests are of an African variety chosen by the Bhutanese farmers that flower vibrantly for which they also use to make as garlands for a ceremony at the local Buddhist temple. They grow a hibiscus plant that can be made into a soup base, a pesto, the flower for which is used made into tea. They have also expanded the varieties of eggplant of the Thai tradition and learned from its farmers that its leaves are also good to eat, that part of the plant that would have been discarded by the American contingent. Hot chili peppers are another significant food plant of cultural importance to the Thai farmer (Fitzpatrick, 2018). Foods grown by refugee farmers are not only for the Clevelander, but as a means to help ease the adjustment with the cultural significant foods of the farmer.

Participants of REAP work twenty-eight hours on the farm and twelve hours in ESL classes, for which they are paid for 40 hours a week of work. A graduate of the program, Lor Doe of

Myanmar, that began at REAP in 2012, now holds a permanent position as the manager of the farm (Hardman, 2017).

From an agricultural neighborhood in Afghanistan where he grew up helping to grow food for his community, Mohammad Noormal is also a participant of the program. Noormal came to TRR from his post as a translator for the U.S. Army, a position he held for five years during the war. After his post he would have been vulnerable to retribution from the Taliban and al-Qaeda had he not been granted a special visa to come to Cleveland. He and his wife Rana moved here in 2014, their first two children having been born in America. Noormal now holds a permanent position as the manager of an auxiliary gardening program at the Urban Community School and is a tutor for incoming refugees. He and his wife also make traditional flat bread fired in a clay oven that was given to the farm for those of the refugee community that practice the ancient form of cooking with fire. The Noormal's have been seen baking loaves for CSA shareholders to go with their share of weekly vegetables and at special fundraising events at the farm. As its current capacity, through the work of the refugee farmer, REAP funds twenty percent of The Refugee Response's programming (Meet Moh and Rana; Snook, Chan, 2018). What the farm brings to Ohio City is a refugee community that are culturally agrarian with knowledge for living close to the land. They share that knowledge with the community that supports them through the purchase of their foods that together root each other in the local environment that is exemplary of the social-ecological experience.

DETROIT-

Over decades Detroit has been left abandoned and within those emptied spaces the city is currently going through a renaissance of which local food is an important component. What has led to the landscape on which food gardens have proliferated, began over seven decades ago when workers were needed in the city's manufacturing plants, coupled with a comparative openness to hire African Americans in those factories. Initially, fifteen percent of the labor force in Detroit's manufacturing sector were from black communities who had come from the South in search of better paying jobs. African American employment in Detroit went up to twenty percent in the 1970s before the decline in early 2000 as the industry moved to white southern states and to plants overseas. As the initial impetus dwindled for coming to Detroit to assemble military weapons and then later cars (Sugrue, no date) and ensuing problems with race relations exacerbated, there became a dramatic drop in the city's population by approximately 65% mostly by white flight (Vox, 2016).

In those early years as the manufacturing sector was booming, the black community was developing in that section of the city called 'Black Bottom.' The area is said to have been named by early French settlers because of the richness of its alluvial soil along the Detroit River. At its peak, the district was densely populated due to discrimination against living in other parts of the city and the surrounding suburbs. Eventually deemed blighted, in the 1950s and supported by Federal urban renewal policies, the structures that housed that life were razed along with Paradise Valley, the main artery of business and culture for that community. Today a major freeway and residential district now occupies that space. Now known as Lafayette Park, the area was developed for urban renewal and designed by renowned modernist architect Ludwig Mies Van der Rohe. The architecture of the mixed-use modernist style is integrated into a park with a

13-acre tree canopy known as the Plaisance, and there remains today an elementary school on the property and grocery shopping within walking distance for its residents (curbed Detroit). Priced beyond their means, the people of Black Bottom were housed in low-income federal apartment blocks that were segregated by race. Urban renewal policies such as these were particularly hard-hitting to African American communities across the country (Rothstein, 2017; Karmelek, 2016; Brancalone, 2016; Mies Van der Rohe, 2011).

