Alternative Food Systems in the Upper Midwest: A Six-Dimensional Food Security Analysis

A Collaborative Research Exploration between Common Harvest CSA Farm
(Osceola, WI)
&
The Students in Geography 232: People, Agriculture and Environment
Macalester College
December 2023

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Prologue and Acknowledgements

Farmers, activists, scholars and consumers have been working for decades to foster and build a sustainable local food system in the Twin Cities Metro area as an alternative to the conventional food system. This system has been rattled in recent years by environmental and economic shocks, raising questions about its long-term robustness and resilience. Using a six-dimensional food security framework, this report offers a collection of student papers that collectively analyze the strengths, weaknesses, opportunities and threats (SWOT) facing the local food system.

The report represents the collective efforts of 20 students co-investigating food systems in and around the Twin Cities, MN in the September-October 2023 period. Students in Geography 232 (People Agriculture and the Environment) engaged in this collaborative research effort with Common Harvest CSA farm in Osceola, WI. Following on ten previous years of collaboration, the course instructor and the co-owners of the farm developed a set of research themes that were of mutual interest and are the focus of this report. Students were divided into six research groups analyzing different dimensions of the local food system. The papers the students developed - working within their research groups - were shaped by the following themes and questions.

1) Availability refers to food production and the supply of food on the market. How available is locally grown produce in the Twin Cities metro? Has the rise and proliferation of CSA farms created and over supply and too much competition? Are big organic food producers crowding out smaller ones? Has less expensive conventional food created an expectation that locally produced food should also be cheap?

2) Access refers to people's ability to access nutritious food. To what degree has food price inflation impacted households' ability to purchase adequate amounts of nutritious food? To what degree has the end of some COVID era programs reduced nutrition support for lower income households and is this a problem? The US farm bill is up for reauthorization this year, over half of which traditionally covers monies for nutrition support programs. How real are threats to cut or reduce nutrition assistance programs and what would be the impacts? How important are SNAP benefits at for some shoppers at farmers' markets?

3) Utilization refers to the water, sanitation services, cooking facilities and knowledge needed to prepare a nutritious meal. To what degree is a lack of cooking knowledge a barrier for good nutrition for college students, low income households or CSA members? Given that CSA members receive seasonally climatically appropriate vegetables, are people challenged to cook new or different types of vegetables? Does lack of know-how on how to prepare certain vegetables lead to food waste?

4) Stability refers to stability of food supplies and prices. To what degree have recent climate and economic related shocks impacted food supplies and prices in the Twin Cities? Have local food systems (as compared to conventional systems) been more or less resilient in the face of recent climate and economic shocks? To what degree do fluctuating input prices impact farmer decision making?

5) Sustainability refers to the long-term productivity of ecosystem health of farming systems. How sustainable is the local food system, especially in light of climate change and increasingly irregular weather patterns (including a major drought in the summer of 2023)? Many farmers depended heavily on irrigation this past summer, to what degree has this undermined groundwater supplies? Have irregular weather patterns or warmer temperatures led to other problems that may lead to unsustainable strategies by farmers who are trying to cope? Is the CSA model a good way to mitigate climate risk?

6) Agency refers to the control of the farmer over their cultivation decisions or the control of the consumer over what they eat. In the midst of economic and climate shocks, are farmers feeling less agency over the running of their farms? Does the CSA model afford the farmer greater agency over running their farm? Does the CSA model lead to the loss of agency over food choices? What is the most effective way for consumers to express their agency in the local food system?

The class spent a full day visiting Common Harvest CSA farm, as well as surrounding areas, on Saturday, September 23. The six groups then spent the following three weeks collecting and analyzing data for their respective research themes and questions. The students working in each of the research groups penned a report addressing a specific research question related to one aspect of their group's theme. These reports are included as sub-chapters, following each research theme, in this document. While the quality of the individual reports may vary, together they represent a rich set of insights that were co-produced with the owners of the farm, as well as the various individuals who were interviewed for this project. Some students have chosen not to publish their papers, some chose to do this anonymously, and others have done this with their name attached to the paper.

None of this would have been possible without the time, energy and intellectual input of the co-owners of Common Harvest CSA farm, Dan Guenther and Margaret Pennings. I am also grateful to my two teaching assistants, Minori Kishi and Reece McKee, who supported the class in their exploration of these topics and helped edit this report.

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Chapter 1

Availability: food production and the supply of food on the market

By Georgia Akins, Brian Anderson, Anonymous

1.1 The Unpredictability Game: A Discussion of Climate Change Impacts on CSA Farms in the Twin Cities Metropolitan Area

Georgia Akins

Introduction:

In the United States, the idea of local farm life is often romanticized. The sturdy red barn with bales of hay and flocks of chickens pecking about, acres of corn that stretch for miles, and trucks full of fresh vegetables to be carted to the local farmer's market. Bounty all around. Although this bounty may not always be exaggerated, the lack of stress is. In the wake of industrial agriculture, many small-scale farmers fight for visibility in a production-driven food system. With the pressing issue of climate change, a new challenge arises: the fear of long-term survivability.

To fight this fear, many small-scale farmers have looked into different ways to expand their customer bases. One of the most notable being the system of Community Supported Agriculture, or briefly, CSA. A type of subscription service, the CSA model is typically based around a membership program that supplies customers with access to a weekly or bi-weekly assortment of produce in exchange for financially supporting a farm's harvest season.

Generally, CSA farms can be found within relative proximity to urban centers, with the idea of increasing the availability of organic and ethically harvested produce for everyone. The UN High Level Panel of Experts for Food Security and Nutrition (HLPE-FSN) defines food availability as "the amount of food available on the market or how much food is available in a certain jurisdiction." (Moseley, n.d.). Under this definition, food availability is a critical part of food security and must be equitably distributed.

In the face of climate change, the availability provided by CSA farms is threatened. Their smaller scale, in comparison to that of industrial agriculture, makes them enormously vulnerable to the disruptions that shifting weather patterns bring. Over the course of this paper, I will address the recent impacts of climate change on CSA farms that supply the Twin Cities metropolitan area in Minnesota to answer the question "How have recent consequences of climate change impacted the success of local CSA farms in the Twin Cities metro area?" I will begin by discussing my various methods of research and their subsequent findings, followed by a comprehensive discussion and analysis that will yield a final conclusion on the impacts of climate change on local agriculture.

Methods of Research:

The research for this paper consisted of a combination of quantitative data acquired from government databases and interviews with local CSA farmers. The numerical data, pulled from a variety of pages from the Minnesota Department of Natural Resources (DNR), quantifies various weather trends in Minnesota over the past few decades. Specific data sets pulled from the Minnesota DNR include those regarding total precipitation, average temperature, mean maximum temperature, mean minimum temperature, and the number of days over 90 °F in the Twin Cities metropolitan area since 2000. Although all of the datasets used date as far back as 1871, the timeline was shortened to the past 23 years for the sake of looking at recent climate changes and simplicity.

As per the interviews, I had the amazing opportunity to interview three farmers from CSA farms that supply the Twin Cities: Margaret Pennings from Common Harvest Farm, Tim Reese from Gale Woods Farm, and Lauren Barry from Dancing Gnome Farm. Each interview was conducted with the same set of pre-planned questions, including, but not limited to:

1. Have you experienced any significant changes in crop yield because of recent weather changes? Such as impacts of intense heat or drought?
2. If you have experienced any negative impacts of climate change, what crops have been affected the most? The least?
3. How have climate change impacts affected your CSA customer base?
4. Have you been using any specific practices to offset climate change effects?
5. How do you expect climate change to affect your farm in the years to come?

Each farm, unique in their produce, scale, and management style, provided me with a wide variety of evidence regarding climate change consequences. Common Harvest Farm, located near the Minnesota border in Osceola, Wisconsin is a education-oriented vegetable CSA farm that is run by Margaret Pennings and her husband Dan Gibson. Having run their CSA services for nearly 33 years, Pennings and Gibson are well known within their local community and offer yearly internship opportunities for college students interested in agriculture. Gale Woods Farm, located in Minnetrista, Minnesota and run by the Three Rivers Park District, is supervised by Tim Reese and a team of farmers that provide the local community with a wide variety of produce and livestock products. Although they sell all of their products at their on-site store 7 days a week, their CSA service specializes in a large assortment of vegetables, which they have been offering since 2004. Finally, Dancing Gnome Farm, located in Wabasha, Minnesota, has been owned and operated by Lauren Barry and her team since 2014. Barry's CSA service supplies organically grown produce to about 75 members year-round, with a goal of providing week-to-week variety to customers.

Findings:

In terms of availability, the previously discussed research methods provided copious amounts of evidence to support the fact that climate change is negatively impacting CSA farmers in the Twin Cities metropolitan area. Most notably, local farms have increasingly felt the effects of climate change in the form of reduced precipitation and intense heat season after season.

Reduced Precipitation and Drought:

According to the Minnesota DNR, the Twin Cities have received significantly less rainfall during the harvest season over the course of the past few years. As displayed in Figure 1, summer months especially have experienced rapid decline, with a drop from 4.63 inches of precipitation in 2020 to 1.93 inches in 2023 (National Weather Service Twin Cities Reporting Station, 2023). It is important to note that this past summer, much of Minnesota experienced significant drought, but this doesn't make the decline any less prominent. As Margaret Pennings told me, these "dry spells" are becoming longer and more frequent, posing a severe threat to many moisture-heavy crops. The biggest issue with these droughts is the fact that they are hitting earlier and earlier each time, making it difficult for crops to seed and germinate (M. Pennings, personal communication, October 9, 2023). At all three farms, they especially felt the failure to germinate in their fall crops, such as potatoes and carrots, that didn't receive enough moisture at a young age to properly grow.

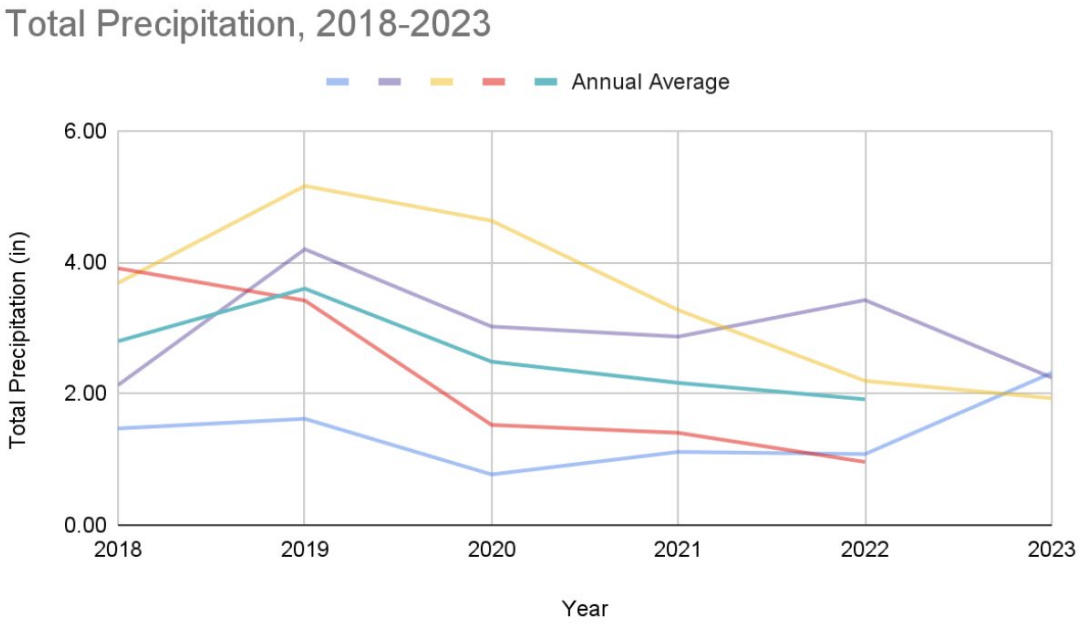

Figure 1: *Total Precipitation in the Twin Cities Metropolitan Area (2018-2023). Adapted from data obtained by the Minnesota Department of Natural Resources, 2023.*

In order to combat these long-lasting "dry spells," the farms have had to scramble to increase their irrigation output to try and save their crops. As an attempt to offput drought effects, these farms are implementing practices such as ground sprinklers, drip irrigation, soaker hoses, layflat hoses, and overhead rotating sprinklers to simply get as much water on the plants as possible (T. Reese, personal communication, October 10, 2023). For these smaller-scale farms, most of their irrigation systems are not set up to supply mass amounts of water that are typically brought by rain. Lauren Barry described such irrigation practices as "the last ditch effort in the moment" in response to limited infrastructure (L. Barry, personal communication, October 10, 2023).

Although these droughts don't last forever, the resurgence of rain can cause even more problems for these farms. When the drought would end, and a massive rain storm would come

by, many crops weren't in the position to withstand heavy rainfall. At Common Harvest, these storms would often cause quick-onset root rot for some of their crops, as the formerly dry soils were unable to properly absorb water and prevent flooding (M. Pennings, personal communication, October 9, 2023).

Longer and Hotter Summers:

In tandem with a lack of rain, intense heat has also been an issue for agriculture in the Twin Cities area, and is increasingly worse each season. Based on Minnesota DNR data, the average temperature of the metropolitan area has been slowly increasing, as have the number of days over 90 °F in the late spring through early fall months (National Weather Service Twin Cities Reporting Station, 2023). As pictured in Figure 2, there have been years where the region has experienced more sustained intense heat than others, but these cycles of high heat are steadily increasing in quantity each time. Notably, 2023 has proven to have the highest number of extreme heat days in the past 20 years, with 33 days on record between May and October. Additionally, the range of when these 90 °F days have been happening has been extending further and further into the spring and fall months. For example, in 2012, the year with the second highest number of days over 90 °F, high temperatures were recorded the earliest in May and the latest in September. Comparatively, 2023 also displayed high temperatures earliest in May but the latest in October (National Weather Service Twin Cities Reporting Station, 2023).

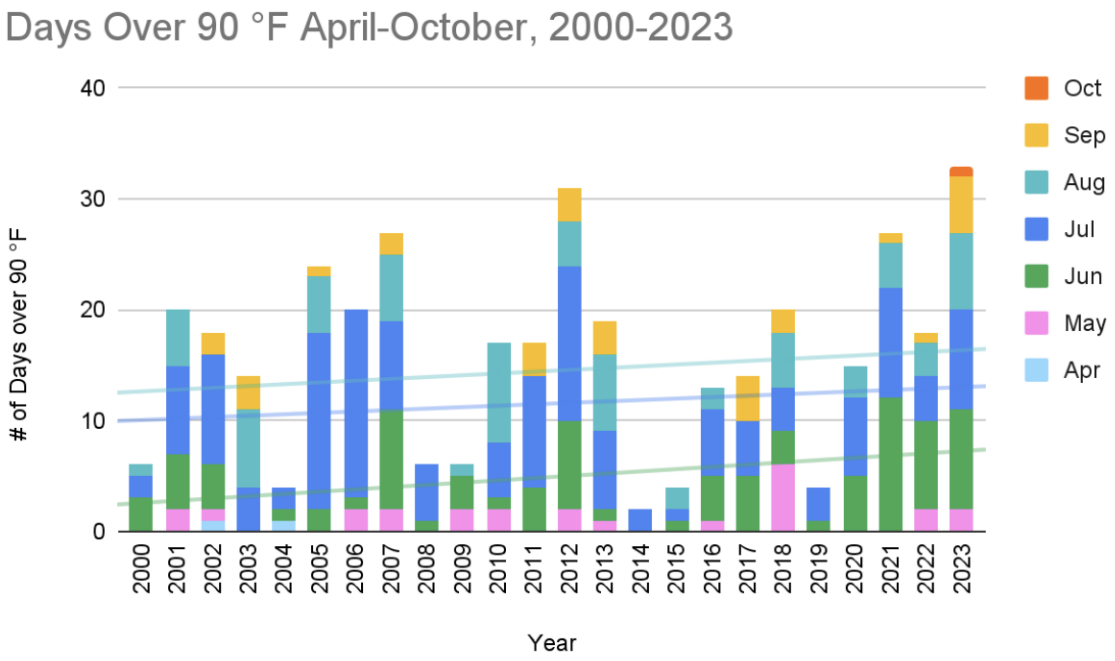

Figure 1: *Number of Days over 90 °F in the Twin Cities Metropolitan Area (2000-2023). Adapted from data obtained by the Minnesota Department of Natural Resources, 2023.*

For local farmers, the prolonged heat has not only created issues with moisture maintenance, but also with pest populations. At Dancing Gnome Farm, the combination of drought and warmer temperatures has worsened the presence of voles in the field. These moisture-driven pests seek out any form of water that they can find, and in a state of drought and heat, they eat the closest thing they can: crops. As a result, Barry and her team have lost a sizable section of their watered produce to these unwanted and unpaying customers (L. Barry, personal communication, October 10, 2023). At Common Harvest Farm, they have specifically struggled with the increased presence of Colorado potato beetles due to the heat. In the case of the Colorado potato beetles, their life cycles depend on heating degree days, and the warmer it is, the longer they live. Pennings expressed to me that she could very clearly notice that this past summer's nights were much warmer than normal, which she directly attributes to the farm's

beetle issue. Due to the fact that the farm is completely organic, Pennings and Gibson must rely on the use of biological sprays to reduce their infestation problem. Unfortunately for them, there hasn't seemed to be a spray that works effectively, as the beetles simply take the sprays as an opportunity to build resistance in the next generation. A phenomenon that they are able to achieve due to their rapid reproduction period and heat-induced long lifespans. In response to this infestation, Common Harvest Farm has decided to take a break from growing potatoes for a season, in hopes of ridding their land of the pest. "We would have never thought that we would have to stop growing potatoes," Pennings told me, "but we have got to break this cycle." (M. Pennings, personal communication, October 9, 2023).

A Concern for Sustainability:

In the light of these worsening weather disruptions, climate change has left many farmers wondering if CSA will even work in the long-term. Tim Reese explicitly expressed to me that he was unsure if "CSA was even the right model" for economically sustainable local agriculture. With the COVID-19 pandemic, many CSA farms actually saw an influx of new members, with more people wanting access to fresh produce for home cooking. As the pandemic has come to an end, Reese has noticed that less and less people have the time to cook for themselves, and have become not as interested in outdoor shopping. Additionally, as the American market continues to undergo inflation, many CSA farms such as Gale Woods Farm have had to raise their prices to keep up with the local economy, driving many customers away (T. Reese, personal communication, October 10, 2023). This being said, many CSA farmers are confident that a large part of their member communities will provide them the support they need each season. Barry admitted to me that she is aware that "CSA is not the right model for everyone," and she's perfectly okay with that. Like many other farms, Dancing Gnome Farm hopes to build a climate

resiliency relationship with their members, and share their value propositions with their local community in the face of climate change (L. Barru, personal communication, October 10, 2023).

Discussion and Analysis:

It's no secret that climate change is impacting the way that our global food system works, what isn't as well-known is the distribution of the impact. The biggest issue with climate change impacts is that smaller-scale farms such as CSA farms don't have the infrastructure to withstand major weather disruptions. As a result, they feel the consequences of climate change the fastest and the hardest.

Based on my findings, a common issue amongst CSA farms is the ability to keep up with variable weather patterns including drought and intense heat. Due to their smaller-scale, these farms are currently unable to supply their crops with necessary resources in a timely manner. In the case of this past summer, many CSA farms were forced to scramble to find last minute ways to keep their crops watered in long-lasting drought and heat. Although these solutions did save some of the season's crops, they are simply temporary fixes to the larger issue of limited infrastructure.

In a world where CSA farms often compete for visibility with the dominance of industrial agriculture, local farms are put at an even worse disadvantage with the onset of climate change. Due to the fact that large industrial farms operate on a much larger and production-centered scale, they are guaranteed to withstand the disruptions of variable weather conditions and continue to be economically successful. This puts local farmers in a position where they must be concerned about maintaining both their crops and their customer base. As unpredictable weather requires local farmers to invest more into their crop maintenance, they must raise their produce and CSA membership prices to make a suitable profit. As previously mentioned, increased prices

doesn't always guarantee the loyalty of customers, putting CSA farms at risk of losing their much needed customer base. Additionally, the fact that local farms often specialize in organically-produced crops, they are not eligible for the use of chemical fertilizers and pesticides that corporate farms use to ensure sufficient crop yields. Furthermore, these organic farms are also restricted from participating in the cultivation of genetically engineered seeds, many of which are specifically designed to withstand issues onset by climate change.

With the convenience of industrial agriculture, it is so easy to feel separated from the food that we eat. If local agriculture were to slip completely into the periphery, it is possible that we could completely lose a vital connection to our food. As climate change makes it harder and harder for CSA farms to keep up with corporate agriculture, we get closer and closer to viewing food solely as a commodity. Whether we realize it or not, food is central to the social relationships that we build with our family, friends, and community. Meals provide a guaranteed connection for bonding, as food is essential for both our mental and physical survival. As we become more detached from where our food is sourced, it becomes harder to feel truly connected to our food if we don't know where it comes from. So, instead of trying to make commodified food more transparent, we should make local organic food more available and accessible to the public. By doing this, we would be able to make it more convenient, the very thing that makes processed foods more preferable. Turning local agriculture into a core part of our food system would not only change the way that we think about our food, but also improve our relationship with both it and those around us.

So how do we keep local agriculture from slipping away? It's really quite simple: more people need to join CSA memberships in their local communities. Expanding the customer base of CSA farms is probably the most obvious way to ensure that local, small-scale farmers are

receiving the economic and social support they need to supply bountiful harvests. On top of this, it is crucial that communities stay aware and educated about their food. Spreading awareness about the benefits of local farming not only keeps the conversation about CSA farming going, but it also teaches people about where their food comes from or could come from. There is a reason that word of mouth is the best form of advertising, and that is due to its inherently trusting nature. People often trust what they hear from their community, and if they hear of someone who had a positive experience as a CSA member, they are much more inclined to join one themselves.

Conclusion:

Climate change hasn't been easy, and it never will be. Not for agriculture, not for anything. The biggest thing that we can do to offset its impacts is to make reasonable and sustainable decisions today. As climate change increases the variability of our weather systems, local farms will continue to feel the most direct and intense consequences of disruptions such as drought and intense heat. Oftentimes, these challenges have small-scale farmers questioning the reliability of their CSA model and the loyalty of their customers. As we've seen over the years and this past summer, the impacts of climate change make it more difficult for CSA farms to keep up with the dominance of corporate agriculture. Instead of just fighting for visibility, local organic farms are now fighting for visibility and survivability. For many CSA farmers, their organic status is both their strength and their weakness. It prevents them from participating in the use of non-biological practices to ensure their crops' success, but also encourages improved food-consumer relationships within their membership community.