Coupled with the removal of the housing and business district of the black community, what became the outsourcing of local manufacturing jobs, and persistent aggressive discrimination against African Americans from living outside of the city (Klinfelter, 2017; Smithsimon, 2018), almost 70 years later, Detroit is a display of the abandonment of its people (Rothstein, 2017). Census data in 2013 showed that 51.1% of children who live in Detroit live at or below the poverty line (Allington, 2015), thirty 38% of the overall population lives below the poverty line (compared to 8.7% in neighboring suburban Oakland County), and the median income is \$27,000. Eighty-three percent of the population is African American (2014 census), making it the most segregated city in America (Woods, 2017). Furthermore, since 2005 more than 1 in 3 homes have gone into foreclosure because of the cost of the mortgage and/or the cost of property taxes, which are “well above the national average” (Michigan, no page). One resident and single mother of two who has stayed in her home pays \$900 a month on an \$82,000 mortgage for a home that is valued at \$5,000. Break-ins at abandoned homes throughout the city are common for items such as water heaters and furnaces. Residents who have remained in emptied neighborhoods are vulnerable to robbery and fear leaving their homes (Kurth, MacDonald, 2015). Deemed there were not enough people to fund the government and city

services, in 2013 the city went into bankruptcy, the largest municipal bankruptcy in American history (Ferris, 2017).

Although difficulties ensued over the course of almost seventy years for the people of Detroit, it has been a different story for the nature of the city. Nationally and internationally recognized as the bizarre phenomenon where trees have been left to grow out of abandoned factories, are coming through paved streets and engulf abandoned homes, it is an urban environment emblematic of what its looks like for a city to have gone wild. In its current state, work that is taking place within the space of the local environment includes partnerships with local artists who are creatively using the resource of the proliferation of trees known for their propensity to thrive on contaminated landscapes. They are curing the lumber of those species as a resource to refurbish abandoned homes that are then designated as meeting places for the people of the surrounding community. One such project was to rehabilitate a burned-out house called Squash House, named both for the sport and the plant. A sculpture of the cured wood covers what is now a tall ceiling and open design where people are encouraged to come and play the game (About; Woods). A greenhouse was added to the back of the house for neighbors to start seedlings including those plants that have been started from native seeds of squash retrieved from a Michigan Native American tribe. In the vacant lot that has been cleaned up next to Squash house the children of the neighborhood are urged to come and play. (Powerhouse, 2015; Williams, 2016; Wasacz, 2014).

Children are also encouraged to participate in the city's grassroots revitalization where they are learning to recognize their right to a safe environment. On a visit to the Brightmoor neighborhood of Detroit on a fieldtrip for a course entitled 'Resilience' with a class from a university in the Cleveland area, an activist from the local organization Neighbors Building

Brightmoor showed us around the site of a community garden that was built on a vacant lot that had been located next to a drug house. She explained the process of developing the garden as gently pushing out the inhabitants of the house next door without conflict as the garden was being established where the children of the neighborhood now grow fruits and vegetables to sell to the community (Neighbors, 2018). What had previously been feared as the outdoors, the neighborhood is now a safe space for the community where food is grown and the children are encouraged to come out and play (Brightmoor, 2018).

Making art, being outdoors and growing food are emblematic of the transformation that is taking place in Detroit. Community gardens that make use of vacant space are illustrative of that makeover. For example, in addition to its own farm, Keep Growing Detroit (KGD), whose mission is to support food sovereignty for all Detroiters, reported having helped 1,547 urban gardeners establish farms in the city (2017 Annual). It is estimated gardens cover 165 acres of the city that are led by a diverse group of growers who are estimated at producing over 400,000 pounds of produce each year (Hester, 2016). Due to the repatriation of the land by both the natural environment and the work of urban farmers, Detroit is also seeing a resurgence of bees and the honey growers who cultivate their nectar (Kroeker). KGD supports the networking of small farmers throughout the city that are known to collaborate and share resources with a vision for integrating local food into the community (Chae, 2018).