If climate change is one thing, it's unpredictable. In the words of Lauren Barry, "Unpredictable is the name of the game." (L. Barry, personal communication, October 10, 2023).

For CSA farms, this is where they struggle the most: the lack of climate resilient infrastructure. Although these small farms strive to put capable infrastructure in place, they typically don't have the funds to do so. This usually results in them having to raise their prices in order to offset costs, which in itself raises the risk of driving customers away. In place of this self-funded solution, it is crucial that state or federal institutions dedicate specific policy to fund the improvement of small-scale farm infrastructure. By doing so, CSA farmers wouldn't have to anxiously rely on their own profits to maintain the success of their harvest, thereby ensuring the availability of organic produce for all.

In the context of food availability, we must direct our focus to increasing that of our local, organic farms. It is critical that we transform the question of availability from one of mass production to one of connected, stress-free, sustainable bounty. As Barry puts it, "We can't really rely on past precedent to guide us or to be the be-all-end-all of what we're expecting in the future." (L. Barry, personal communication, October 10, 2023). Once we as a society are able to move on from dedicating all of our time and energy toward industrial agriculture, then hopefully we can relieve the stress that local farmers harbor. Maybe then, the idea of quaint, serene, red barn farms won't just be a dream.

Acknowledgements:

In extension of this paper, I would like to thank those critical in the development of this research assessment. Firstly, I would like to thank my interviewees, Margaret Pennings, Tim Reese, and Lauren Barry for taking part in this assessment. Their input was crucial in the development of my thesis, as well as the authority they provided as CSA farmers. I truly appreciate them taking the time out of their busy schedules to address my questions and curiosity, and look forward to following their farms' success in the future. In addition, I would

like to thank my professor, Bill Moseley, for providing me with essential feedback regarding the direction of this paper. With his help, I was able to engage in new forms of research, such as interviews, that built the paper I present you with today.

1.2 Dynamics of Food Availability within Community-Supported Agriculture

Brian Anderson

Introduction:

Throughout the advancement of technology, the production of food for an increasing population has been transformed to implement these new innovations, leading to various forms of alternative agriculture compared to the conventional model. Within the U.S., the food and farming systems of the upper Midwest are present in different forms that have majoritively focused on the implementation of industrialized agriculture targeted to a small portion of commodity crops, such as corn and soybeans, in part due to the federal farm subsidy program that leaves farmers without a choice but to focus on a restricted number of crops (Moseley, 2012). This limited diversity of crops placed upon large fields therefore lacks proper food availability that confines our diets, degrades the natural functioning of soils, and increases environmental vulnerability to droughts.

As a result, alternative forms of agriculture emerged as a response to tackle the various concerns and challenges within the conventional food system. In particular, Community Supported Agriculture (CSA) developed and rose to popularity in the Twin Cities as individuals have been working for decades to foster and build a sustainable locally sourced food system. According to the USDA, CSA "consists of a community of individuals who pledge support to a farm operation so that the farmland becomes, either legally or spiritually, the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production (DeMuth, 1993)." CSA members, or 'shareholders,' typically pay a fee at the beginning of the growing season and then receive shares of produce

throughout the harvest season. This form of alternative agriculture is considered a 'win–win' for farmers and consumers as farmers gain a direct market while members have greater access to seasonal and diverse local foods, and opportunities to know and trust the source of their foods (Wilkins et al., 2015). However, this system has experienced several environmental and economic shocks, which have raised concerns about its long-term stability and resilience. Because of these factors, I am interested in looking into CSA food production using the framework of food availability from the 6-dimensional food security framework introduced in class. This paper seeks to analyze the dynamics of food availability for CSA farms, especially looking into the specific challenges farmers face in ensuring consistent availability of food throughout the year in the Twin Cities and how they address these challenges.

In this paper, I plan to explore the alternative agriculture type of Community Supported Agriculture and the numerous challenges faced by farmers associated with it. In particular, I will examine how these impacts on food production are addressed but are heavily influenced by other socio-economic factors. I focus on several challenges that affect the production of food to be introduced to the market; obtaining enough memberships to meet financial obligations, carrying out proper technical aspects for efficient farm production, unpredictability from weather-related risks, and the ability to obtain proper forms of labor. Finally, I conclude with a look at opportunities for CSA farmers to have better chances to deal with the challenges of consistent food availability throughout the year.

Methods:

In order to answer my research question, the methods use a combination of field components and a literature review. Field components were gathered from a trip to Common Harvest Farm in Osceola, Wisconsin, which served as an opportunity to see a

real-world example of alternative agriculture. This small-scale 40-acre family-run CSA vegetable farm uses organic practices to grow and distribute fresh produce to their shareholders in the Twin Cities and other parts of Wisconsin. This trip allowed me to gain knowledge directly from the head farmers, Dan Guenthner and Margaret Pennings, and understand their perspective on owning and operating a CSA farm. Afterward, a literature review was conducted to obtain scholarly articles gathered from Google Scholar containing keywords such as "community supported agriculture, challenges, food availability, impacts, etc." In addition, other sources from a Google search were gathered from academic institutions and government departments/agencies. Articles were then chosen in accordance with the relevance to the topic at hand.

Findings, Analysis, and Discussion:

The most defining challenge of CSA farms in food production is the ability to meet enough shares or memberships for a given growing season. Inherently, CSAs are a partnership between farmers and consumers, where consumers purchase a share of a farm's products in advance, typically paying in full in the wintertime when farms need capital to prepare for the spring. The following arrangement allows farmers to buy the seeds, transplants, and other inputs they need for the growing season, and pay their farm labor without waiting until harvest to generate revenue. If these farms do not reach certain quotas in terms of the number of members, there is an increased chance of not having enough finances for the upcoming season if they experience times of unpredictability. CSAs probably liberate farmers from their dependence on the mainstream capitalist market, however, it will increase their dependence on limited members (Sulistyowati et al., 2023). The farmer's survival depends on the members' support in the form of awareness, willingness to support, and trust. Because of this aspect, maintaining a

good relationship between farmers and members is one of the key elements of CSAs that Dan and Margaret aimed to convey during my experience at Common Harvest Farm. Using the dimension of availability as a lens, it can be seen that the production of food within CSA farms have a better focus on producing a diverse range of foods using sustainable practices. In the case of Common Harvest Farm, 10-12 acres are dedicated to the production of 40 different vegetables and herbs that are all grown to work within a natural system. Once the crops are harvested, produce is gathered and distributed according to the 3 seasons, Early (mid-June to mid-July), Mid (mid-July to mid-September), and Late (mid-September to mid-October). When food production is in full effect, food boxes are delivered to about 140-200 families within two days of harvest, which maintains freshness and leaves the produce more nutritious compared to produce at general grocery stores.

Despite the various types of foods CSA produces, farmers experience much greater challenges prior to the benefits that come with a bountiful harvest. CSA farms in the Twin Cities, like elsewhere, face several obstacles in ensuring consistent availability of food throughout the year. These challenges are often influenced by the region's climate, seasonality, and the specific dynamics of the local agricultural system. The upper Midwest experiences 4 distinct seasons, with winter being particularly problematic for growing many types of crops. Because of these factors, CSAs time their production in accordance with the growing season, limiting the amount of farm activity during the winter.

The second challenge revolves around the technical aspects of efficient farm production, such as maintaining a diverse range of crops throughout the year. CSA focuses on taking full advantage of the growing season, usually at the start of spring in May and the start of fall in October. Out of this six-month period, most CSAs only provide their members with food boxes

throughout the June-October period. This limited amount of time for harvest remains the utmost concern for farmers as they have to make sure the crops obtain the inputs they need to be harvested in ample time. Even though shareholders are only able to experience the benefits for a small portion of the year, individuals are likely aware of this aspect through the close connection between farmer and consumer as most members are white, female, and frequently have higher education, higher incomes and stronger levels of social connectedness than non-participants (Vasquez et al., 2017).

To navigate this task, farmers, like Dan and Margeret, engage in the efficient planning of their crops in advance based on the factors of environmental climate, soil conditions, and sometimes member preferences with the implementation of sustainable practices and season-extending techniques. The practices of crop rotation and cover cropping are implemented to ensure the continuous use of soil as each works to optimize nutrients, maintain soil fertility, and reduce the risk of pests and diseases. Even though some have ways to address this challenge, the knowledge of these aspects requires a certain level of farming expertise, including an awareness of the intricate interactions between matter and life inside the farming ecosystem, which is made up of factors like soil fertility, seed quality, water intake, climate, and seasons (Sulistyowati et al., 2023).

Furthermore, the particular uses of greenhouses, high tunnels, and cold frames are techniques catered to prolonging the growing season. These practices for maintaining crop diversity were seen at Common Harvest Farm as it uses a greenhouse with heating abilities from a wood-fired broiler to house seedlings and young transplants intended for production. Although, it is important to note that not all CSAs have access to these season-extending techniques especially as some may not have the space nor the funds to obtain such equipment.

Furthermore, more expenses are needed to produce food sustainably as production costs are higher compared to non-organic, involving the use of sustainable farming methods and allowing adequate living conditions for farmers. Interestingly, this leads to the "self-exploitation" of farmers as they feel it is their responsibility to produce food for their members despite instances of low income, which restricts the farmers from gaining benefits from CSA (Sulistyowati et al., 2023).

When looking at the dynamics of production, the case of overproduction is far easier to solve than underproduction. If the members choose not to accept the over-harvest, farmers can sell the product through other marketing channels or in most cases donate it to those who need it. This can be understood at Common Harvest as they work with various food shelves to provide produce in surplus to low-income families for free. However, when there is insufficient produce, farmers frequently feel obligated to obtain food from other sources, which could result in a reduction in their income to ensure membership expectations.

Within the challenge of the technical aspects, another issue arises from the unpredictability of weather-related risks. Unpredictable weather events, such as storms, droughts, or extreme temperatures, play an important role in the success of crops and can impact crop yields, requiring farmers to make up for the shortage of inputs. When events like these occur, risk management strategies are put in place to minimize the impact such as the investment in irrigation systems and solar panels to mitigate the impact of drought or provide ample heating. Despite the influence this factor plays, this one area of research I fell short as I did not find accompanying articles that look further into this issue.

As CSA farms maintain their size or grow, managing the logistics of labor in the form of harvesting, packing, and distributing shares while maintaining quality is another challenge. In

the case of food production, labor shortages, and limited skills are issues that farmers tackle with every growing season through the options of hiring waged labor, opening volunteering opportunities, and hiring interns (Sulistyowati et al., 2023). Unfortunately, many farms cannot afford to pay a high salary of wage labor because of the farm's limited income so they rely on interns and volunteers. However, employing interns can be costly as well, as they need food, lodging, and a stipend while lacking sufficiently mastered skills to contribute to the farm. Member volunteers can be useful in some situations, but in others, the farmers tend to redo all of their labor. If farmers are not able to obtain sufficient labor for the growing season, the expected success of the harvest falls dramatically from the impacts of daily maintenance such as the presence of weeds and disease buildup. In the case of Common Harvest Farm, Dan and Margeret rely on the help of a select few interns to help with daily operations during the summer months. However, the majority of the time they take matters into their own hands often leading to some parts of the farms experiencing a lack of maintenance due to the amount of manual labor needed to uphold sustainable practices.