Beekeeping complements the process of growing gardens in Detroit. A beekeeping organization Bees in the D is located on the rooftop of Cobo Center, a convention facility located near the bridge that crosses over to Belle Isle Park (Bees; Pflieger, 2018). The island-park symbolizes neglect of the city but also the potential for its rejuvenation. During the city's reorganization through its bankruptcy and coming to realize they could not afford the cost of

taking care of the 982-acre landscape, the Michigan Department of Natural Resources (DNR) agreed to a 30-year lease to take over its management (Ferris, 2017). The agreement is estimated at saving the municipality what would have been over four million dollars a year in maintenance expenditures (McNeill, 2013). In addition to the support from the DNR to take care of Belle Isle, the philanthropic efforts of the Garden Club of Michigan are helping to reshape what is now the largest state park located in a city in the United States. In an effort to develop the landscape architecture of the park, through what is described as “a love letter for Detroit” members of the Club were able to connect with renown gardener Peit Oudolf and convince him to come to Detroit to work with them, whose landscape designs include Lurie Gardens at Millennium Park in Chicago. Upon his visit in spring of 2017 and seeing the site, he agreed to design a 6-acre public space including a 1.5-acre garden that he described would be a “community of plants that will work well together.” He is known for his gift of mixing native perennial plants and grasses that represent how they intermingle in the wild and show beauty in them throughout the seasons (Feighan, 2018). His garden would be that kind of plant community based on long-term resilience within the local environment.

Fisheye Farm-

Rejuvenation projects have come to fruition with the support of both philanthropic endeavors and a labor of love through grassroots efforts in what is described as the city’s renaissance. As is true for Andy Chae who has put down his roots in his home state to develop the food garden of Fisheye Farms in Detroit. With fellow DePaul University graduate Amy Eckert and his mother, Susan Chae who is a lawyer and helps to coordinate neighborhood events at the farm, he has successfully started a business to integrate urban agriculture into the

community (Fisheye). In an interview with Chae, he described the boundaries of his farm in what began at a property in West Village in spring of 2015, a neighborhood located just a mile from the Detroit River. At that time when he was establishing his farm he was leasing land from a family member. In what proved to be a promising endeavor, his ultimate plan was to move to a more permanent location. As he was looking for a place to establish the farm, he explored the possibility of moving to the neighborhood of the historic campus of Detroit Mercy University, a district also located next to a well-maintained public park in Detroit. In an effort to establish his roots in this part of the city, he applied for a grant from the Fitzgerald neighborhood conglomerate. While they were accepting proposals to fund unique development in the area, Chae was not awarded a stipend for his project at that time. His next move was to go through the challenging process of purchasing land from the Detroit Land Bank of whom owns a substantial amount of property in the city. Having gone through the process he was ultimately granted the right to purchase nine parcels of vacant land in the up-and-coming neighborhood of Core City where the farm is now located. He subsequently purchased for \$4,000 the home adjacent to this property. His focus as a grower is on servicing farm-to-table restaurants where he delivers his vegetables in and around the city including that of Ferndale, a densely populated suburban area located on the periphery of Detroit.

When I asked him about his relationship to other growers in the city, he said this was his favorite thing about working in Detroit in that there is a support network he shares with other members of the urban farm community. He explained that the network of farmers help each other by sharing price lists, crop plans, farm machinery, and what they know about growing food in the local environment. They also call on each other when there is need with respect to the request of a customer. More generally, local farmers have an understanding that meeting the food

demands of the city means having a sense for what the farmers are growing and taking care not to saturate the local market with any one product. He primarily gets his seeds for the plants he grows from 'Johnny's Selected' that he starts in his hoop house in early spring in preparation for the upcoming growing season that are then planted as young plants outside as the weather warms. He also grows plant from the transplants of neighboring growers. Starting plants early in the hoop house in a community where there are a network of local growers has helped to secure his place as a farmer in Detroit.

At Fisheye, Chae grows his food plants primarily for the local chefs of Detroit. He explains the food culture in the city is a reflection of the urban farms available for the procurement of food for preparation at the restaurants throughout the city. The local food movement in Detroit is unique in that there is a reciprocal relationship between chefs and farmers of the city. Area chefs rely on having access to the produce of local farmer and the farmers rely on the chefs for buying their produce. With respect to what he grows, his approach is that which he has found to be easily cultivable and nutritious in the local environment. At the time of our interview, his focus was on growing mustard greens and kale. His long-term goal is to develop a niche market of specialty greens that can be served both cooked and raw. Were there to be an interest in what he sees as missing from the local food palate, he envisions filling a market gap in less conventional, yet dark and nutritious, leafy greens that he anticipates would flourish at his farming using organic techniques that could be prepared in a tasty dish.