Conclusion:

With the rise of alternative forms of agriculture, Community Supported Agriculture farms have a unique role in contributing to local food resilience, promoting sustainable agriculture, and fostering community engagement to create a more resilient and reliable local food system. Despite the benefits CSA farms bring to the table, farmers face various challenges that affect the consistent availability of food production, such as obtaining enough memberships to meet financial obligations, carrying out proper technical aspects for efficient farm production, unpredictability from weather-related risks, and the inability to obtain proper forms of labor. The literature used in the review provides a further understanding of my findings at Common Harvest

Farm and provides a deeper perspective on the complex challenges that impact the production of food by CSA farmers. With this information, I find it necessary for an increase in external resource support for CSA development as it can be used to support a transition to better forms of sustainable agriculture and to finance experimental CSA that can be focused on a certain target group. Furthermore, the development of CSA should be influenced by the recommendations of public support as it will require the implementation of certain structures such as specific legal and tax systems, agriculture and trade policies that protect local production, incentives to implement sustainable farming practices, and incentives for local food consumption and small-scale producers. The creation of a social welfare system that encompasses all that occurs within it, including aspects that are unique to farmers, such as farming insurance, is a more comprehensive solution. Despite these optimistic recommendations, the future of CSA farms is uncertain but I can only hope that the changes are made to further support alternative forms of agriculture.

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1.3 Large-scale Organic Farms and Local CSA Farms: A Comparison

Anonymous

Introduction:

Organic or conventional? Local or organic? Large-scale organic farm or local CSA farm? These are just a few of a myriad of questions consumers across the United States confront about organic products as they shop for their food. Particularly with the popularity of organic produce on the rise, consumers in this country find themselves with more organic options than ever before. Between the years 2019 and 2022, sales of organic produce went up nearly 20%, demonstrating a shift in the demand for organic foods (Center for Sustainable Systems, 2023). The Minnesota Department of Agriculture even goes as far as to say, "Organic agriculture is one of the most rapidly growing sectors in the food industry." (Minnesota Department of Agriculture, n.d). This growing demand is leading to a change in the ways we grow organic food with an increase in the number of large-scale, industrial organic farms we see nationally. As the number of organic products on the market goes up and consumers have more choices over the kinds of organic foods they're buying and where they're coming from, many questions arise about competition within the organic food sector. Particularly, between different kinds of organic farms. This paper will compare large-scale, industrial, organic farming with small-scale, local, organic, community-supported agriculture (CSA) farms. When I first began this research endeavor, I wanted to know whether the increased demand for organic food was leading to large scale organic farms crowding out CSA farms that produce a lot less output. After visiting a local CSA farm and having a conversation with Farmer Dan, he made me realize that this is not the case. This led me to wonder *why* and thus, this paper asks why large-scale organic farms are not crowding out local, small-scale, organic CSA farms. It is important to comprehend this question

in order to understand the most viable ways to grow organic food and to explain the intrinsic value of CSAs. From an economic perspective, this matters for the market to be able to supply enough organic produce to meet growing demand, while also accounting for consumer preferences. From an environmental viewpoint, this question is important to be able to weigh the costs and benefits of large-scale organic farms, by looking at the part of the market they occupy. As I answer this question, I will first start by describing my research methods before delving into a discussion about organic farming practices and competition on the market. I will then analyze my findings and conclude what I have learned.

Methods:

In order to answer the research question, I used two different research methods. First, I went on a class field trip to a local CSA farm located in Osceola, Wisconsin. At the farm, *Common Harvest*, we got a tour of the farmland, learned about the agricultural practices employed, and were able to talk one-on-one with Farmer Dan. I was able to ask Farmer Dan about the threat of competition from large-scale organic farms, and he explained some of the reasons their farm is not in direct competition with industrial-scale organic farms. In addition to the information farmer Dan provided in our conversation, I consulted the existing scientific literature on the topic to inform the analysis of the research question.

Findings, Discussion, and Analysis:

Before analyzing the answer to the research question, we must first define what organic food is. Organic refers to products that are grown and produced without the use of human manufactured fertilizers, pesticides, and other synthetic chemicals that can be detrimental to the stability of local ecosystems, the quality of soil, and human health (Duram, 2019). The organic food movement began in the 1940s, but the term “organic” was not officially defined until the

1980s (United States Environmental Protection Agency, 2022). Now, organic foods can be "certified organic" according to the United States Department of Agriculture's (USDA) strict list of criteria (McEvoy, 2012). For example, in addition to being produced without synthetic chemicals, organic produce cannot contain genetically modified organisms (GMOs), artificial preservatives, or manufactured colors (McEvoy, 2012). Many other criteria exist regarding animal treatment practices, soil quality, and more (McEvoy, 2012). Given these precise standards, particularly regarding pesticide usage, organic products tend to be more expensive. This is because they typically have greater labor inputs and their supply is low compared to demand (Food and Agriculture Organization of the United Nations, n.d).

In addition to understanding what organic farming is, we must also understand who is buying organic food and why. Given the fact that organic produce is generally more expensive to produce, consumers buying organic food are typically higher-income households who are motivated by a variety of factors (Gundala, R., & Singh, A., 2021). In a research paper, Gundala and Singh, 2021, identified perceived health benefits as the primary reason a group of consumers in the Midwest decided to support organic agriculture. Additional considerations included: environmental benefits, pesticide-free, and the freshness of produce. These priorities contribute to the types of organic farms consumers choose to support, whether local or industrial.

When comparing these two different types of organic farms, despite producing similar products, it becomes clear that they are fundamentally different types of businesses. Large-scale organic farming is a relatively new concept and has developed as a way to appease the growing demand for organic products. With organic farms being less productive, there is less supply on the market which leads to an increase in prices, making organic food less available to anyone

who may want it. Therefore, many organic farms have adopted similar farming techniques to conventional farms, including large monoculture fields (Salaheen, S., & Biswas, D., 2019). Monoculture can cause a host of environmental issues, such as soil degradation and ecosystem disruption (Balogh, 2021). While organic farming does not use pesticides and practices more environmentally friendly farming as a whole, it still contributes to environmental degradation, undermining many of its benefits when compared to conventional farming.

Additionally, many large-scale organic farms are owned by big agricultural organizations that contribute significantly to the destruction of the environment, countering the organic foods movement. For example, Cascadian Farm was originally a small, organic farm located near the Skagit River in the Cascade Mountains in Washington state, but is now owned by General Mills, one of the largest food corporations in the US (Bruns, 2022). Interestingly, they have maintained their image as being a small farm from Washington with much of the brand's marketing showing beautiful farmland and saying, "founded in Skagit Valley, Washington." (Cascadian Farm Organic, 2023). This is a marketing move, with the intent of making the brand seem like a small scale farm, when really the company distributes its products internationally. This branding clearly demonstrates a large, industrial farm trying to seem like a small-scale farm in order to get more customers. This is an example of greenwashing but also shows the popularity of seemingly small-scale farms.

While some large corporations are greenwashing customers into thinking they're supporting a smaller business, community-supported agriculture farms are authentically small, local farms. They rely on the farmer selling directly to the consumer, through subscription boxes. Consumers become "members" of a particular farm and spend a certain amount of money at the beginning of a season, on the CSA box subscription. The boxes are delivered to

various locations, often not far from where the customers live. In the case of Common Harvest, the boxes are full of different produce from the farm each week. The customers are unable to choose what goes into the box, so they sometimes receive produce that is unexpected. When people sign up to be members of CSA farms, they are not only signing up for a box of produce every week, but they are also becoming members of a community. At Common Harvest, Farmer Dan told us that a lot of their members learned about their farm through word of mouth which demonstrates both the importance and the strength of community for this business model. Farmer Dan is also very hesitant to call the farmer's customer, rather, he and his wife Margret refer to their subscription box recipients as "members" which emphasizes the communal relationship between the farm and its consumers. This is very different from the transaction between industrial organic farms and their customers. Customers go to grocery stores and choose products, often having absolutely no idea which company they are supporting or where the produce they're buying is coming from. Rather than the community-based support model of a CSA, large-scale organic farms rely on price and quality to guide customers to choose their products. Therefore, despite both kinds of farms supplying organic products to the market, small scale CSA farms and large-scale organic farms occupy different parts of the market.

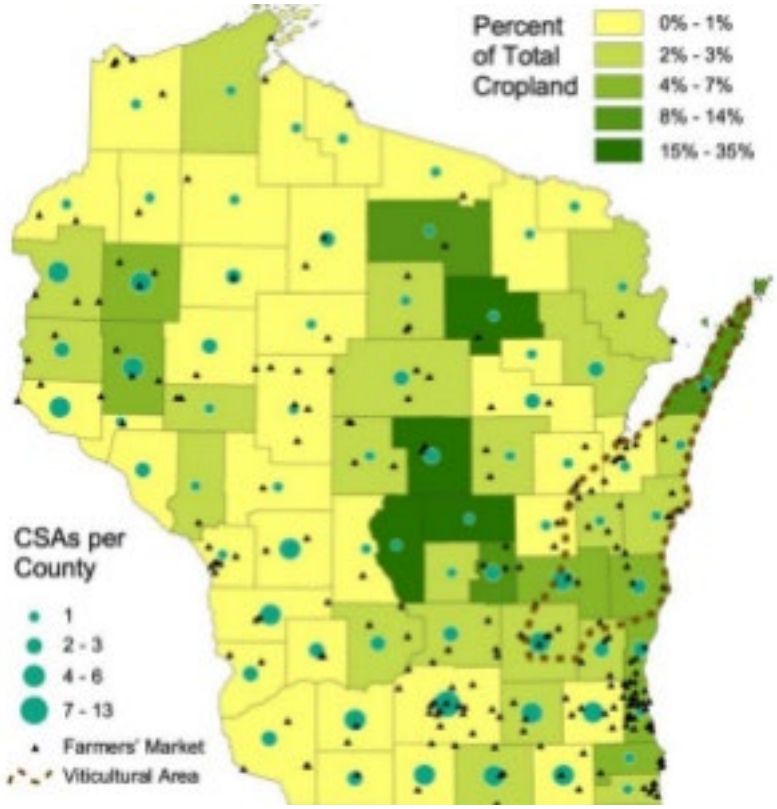

Figure 1: *Citation for image: University of Wisconsin Stevens Point, Center for Land Use Education* [*https://www3.uwsp.edu/cnr-ap/clue/documents/megatrends/Wisconsin_Land_Use_Megatrends_Agriculture.pdf*](https://www3.uwsp.edu/cnr-ap/clue/documents/megatrends/Wisconsin_Land_Use_Megatrends_Agriculture.pdf)

In addition to the two types of farms not being in direct competition with one another, my discussion with farmer Dan helped explain another reason why the large-scale industrial organic farms are not crowding out small CSA farms. This is due to location. As he explained, industrial scale organic farms and CSA farms are typically located in different parts of a state. CSA farms tend to be located around cities, or places with dense populations. This is in part because the transport of the products is done on a small scale, and CSA boxes are not able to be transported as long of distances. In Figure 1 above, we can see that the state of Wisconsin demonstrates what Farmer Dan said (University of Wisconsin Stevens Point, 2010). The counties with the largest number of CSA farms are found in the southern part of the state, near

the cities of Madison and Milwaukee. Additionally, in the northwestern part of the state, near the Twin Cities metro area, we can also see an abundance of CSA farms. He cited this as the primary reason large-scale organic farms are not encroaching on CSA farms. The two distinct types of farms are interested in different types of land. Large-scale organic farming businesses are interested in large amounts of productive land, while CSA farms are focused on location so they can be relatively close to their consumer base.

Conclusion:

Ultimately, big organic farms are not encroaching on small, organic CSA farms because they occupy different parts of the market and are, therefore, not in direct competition with one another. While they produce similar organic products, when buying a subscription to a CSA farm box, the customer is paying for a membership to a community in addition to the organic products they receive. This socio-cultural dimension to CSA farms differentiates them from big, organic farms and is reflected in consumers' willingness to pay upfront for their subscription and to buy unknown products (given they have little to no choice of what is in their CSA box). In addition to the two types of organic farms occupying different parts of the market, they are also often located in different parts of a state, meaning they are not necessarily in competition for the same type of land.

The existing literature on this topic is sparse, especially given the relatively recent development of large-scale, industrial, organic farms. More research on these topics would be useful, particularly looking at the environmental impacts of large-scale organic farming and contrasting it with small-scale organic farms. Ultimately, the findings in this paper point to the fact that both large and small farms occupy different parts of the market and are therefore both important. From an economic perspective, large-scale organic farms are necessary to meet

growing demand. From a sociocultural and environmental perspective, small, CSA farms hold value in the community they help create and in the farming techniques they employ that are less environmentally destructive.

When thinking about the future, with the amount of arable land expected to decrease significantly in the face of climate change, agricultural land will become more precious and competitive (FAO, n.d). Therefore, it's not unlikely that the issue of large farms overtaking smaller, CSA farms could become an issue down the line. Given the value CSA farms have for both the communities they support and the environment, public policy should ensure they are able to stay viable businesses and maintain the land they possess.

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Chapter 2

Access: people's ability to access nutritious food

By Sarah Beth Hobby and Oliver Matus-Bond

2.1 Implementation of Food Access Programs within Minnesota and Future Areas for Growth

Sarah Beth Hobby

Introduction:

Within the state of Minnesota, access to healthy food is a key issue for communities throughout the state. Particularly, low income communities of color are hit hardest by specific realities within the state related to food access, especially Indigenous reservation communities and rural communities farther from the Twin Cities metro area. One of the largest contributing factors to food access disparities experienced by these groups in Minnesota, is the relatively limited number of grocery stores and supermarkets per capita relative to other states.[1] Additionally, food access disparities not only extend to where supermarkets are located and how many there are, but also the kinds of food they are likely to supply. In rural areas where more low income populations are concentrated, reports found that there was little to no financial incentive for supermarkets to carry "healthy" foods given the realities of affordability of such produce for the communities they serve. While there is momentum to shift financial accessibility for underserved communities, many of these programs have gaps in how applicable they are or their capacity to actually be utilized given the constraints of what is not only accessible financially, but what is culturally appropriate or regionally accessible for the communities they serve.

The issue of food accessibility is especially important because disparities in food access lead to dramatically different health and wellness outcomes for underserved communities. Low income families in rural areas, particularly, are highly impacted by the foods available to them in their local grocery stores because they are more likely to be

constrained by local availability. Minimum wage workers who are often working 60-80 hours a week, for example, have both less time to invest in driving far away in order to access healthy food and also less money to spend on healthy food in the first place. Both physical and financial access are key to making local and healthy eating more reasonable for all people and not just those who can afford to make it a priority. Some programs like SNAP (Supplemental Nutrition Assistance Program) aim to help curb issues with financial access, however, access to healthy food is still constrained by what is available in different markets around the state. Additionally, while some farmers markets and other food locations with healthy options are making attempts to increase access to local produce, infrastructural challenges like lack of public transit options continue to hamper access.

Within this paper particularly, I will be evaluating how government and state subsidies/funding programs impact consumer access to fresh, local produce. I will focus this question, specifically, on the ways government programs like SNAP are implemented within the state of Minnesota, how those programs help people access food, and what holes current programs have yet to address. Through this evaluation, I hope to both explore current policy frames for evaluating food access and recommend potential solutions that could be broadly implemented in order to address current gaps. I will do this by first discussing my research methodology, and then discussing my general findings as well as their implications. Structurally, issues surrounding access and their solutions will be discussed from broad to narrow in order to best capture both the larger themes important to access broadly but also specific challenges faced by particular communities within the state. I will then conclude with a discussion of what different programs or important policy solutions have been suggested within current literature and the possible impacts those suggestions may have for food

accessibility.

Research methods:

My research methods mostly included initially looking for large papers or studies on food access that would have large amounts of sources that I could also look into. I did run into issues where many of the articles I wanted to read were behind a paywall, however, I was able to access many papers about broader themes and issues relating to food access across the State of Minnesota. After reading a variety of case studies and documents, I noted similarities and recurring issues that came up in order to further direct the documents I looked into. Through following that process, I was better able to look at issues that were important to the communities more impacted by lack of access rather than going off of my initial assumptions.

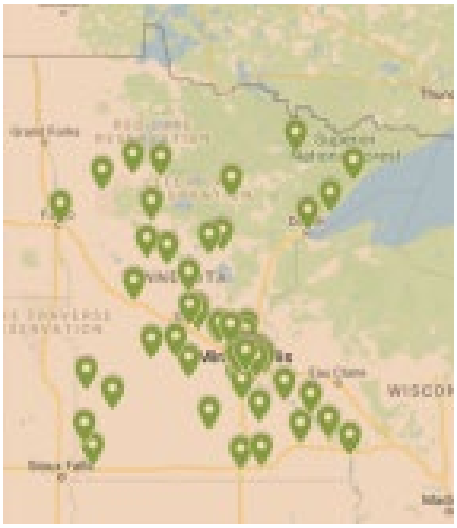
Findings, analysis, and discussion:

> *"There's a strong tendency across my region to conflate health foods to local foods. People think about gardens, foraging mushrooms, farmers in the region, wild rice. Which is part of the food culture, but the whole locavore movement isn't going to help someone struggling with permanent housing and employment and trying to feed 3 kids." – Key Informant Interview with Noelle Harden, Health & Nutrition Educator in Greater Minnesota*[2]

Within Minnesota, many current initiatives have great intentions but are not being implemented effectively. While many farmers markets are taking measures to make fresh produce more accessible, lowering cost barriers is not singularly enough to address food insecurity and food access inequities. One initiative that both points to the ways that accessibility is being addressed positively but not holistically is the move towards accepting SNAP benefits at farmers markets around the state of Minnesota.

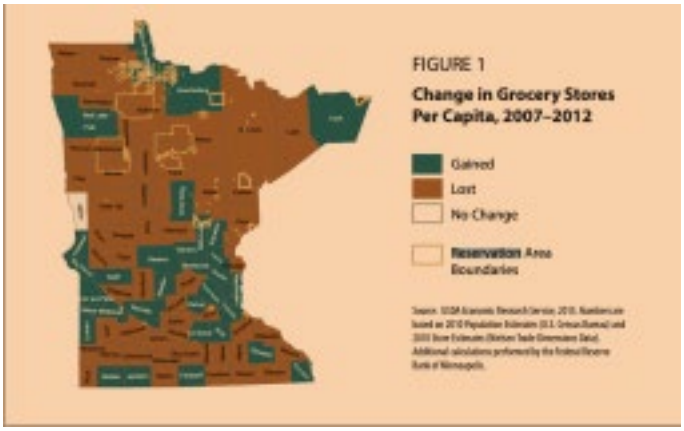
Hunger Solutions Minnesota outlines and directs individuals towards farmers market locations that allow people to use their SNAP benefits in exchange for fresh produce, for example.[3] Given that cost barriers are one of the largest inhibitors of families purchasing healthy food in Minnesota[4], enabling more access to those foods through diversification of payment methods is directly helping to create more financial access to healthy produce. The map below from Hunger Solutions Minnesota, though, also shows that there are many areas of the state where the option to pay with SNAP benefits is not applicable. One of the other major barriers to accessing local and healthy food for communities who may be utilizing programs like SNAP is distance from supermarkets.[5] Although making healthy food more affordable is an amazing first step, if the communities who need to access those benefits cannot physically get to locations that offer them, then accessing that food remains out of reach.

Another key issue relative to food access where programs like SNAP do not go far enough is the kinds of food that people are accessing. Specifically, there is a gap in implementation of benefits themselves and also available services that further encourages people to choose unhealthy foods over healthy ones even when the option is available. The quote by Noelle Harden above points to the reality that healthy foods are often not the easy decision for low income parents to make. Socially, government subsidization of corn and corn products has led to an overabundance and easy accessibility of cheap, unhealthy, high calorie foods.[6] Even if a parent can



purchase healthy food at a farmers market with their SNAP benefits, the amount of calories they're able to potentially afford with the same amount of money compared to the amount of calories they may get at a conventional supermarket, sometimes make choosing healthy foods an impossible decision. Potential future policy solutions to this issue include a restructuring of government agricultural subsidization programs in order to ensure that healthy foods are easier both to access but also to choose.

Additionally, a large portion of Minnesota's population exists within food deserts. Specifically the Federal Reserve Bank of Minneapolis's study found that, "about 16 percent of Minnesota's census tracts qualify as federally designated food deserts—areas with a high proportion of residents who live far from a full-service grocery store and a high proportion of residents who are low- to moderate-income" and that, "Counties in rural Minnesota have a disproportionate number of food deserts relative to their total population and geographic area."[7] Additionally, the report notes the reality that many of the people living within Minnesotan food deserts live within reservation boundaries.



The realities of both food deserts and the communities who largely are residing within them for Minnesota particularly raise two additional issues surrounding access. Lack of affordable and accessible public transit makes it extremely difficult for people to potentially reach places that, as aforementioned, would actually make healthy foods accessible.[910]Additionally, many of these healthy options may not actually be foods that are

culturally relevant for populations accessing them.[11] Future policy solutions could help fill existing access gaps through supplementation of SNAP benefits with specific targeting of foods that are selected in consultation with local populations. This process could potentially help ensure that culturally important foods are also being made financially accessible through SNAP and other such programs. Additionally, funding more accessible and affordable systems of public transit would help make the solutions already being implemented —such as the Market bucks system discussed above— much more impactful through increasing their reach.[12] Opening additional supermarkets in current food deserts would be an additional step to curb issues relating to access based on physical distance.

Conclusions:

Broadly, there is much positive work being done in order to ensure that healthy food is made more affordable. However, there is still much work that can and should be done in order to make sure that access is not limited to those who are able to travel to reach places like the farmers markets that accept SNAP benefits. Rather, we need to take a more holistic approach to future policy solutions that address access inequality and address the various ways that different kinds of inequity interact and impact various stakeholder groups. The particular inequities that make accessing healthy food difficult that should be primarily considered within this context are: distance from supermarkets, affordability of healthy foods, accessibility of culturally relevant healthy foods, and caloric inequity's impacts on decision-making when shopping for foods. The most important stakeholders to consider are: individuals who currently are unable to access healthy foods, government bodies and organizations who fund access programs, broader society at large. The reality is that making changes that help people who are currently being underserved, winds up helping all communities have better outcomes in the long run. Federal,

state, and local governments have an obligation to address food access inequities and partner with local people and organizations in order to meet the needs of individuals currently undersupported in a way that is both productive and solution-oriented.