While Chae networks with fellow growers and restaurateurs in the city as he is establishing his farm, he is also building relationships with the people of his neighborhood. In addition to growing vegetables for local restaurants, his goal is also to be a food resource for the people of his community. As a local food farmer, his vision is to be a conduit for that which

enables having the basics of what you need within walking distance from where you live. In that farming is an occupation that takes place outside his work enables him to connect more freely with the members of his neighborhood to meet that goal of building a sense of community. He explains the location of the farm in the district of Core City is a place where people look out for each other and as the farm is an outside establishment it is a natural place for people to make connections. A neighbor who does not have electricity uses an outdoor socket at the farm where he charges his cell phone and Chae gives him small jobs as he has a strong command for networking at the street level. Neighbors are known to stop by and share personal experiences with growing a specific plant or ways in which to use a vegetable. In one such meeting, it was determined the greens of turnips are a tasty and nutritious part of the plant to eat. He loves that working outside enables him to connect with the neighbors and for that reason the farm is also dedicated as a space for community gathering.

At Fisheye he adheres to organic farming by fertilizing the soil with compost, oyster shells, chicken waste, and 'exclusion' techniques to manage pests. He follows the growing methods of Canadian farmer Curtis Stone who is an advocate of for-profit models of intensive farming in small urban spaces and JM Fortier for his knowledge of organic, small-scale farming. Chae's sustainable farming efforts include reusing and repurposing resources, like plastic totes for delivering vegetables, pint baskets for measuring vegetables, and scrapping and salvaging materials for fencing. He also repurposed a hoop house that he rebuilt on the farm. In addition to the support of the network of farmers in the city, loans are available for small-scale urban farming including from the Steward organization for which the neighboring farm ACRE has received. There are also incentives for the purchase of hoop houses from the United States

Department of Agriculture (USDA). At the time of our interview Fisheye was supplying vegetables to twenty-two restaurants.

His goal is to help with curbing climate and food insecurity and to be a model for young people to come to understand how food is grown locally. The name of the farm is how he envisions his project; the fisheye is like a camera lens that spreads out the image from a small scale, his farm a version of what it could look like were small farms of local agriculture to stretch out into the beyond and populate local spaces. The farm is also way for him to engage in what he came to love about being a skateboarder. Being a farmer is fun, physical, allowing you to be outdoors, and is always with new challenges. At the time of the interview, his goal was to quadruple his growing capacity to provide food and employment for the people of the community for “nurturing a strong community and providing space of inspiration and celebration” (Fisheye).

Conclusion-

Our local food scholars have addressed the need for an alternative to the conventional food system. They have a place in the conversation about how food produced locally builds community resilience. Jo Robinson illustrates in her work unearthing native plants that thrive in the local environment are traits that in turn are passed in to its consumer. The American farmer Wendell Berry calls for small-scale farming coupled with techniques that use the energies of the cycles of earth’s ecosystem to grow food. Local food activist Mark Winne came to understand that networks of food produced locally from inside the community have the potential to be a system cultivated for resilience. From his post at a land-grant university, Lyson made the connection between local communities and rural farmers to develop a local food economy.

Lastly, Nordahl argues that municipalities have the power to cultivate a local food system through institutional zoning and support for growing food in the community. Each of these authors has a vision that is based on building the resilience of our food system. They illustrate the ways that people connect with the food of the environment and with each other in the community.

Local food landscapes built for resilience are based on the equitable use of the ecological environment and equal sharing of those resources in the community. The practice of sugarcane farming in the Everglades illustrates the inequitable use of earth's resources because of growing practices that are disconnected from the biological mechanisms of the environment and that which leads to degradation of the environment. Through extensive research that has been written about the historic wetland ecosystem, we learn that controlled and chemically enhanced landscapes disrupt the functional ecosystem services of the environment. That response to landscape enrichment is taking place across earth's landscapes where excessing external nutrient enhancement is causing a tipping into unbalance of those landscapes evolutionarily built to adapt to resource limitations. Through the successive process as illustrated with perennial polyculture, as species come together in a community based in diversity they are designed for internal resilience as an adaptation to the land one which resources are limited. Landrace seeds of edible varieties of native environments can offer the genetic material for the design of perennial polycultures so as to develop resilience of food plants in the local landscape. When we allow for experimentation with using the local resources of the environment to grow those foods, we will benefit from nature's propensity to flourish of the fruits of earth's ecosystem.

Like coming together with a community of diverse species adapted to the local ecosystem, people come together in the same way in communities developed for resilience.