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2.2 Ramsey County: Access to Organic Food Markets

Oliver Matus-Bond

Introduction:

Many areas throughout the United States face high-levels of food insecurity. The United States Department of Agriculture defines food insecurity as "a household-level economic and social condition of limited or uncertain access to adequate food" (Definition, 2022). Adequate food being food that fulfills nutritional and cultural needs (Dillon, 2023). Lack of access to supermarkets, grocery stores, etc. largely drive food insecurity. Many urban areas are faced with these challenges. These problems stem from redlining which hurt local food systems within communities and the defunding of urban areas that came from "demographics shift in the 1970s and 1980s" (Li et al, 2018). Race and socioeconomic status plays a role in who has access to food, with BIPOC and poorer communities more likely facing food insecurity (Li et al, 2018). Disparities in food access affects "distribution of healthy and unhealthy components of the food" (Li et al, 2018). Buying organic continues to grow within the popular culture, but location becomes a major factor in options to eat healthy. The question arises, how is access to organic food affected by people's location and income?

Ramsey County, which holds jurisdiction over most of Saint Paul, functions as a pertinent case study for this issue. It's an area that still feels the effects of redlining and has significant income inequality. Ramsey County's food insecurity rates fall above Minnesota state average, which is a common trend in urban areas (Dillon, 2023). By understanding Saint Paul's food system, it becomes possible to identify what roles income inequality and location play in accessing organic food markets.

Methods:

This research paper is a compilation of information gathered from surveys done by Ramsey County and Minnesota Employment and Economic development, along with national and local reports on food insecurity, and, lastly, field research. Using government information provides reliable census and surveyed data from a focused local standpoint. Details regarding economic status and insecurity can be easily identified through those numbers. National and local reports on organic food access and food insecurity provide multiple perspectives of the human level of this issue, while the field research allows there to be even more local context as I identify trends in supermarkets down the street.

Analysis:

Affordability is a major factor in decisions around food. When considering the economic accessibility of organic food, there are two things being considered: families budgets and supermarket pricing. Understanding the relationship between these two factors will create a better vision of how economics affects the organic food system.

Before diving into food budgets for families, it's important to establish what a family in Ramsey County looks like. Through the “Cost of Living in Minnesota” survey done by Minnesota Employment and Economic Development in 2022, the average household in the state is around three people (Cost, 2023). Within this cost of living assessment, they configure that the average household has a full-time worker, a part time worker, and a child (Cost, 2023). The role of this information gives a better vision of who is part of this food system. It is important to note that averages of household cost of living are unable to tell a full story. What it does is give a broad scope of what people can afford and what that looks like. The survey reveals that for a household of three in Ramsey County, the average food bill would be $949 a month (Cost, 2023). This rate is the highest in Minnesota, making Ramsey County the most expensive place

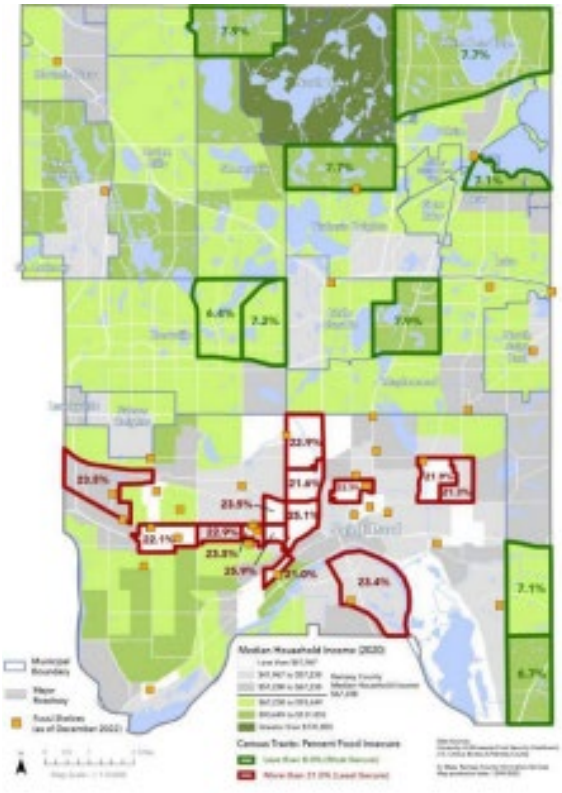
to buy food in the state. High food bills significantly impact those who are low income as a larger percentage of their earnings goes to food. Majority of low-income residents receive SNAP benefits; SNAP is a government run Supplemental Nutrition Assistance Program that supports people within a certain income range in buying food (Eligibility, 2023). To qualify for a household of three, they need to earn less than $4,144 a month (Dillon, 2023, p.1). Around 16% of Ramsey county residents are on SNAP, with “11% of the county’s adults and 17% of the county’s children”, which is higher compared to “9% and 13% statewide” (Dillon, 2023, p.1). This assessment leads to Ramsey County reporting higher food insecurity rates than average in Minnesota. These numbers are not colorblind either; 50% of total Black residents, 33% of total Asian residents, 20% of total Native American residents in Ramsey County are on SNAP (Dillon, 2023, p.1). This compares to 5% of total White residents in the county (Dillon, 1, 2023). Race plays a significant role in food access with systematically racist systems creating uneven food systems.

So why point out food insecurity when looking at access to organic markets? It’s all in the numbers; SNAP gives a three-person household a budget of $766, while Ramsey County identifies $949 as the average cost for groceries, displaying an obvious gap (Cost, 2023)(Dillon, 2023). While it's important to note that the money given by SNAP may not be the complete grocery budget, it contains a significant majority of it. This gap means people have less money than they need to fulfill their food needs. Food insecurity trends support this belief with “food shelf usage rates were nearly 50% ”(Dillon, 2023). So with it being obvious that low-income households are having issues affording food, it's fair to assume that the same issue affects other households.

Having established that many people in Ramsey County wrestle with high food bills

and many residents face food insecurity, we can now look at the cost of organic markets. Whole Foods and Mississippi Market Co-Op are the common organic grocery supermarkets in the area. Their prices are significantly higher than other supermarkets. Consumers Checkbook, a nonprofit consumer organization, completed a survey in the Saint Paul area examining pricing at different supermarkets (Brasler, 2022). They found that Whole Foods prices were "31 percent higher than Walmart, 18 percent higher than Fresh Thyme and Target" (Brasler, 2022, p.1). These other supermarkets sell some organic products but tend to have less options. These organic products also tend to have a higher price. For a better visual of the difference in cost between eating from organic supermarkets versus other super supermarkets, I decided to compare the cost of a single meal. Through looking at the prices at both stores, I found how much it would cost to make homemade hotdish from each store.

Whole Foods (Organic)	**Target (Non-Organic**
Olive Oil 2 oz: $2.18	**Olive Oil 2 oz: $.65**
1 Yellow Onion: $.65	**1 Yellow Onion: $.49**
1 lb Ground Beef 80 Lean: $6.99	**1 lb Ground Beef 80 Lean: $6.5**
Frozen Green Beans 8 oz: $2	**Frozen Green Beans 8 oz: $1.49**
Frozen Corn Kernel 8 oz: $1.65	**Frozen Corn Kernel 8 oz: $.81**
Mushroom Soup 20 oz: $7.2	**Mushroom Soup 20 oz: $3.4**
Frozen Tater Tots 1lb: $4.79	**Frozen Tater Tots 1lb: $5.79**
Total Price: $25.46	**Total Price: $19.13**



The hotdish recipe creates 8 servings of food explaining the price point. The main purpose of choosing hotdish is that it is a Minnesotan recipe containing a variety of products. The recipe has oil, produce, meat, frozen vegetables, and canned food, which allows us to compare the prices of products from many different sectors of the supermarkets. Having established that a number of households in Ramsey County face food insecurity and navigate a limited grocery budget, the added cost of buying organic becomes hard to achieve. Large percentages of residents become left with no choice but to buy standard products.

Location plays an important role in determining access to organic food markets. In a study published in 2018, National Health Institute found that low-income and predominantly communities of color had lower access to healthy and organic food (Li et al, 2018). Ramsey County is no exception. In "Food Security Needs Assessment 2022," created by the Food Security Coordinator for the county, Carrissa Dillon, found that the "highest concentrations of food insecurity in Ramsey County include portions of University-Midway, Frogtown, and Capitol Heights"(Dillon et al, 2022, p.1)(Figure 1). These areas have less access to supermarkets and even less access to organic supermarkets. Whole Foods, Mississippi Market Co-Op, etc. are located in areas that have higher income residents in areas North of

Saint Paul, Macalester-Groveland, and Highland Park. There are the options Hmong grocery stores that provide fresh organic produce and other products, but they don't provide as much variety as the larger groceries.

Transportation is a major element of accessibility to these organic supermarkets. In the Ramsey County food security survey, they found that "half of these respondents said that transportation was an issue for them in accessing food"(Dillon et al, 2022, p.1). If there's difficulty for residents to get to supermarkets or food shelves, there would be the same issue of getting too hard to reach organic markets. In Ramsey County's Community Health Improvement Plan in 2020, they found that areas such as the North End and Frogtown have "low access to vehicles … very few public transit routes" (Community, 2018, p. 1). Inability to even get to the supermarket takes the options of "choosing" organic out of the residents hand. For many residents to eat from an organic supermarket they would have to commit tons of time that they don't have. One resident stated that "sometimes I don't have transportation to stores with good products"(Community, 2018, p. 1). With organic supermarkets being in selective areas and transportation not being completely accessible, many residents are left without the ability to reach organic supermarkets.

Conclusion:

Affordability and location restricts Ramsey County residents' access to organic food markets. Prices of organic food seem out of reach for a large portion of the population and trend more expensive in comparison to non-organic products. Many residents who are already facing food insecurity have no organic option. The location of organic supermarkets are out of the way for many residents, and without easily accessible transit, there is no easy way to get there. This leads to a number of people in Ramsey County with little to no access to organic supermarkets.

Organizations have identified this structural issue and have worked over many years to advance access in Ramsey County. Hmong American Farmers Association, a group founded in 2011, allows Hmong farmers to come together to support each other through this unfair food system (Fernandez et al, 2011). HAFA has a goal of providing healthy produce to the Hmong community and other marginalized groups (Fernandez et al, 2011). By doing this, they improve healthy eating and decrease food insecurity. Hmong farmers tend to sell to farmers markets, but HAFA's goal is to get their produce into more institutions like grocery stores (Fernandez et al, 2011). This will allow access to organic produce to many more residents in the area. Organizations like these are the steps forward to push back against this dysfunctional food system. It's incredibly important that the community has the power in controlling food access; organizations like HAFA give that power to those individuals.

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Chapter 3: Utilization

By Makol Chuol and Alex Petelin

3.1 Cooking Knowledge as a Key Ingredient for Healthy, Nutritious Meals

Makol Chuol

Introduction:

Food security is a concept that includes various parts with utilization being a significant part of its six dimensions of food security. The utilization extends beyond just mere access to food, it includes other essential factors such as access to clean water, sanitation services, kitchen facilities, and cooking skills. Within the topic of food security, understanding how individuals, particularly college students, navigate their daily meals and ro find the answer to my question; to what extent do the college students who do not have meal plans have access to adequate kitchen facilities, and their proficiency in preparing nutritious meals. I am going to look into the complexities of this topic, with a specific focus on older college students who do not have the convenience of college meal plans and are responsible for preparing their own meals. It is important to acknowledge the different challenges that older college students may encounter in their College life as they also have to sustain themselves on and off campus. Many of these students who are not on meal plans or have only partial meal plans, which facilitates and gives them reasons why they are involved in active meal preparation. The significance of this essay extends beyond personal health and well being. It reaches into the wider context of food security, where access to nutrients and balanced meals is an important one. I also think that food security is not solely about having access to food items; it is also about the ability to transform those ingredients into balanced, nutritious meals. The ability to cook is a significant skill that directly impacts the overall health of individuals, especially college students. In the absence of cooking skills, students may be compelled to turn to unhealthy food choices, affecting their health and overall quality of life. Especially college students. This means you have a meal but

since you lack skill to prepare it, you failed to utilize the meal that was supposed to be of great importance to your body requirements. For older college students, the challenges of balancing academics, work, and daily life can worsen the importance of acquiring cooking skills and to utilize the kitchen facilities. I aim to see whether these students face unique challenges when making healthy meal choices and whether they possess specific cooking skills compared to their peers who benefit from meal plans. By examining these differences, we can understand the broad idea of ideal food utilization.

Roadmap of the Study:

This essay is structured to provide a better understanding of the relationship between older college students, kitchen facilities, cooking skills, and utilization. To achieve this, I will follow a systematic approach in that I will give a broad idea to the concept of utilization as one of the core dimensions of food security. I will also discuss its relevance at the local level, emphasizing the important role of cooking skills, knowledge, and the presence of functional kitchens. This section will be followed by analysis and findings

In the findings I will provide insights into the unique circumstances that necessitate their involvement in meal preparation,their responsibilities as students, time constraints, and financial limitations. Access to Kitchen Facilities and Cooking Skill,I will explore the extent to which older college students have access to well-equipped kitchen facilities and the adequacy of their cooking skills.

This will include insights from interviews with students like Anika Brennan, Abdalla, and Christine Oduor, as well as my personal observations and experiences. Budget Constraints and Meal Planning Strategies: We will investigate the financial constraints that impact the availability of these students to cook nutritious meals. I will also look into their meal planning

strategies, seeking to understand how they manage their budgets while striving for healthier meal choices.

Time Management Techniques, given the time constraints that older college students often face, we will explore the time management techniques they employ in their meal preparation. This will shed light on their ability to balance various aspects of their lives while ensuring that their meals are both affordable and nutritious.

Methods:

In this study, I used interviews, and personal experience to gather information. I interviewed four students, mostly in their Junior and senior years, to understand their perspectives. I also visited a CSA farm in Wisconsin and spoke with Dan, a vegetable farmer. He explained how CSA boxes make their way to the Twin Cities and how some of the produce is donated to those in need. This helped me grasp how food ends up in grocery stores and our kitchens.Some of the questions among others that I asked most and especially those students that I interviewed. Do these students have access to well equipped kitchens, and do they possess the necessary cooking skills to prepare affordable and healthy meals? My main goal was to explore how college student students , especially the older students who are not on a meal plan, prepare various vegetables in a unique way, whether the students have cooking and kitchen skills to prepare a nutritious meal . By using this combination of interviews, personal experiences, I aimed to gain a comprehensive understanding of the subject in a local context.

Findings and analysis:

1: Kitchen Facilities and Cooking Skills

From the interviews and also inquiry from six other students about the idea of a kitchen. Out of all 9 students that I interacted with, they indicate they have access to fully equipped

kitchens, including ovens, refrigerators, stoves, dishwashers, and microwaves. Anika Brenann, a senior majoring in Sociology, rates her cooking ability at 8 out of 10, attributing her competence to skills acquired from her parents. Similarly, Abdalla, an international junior student majoring in International Studies and Geography, and Christine Oduor, a double major in Economics and Mathematics, possess well equipped kitchens in their shared accommodations. These findings suggest that housing conditions for these students are generally conducive to cooking.

2: Time Management and Meal Prep

One common challenge among these students is effective time management. The academic commitments and often part-time jobs leave limited time for cooking. For them to address this problem, meal preparation (meal prep) emerges as a popular strategy. Abdullah, for instance, said that he prepares meals for the entire week on Sundays when academic and work pressures are moderately low. Anika Brenann, on the other hand, opts for recipes that require minimal preparation and can be easily cooked during busy weekdays. This time-efficient approach allows these students to balance their schedules effectively.This meal prep might sound ro anybody as a good idea of saving time, but overall health might not be good, because to be healthy you need at least some fresh meal.

3: Budget Constraints and Meal Planning

Budget constraints are another significant factor influencing the cooking habits of older college students. The limited financial resources available to them often lead to prioritizing affordable grocery options. Anika Brenann, for instance, aims to spend around $300 per month on groceries, emphasizing cost-effectiveness. She shops in the sale section of the grocery store and utilizes The New York Times cooking app to find recipes with overlapping ingredients, minimizing waste and maximizing resource utilization. This approach aligns with the students'

need to manage their finances while ensuring nutritious meals. Christine Oduor on the other hand shops for groceries at budget-friendly places, with an emphasis on both quantity and quality when possible. This means sometimes buying quality food is overlooked as they dont have much money to purchase them. She prefers to purchase affordable but good quality ones. To balance cooking with her busy schedule, she does meal prepping on weekends, buying a variety of ingredients to make different dishes throughout the week. Christine's part-time job also influences her cooking choices and time management. Abdi, for instance, buys groceries from Ali and Sam's Club and sometimes shops online. They don't worry too much about the quality as they dont have much money to purchase.

4: Cultural Diversity and Cooking Skills

Cultural diversity plays a role in shaping the cooking preferences and skills of some students. Abdullah, with a multicultural background, brings a unique perspective to cooking, incorporating influences from various cultures. Encouraging cultural diversity in dining options on campus can enhance the overall dining experience for such students.

5: Personal observation

From my personal experience, I was born and raised in a society where men don't cook. This wasn't just a case, it was normal until it is in your head that you can't be close to the kitchen because you are male, always your friends would laugh at you and make you feel embarrassed. Women also knew their duties and responsibilities and never complained about it. In such a society , one gender benefits from cooking something that would cost one should end up in a totally different cultural experience. If it was not in middle school where I live with my host family , I would have struggled so much to cook. Although now I have learned to cook some food, I don't know whether a major would affect me entirely when I move off campus. It

is essential to recognize the multifaceted nature of this issue and explore ways to support healthier. One significant aspect that came up and needs attention is the extent to which college students have access to facilities and possess the necessary cooking skills to prepare nutritious meals. This part is often overlooked but critical, plays a significant role in shaping their meal choices and overall health.

When college students are faced with limited access to cooking facilities and possess only basic cooking skills, they are more likely to turn towards cheaper, processed, and less nutritious food meals. The quickest and easiest meals become a tempting solution to the time constraints and budgetary pressures that define their lives. This reality paints a clear picture of how food insecurity can manifest on campus. The inability to prepare wholesome meals due to lack of access or skills pushes students towards a path of unhealthy eating habits, potentially leading to associated health issues. Therefore, understanding the connection between food security, cooking abilities, and dietary choices is crucial in developing ways to solve these problems among the college student

The findings show the importance of addressing the multifaceted issue of food security at the local level. Cooking skills and access to functional kitchens are instrumental for food security, as individuals may have access to a variety of food items but lack the essential skills to transform them into nutritious meals. This issue is especially critical for college students, as a lack of cooking skills, rigorous school work that bring time constraints can lead to unhealthy diet choices that bring about their overall health. The inability to prepare wholesome meals due to limited access or skills can inadvertently lead to food insecurity, as students may resort to cheaper, processed, and less nutritious options. It is essential to recognize the connection between food security, cooking abilities, and dietary choices to develop effective solutions for

college students.

Conclusion:

In conclusion, this research indicates the significant role of utilization as one of the six dimensions of food security, with a specific focus on older college students responsible for their own meals. The study has revealed that, generally, these students have access to well-equipped kitchens, yet they face challenges related to time management and budget constraints. Additionally, cultural diversity influences their cooking choices, knowledge and skills.

Recommendations:

Based on these findings, some of the policies and recommendations that I can make to support older college students in achieving utilization of the resources available are as follows.

1. Cooking Workshops: Colleges and universities should offer cooking workshops and classes that teach students essential cooking skills, meal planning, and budget-friendly cooking strategies.
2. Meal Planning Resources: Provide students with meal planning resources, including online tools and apps, to help them create nutritious meal plans.
3. Promote Cultural Diversity: Encourage diversity in dining options on campus to cater to students with multicultural backgrounds, to include their experience.
4. Flexible work options: Advocate for flexible work options for students to help them better balance their academic and work commitments, allowing more time for meal preparation so that they wouldn't use meals which can be unhealthy sometime. By implementing these recommendations, colleges and universities can support older college students in preparing affordable and healthy meals while effectively managing their academic and work commitments.

3.2 Butternut Squash Reveals Insights and Barriers to Utilization Among College Students

Alex Petelin

Common Harvest Farm, Osceola WI, September 2023

Introduction:

Amidst a world threatened by hunger and food insecurity, it is important to keep in mind that there are a variety of components at play. Food production is too heavily focused upon by the international collective; the amount of food that exists in the world is not the only issue to consider. The current definition of food security, as defined by the High Level Panel of Experts on Food Security and Nutrition (HLPE) is established through six core dimensions: food availability, economic and physical access to food, food utilization, food stability, agency, and food sustainability. This report will focus specifically on utilization. Utilization as a dimension of food security is important because it brings to light the barriers that contribute to food waste

and limit the agency of the individual. In their working paper, the HLPE states several important goals within food security, including: to "ensure sustainable consumption and production patterns, to ensure healthy lives and promote well-being for all at all ages, and to end hunger, achieve food security and improved nutrition and promote sustainable agriculture" (Von Braun et al., 2015, p.1). There are a variety of fruits and vegetables at the disposal of the consumer that deserve more recognition: leeks, bok choy, cabbage, squash, etc., but there are barriers that prevent people from taking advantage of them. Improvement of utilization skills would help populations eat more locally and sustainably, which will in turn promote health and well-being. In September 2023, I went on a field trip with my People, Agriculture & the Environment class at Macalester college to the Common Harvest farm in Osceola, Wisconsin. Butternut squash was, by far, the most abundant harvest the farmers had collected. It is a very productive crop that requires little maintenance and is quick to harvest. Farmer Dan argued that it is a cherished, widely popular food for CSA members, and more largely upper midwesterners during the fall months. In contrast, Farmer Margaret brought up that it is not as popular as a choice at inner city food shelves, where the clientele does not always have the facilities and experience to prepare it. At the end of our day at Common Harvest, both Dan and Margaret urged all the students to take a squash home with them. "And do us a favor, take one of the larger ones!" they exclaimed (Dan Guenthner & Margaret Pennings, personal communication, 2023). We got the impression that they had more squash than they knew what to do with, and many of us enthusiastically obliged, while others left empty handed. This interaction posed the opportunity to ask some questions pertaining to the utilization of butternut squash: What are the barriers that stand between the college student and the butternut squash? How do utilization factors such as a meal plan, access to cooking facilities, background knowledge, and levels of busyness influence

the relationship between the college student and the butternut squash?