Abandoned post-industrial urban landscapes left open as natural spaces have become fertile ground for growing local food and developing interactions between people at the grassroots level and upon which resilience is based that is an eco-social endeavor. The case study of Rid-All illustrates how the dynamics of resilience plays out in real life as members of the community learn about small-scale farming that is a model to empower people to grow food for themselves using the resources of the local environment. The city of Cleveland supports that initiative with municipal zoning for land use for agricultural purposes and legislation for the purpose of enhancing the ecological sustainability of the region. At Rid-All fruit trees of the deciduous forest ecosystem, including vegetables adapted to thrive through the winter in house-generated organic soil under the protection of the hoop house are grown. Coupled with tapping into the ecosystem services of the environment through the multiple uses of compost that illustrate the cycle of life and that which mimics that design in its and an aquaponics system. Together these local resources are designed to be a self-sustaining means of food production for people of food desert communities. The farm itself is also model for resiliency in that the individual takes that knowledge for growing food to vacant lots throughout the neighborhood ideally gradually populating the landscape with independent and self-sustaining farms meant to proliferate though as a network of local farms in the community.

Refugee farmers with an agrarian background bring knowledge for growing food locally to the people of Cleveland's Ohio City neighborhood. The REAP program where refugee farmers grow food for the local community is on land that has been deemed undevelopable due to its location along the Cuyahoga River and its potential for erosion. Although the farm is located in a densely populated area with a burgeoning local economy where corporate interests might have set their eye on that land for development, its location is secure. The farm rests on

land gently cultivated by horse-drawn tilling and meticulously designed to maximize its space for growing produce by farmers that have an expertise for growing food of the local environment. The farmers who grow food here are of cultures that have knowledge for using the resources of the local environment for cultivating sustenance in a local community. Along with that knowledge the immigrant farmers bring to their work for how to grow food locally, where the farm is rooted also helps to secure its place as it is within a strongly developing local food economy that is supported by the pre-existing community and a restaurant industry that prides itself on having access to food from local farmers. Through REAP, the farm of The Refugee Response bring a different perspective on life to the neighborhood that adds to the diversity of the community that is exemplified in their knowledge for growing local food using the resources of the local environment. With what they share with the local community in knowledge about and growing local food, they are monetarily supported for that job as they are resettling in northeast Ohio while also learning how to navigate the American economy through what could be a long-term trade for them. The work taking place in Ohio City through its farm is based in resilience in that the food is grown by farmers that have knowledge for growing it using the resources of the local environment, coupled with the developing community relationships of the reciprocal relationship between the farmers and those of the pre-existing community that is being established through the farm in Ohio City.

Andy Chae at Fisheye Farms also exemplifies what it is to be a local food farmer whose project is built upon the tenants of resilience. The farm is of a network and scale that is interconnected with other farms in the city that collectively have the long-term goal of developing food sovereign for the people of Detroit. Through his work at the farm located in the neighborhood of Core City, Chae is establishing connections within the network of local farmers,

local chefs and the local food economy with the goal to being a secure food resource for the people of his immediate community. The plants he grows are a good choice in that they are chosen for their ability to grow using the resources of the local environment, are nutritious, and fit with the local palate of Detroiters. Branching out in these ways to establish his food farm in Detroit, he securing his mission to be a place that is rooted in the neighborhood for growing organic vegetables that are healthful and thrive in the local environment and for community gathering and that of the fisheye as an elongated view that is a symbol for duplicating that model for those new to urban farming. The urban farms of Cleveland and Detroit are built within local environment and by the people of the community, illustrating the eco-social relationship upon which resilience is dependent. While maintaining those connections in the community, were the people that make up those programs to integrate native seeds and perennial polycultures into their farms, it would further establish their internal capacity for developing resilience through local food.

The farm in Ohio City illustrates how local food has come to Cleveland through the refugee farmers who have a talent for local agriculture and are growing food for the community through the support of The Refugee Response. In a different way, the farms of Fisheye and Rid-All show how people are taking a grassroots approach to cultivating food in the open spaces of the urban landscape where people have experienced a kind of abandonment requiring them to take it upon themselves to address the need for food in those communities. Were this project to have looked at food deserts across the county, we might have unearthed other unique ways people within the abandoned landscapes without access to the conventional food system are coming to address that need for food through the production of it locally and for how the local food movement in America can develop its capacity for resilience.