Research Methods:

To gauge the answers to these questions, I created a virtual survey for my classmates to take, and sent it out to the class email list. It was anonymous, so that people could feel free to be more open and honest. This was about three weeks after the field trip, which was an effective measure of utilization, seeing how a handful of students had not yet prepared their squash. There were a couple absences from the field trip, so the pool of students that went on the trip was about twenty. I received eight responses from my classmates. Fortunately, most of these eight were generous with the amount of detail and information about their experiences that they provided. Questions included 'We were all offered a butternut squash, if you took one home, how did you prepare it (the more detail, the better!),' 'If you didn't take a squash, why not?' as well as 'Did you take home any other produce from the Common Harvest farm field trip? How did you prepare it?' I also asked specifically about the barriers that came up. I included a poll to see if the participants were on a full meal plan, a commuter plan, or prepared their own food. Additionally, I inquired about student's schedules, how much time they spend a week preparing food, and how much free time they have at their disposal to do so.

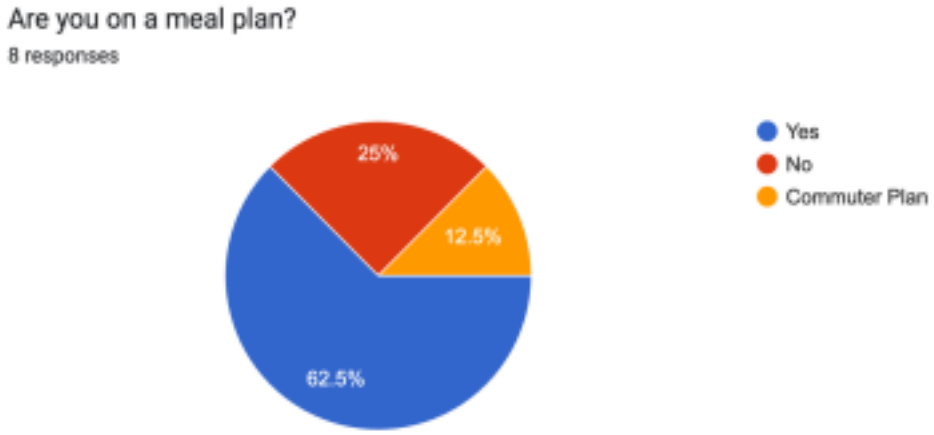
In addition to the survey, I spent the few weeks after the field trip with butternut squash and utilization on my mind. I prepared my own squash from the farm, and bought two more from the supermarket so that I could get the first hand experience several times. I asked numerous people in my life some of the same questions from the survey. These questions included: 'Do you ever prepare butternut squash, and if so, what is your method,' 'How much time do you spend preparing food each week' and 'What barriers do you encounter within food preparation'. This was a helpful way to solidify my understanding and get a wider scope of the barriers people

experience in terms of utilization and butternut squash.

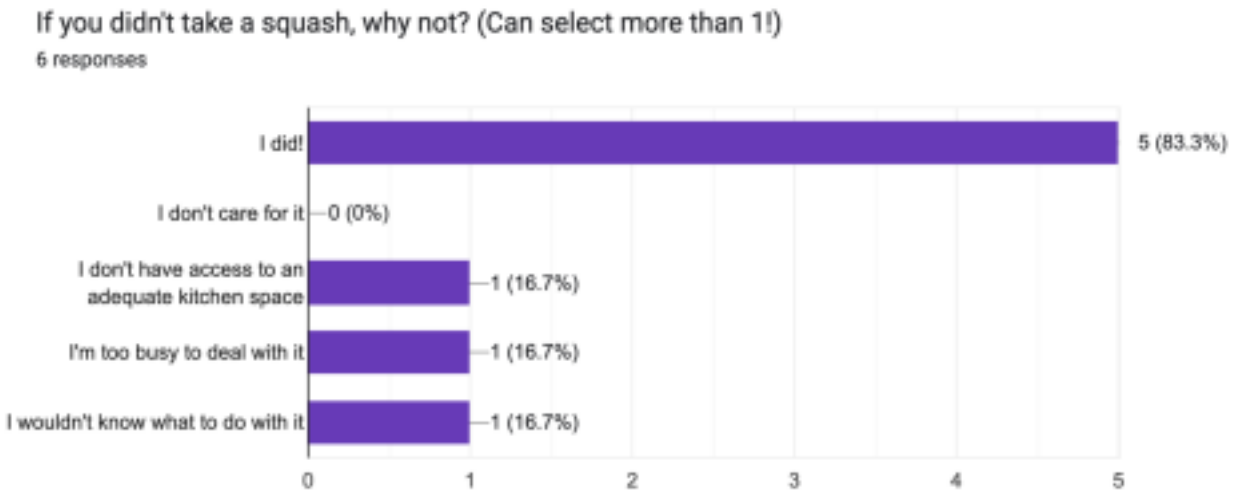
Findings:

The survey accomplished what I wanted it to, the answers I received gave me lots of insight into utilization and the college student experience. I was lucky to receive a wide range of perspectives. The survey revealed that the most common barriers to the utilization of the squash were access to cookware and cooking facilities, a lack of prior experience with the fruit, a busy schedule, and an extent of dependence on the meal plan among underclassmen. Seventy-five percent of survey participants took a squash home from the farm. These students reported a range of experiences, from "IT WAS SO HARD TO COOK THE SQUASH. I learned that very few people like butternut squash, so my original plan to gift it failed. I was lucky to have air fryer access, but I had to cut it with a very small knife on a very small cutting board which was not the safest system ever. If I had had more resources I would have loved to add more spices and make it into a soup, but my options were limited" to "It is not something that I know well, but I was kind of treating it like baking potato chunks or another vegetable. It is so easy to look up a recipe online though so I didn't feel like I needed to have any previous knowledge". Every participant who prepared their squash reported that they did not know exactly what to do, and used the internet as a guide to some extent. Two students felt the dormitory kitchen was insufficient, so instead they brought it to friend or family households to prepare. Twenty-five percent of students reported that they did take a squash, but have not done anything with it yet (This was on October 12, about three weeks after the visit to the farm). The twenty five percent of participants who did not take a squash rationalized that they do not have access to adequate cooking facilities, they do not know how to prepare it, and that they are too busy to deal with the process of figuring it out.

It was interesting to see how lifestyle and workload impacted utilization. Seventy-five percent of the participants were on a meal plan in some way, shape or form. One student stated in the survey that they gathered oil, salt and seasonings from the dining hall in order to cook the squash. Fifty percent of participants reported spending between zero to thirty minutes a week preparing food. The other half reported that they spend three to six hours a week preparing meals. The greatest amount of time spent per week preparing food for anyone I talked to was nine hours; this individual was in their late twenties and mostly works from home so those were clearly factors at play. Almost everyone I talked to, as well as one hundred percent of survey participants reported having less than three hours a day of free time after all other responsibilities, to potentially spend preparing food.



Macalester students, October 2023



Macalester students, October 2023

Analysis & Discussion:

Aside from the barrier of little free time, there are some psychological barriers present in utilization. It has been psychologically proven through laboratory experimentation with feedback and reward that human beings "have a fundamental need for competence and autonomy" (Ryan & Deci, 2000, p.70). A lack of a clear vision of the end result (the reward) and a plan for how to execute it, reduces the motivation to embark on the task at all. As put by one student: "I originally took one to give to a friend who lives off-campus, but it turned out that they do not like squash! So it sat on my desk for a week (or two) before I ended up chopping it up into small cubes and cooking it with salt, pepper, honey, garlic powder, and olive oil in my friend's air fryer." Evidently, college students do not know what to do with butternut squash, many do not care for it, and for many students in our class, cooking the squash became one more strenuous activity on their to do list. Students lead busy lives, and it is easy to stick to quicker meal options, rather than to prepare a butternut squash.

In my experience with preparing three butternut squashes, I did find the process to be

time consuming. I live in a house with an adequate enough kitchen, but it was labor intensive and time consuming to peel and cube the squash, and then season and bake it (but it was very much worth it!). I did find that a quicker way to prepare the squash is to simply cut it in half, scoop out the seeds, and bake it, but of course that is at the expense of the perfectly seasoned, bite sized pieces. My favorite way to eat butternut squash is as soup, but I do not own a blender, so that was my utilization barrier.

I noticed that zero survey participants mentioned anything about consuming the seeds. Insignificant as this may be, the food waste of these seeds is due to utilization barriers, a lack of time and knowledge. This was interesting, as research into the history of squash consumption revealed that "the nutritious and palatable seeds were probably the main attraction for first gathering, and later domestification" (Lee, 1990, p. 58). Seeds are easily extracted, and were typically put to use throughout human history. It appears that in a modern college setting, seeds do not hold functionality or importance. I did look up how to roast the seeds in the oven and that was a fairly simple endeavor. Lee also brings to light that traditionally the squash was prepared in changes of boiling water. I did not encounter this preparation throughout the survey or through asking around. The way that humans apply utilization has changed over time. Now that we have air fryers, ovens, olive oil, and a variety of spices and seasonings, the appeal of a plain boiled squash has diminished.

Improved utilization of local foods like butternut squash is necessary, for both food security, and sustainability. With the COVID-19 pandemic, the world saw "lockdowns, closed borders, trade restrictions, and the virus itself" (Clapp, 2020). In situations like this, food security depends on the ability of populations to utilize the resources at hand. Besides, even without the trade restrictions of a global pandemic, eating locally is an effective way to reduce

CO_2 emissions, as the food has far less distance to travel. Aside from the climate crisis, rising rates of inequality and persistent hunger around the world necessitate the use of the six-dimensional food security framework (Clapp et al., 2021, p.3). Development and work upon each component, including utilization, will create a world where the average individual has more agency and power in their relationships with food.

Conclusion:

In summary, I was a part of a class field trip where we were each given the opportunity to take with us a butternut squash; this became an excellent case study for how the utilization dimension of the HLPE's Food Security framework is applied at Macalester College. I conducted a survey where I gathered a lot of qualitative information on student experiences in utilization of the butternut squash. The main barriers between the students and the butternut squash included busy schedules, lack of competency, lack of interest / motivation, and lack of access to adequate cookware and cooking facilities. Butternut squash is abundant, easy to grow and local, but the barriers on the consuming end of the situation present some challenges. Given the findings of this research, a policy change I would like to suggest is to promote and invest in education on the

importance of nutrition, eating locally and sustainably, and how to do so with foods abundant to each region of the country. This would better prepare people for sudden trade restrictions, as seen during the COVID-19 pandemic, as well as help in decreasing the CO_2 emissions spent on transporting foods. A country that can effectively utilize the food that it has is better prepared to face the future.

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Chapter 4: Stability

By Alice Gray, Jesse Terry and Laura Williams

4.1 If You Build It: The Necessity of Ingenuity in Local Food Systems

Alice Gray

Introduction:

In the year 2020, the state of Wisconsin reported the highest number of farm closures in the country. (Baker 2021) Western Wisconsin, a region dramatically impacted by low commodity prices, changing environmental conditions, and high production costs, reported 39 closure filings alone. (Newton 2021) In response to these significant statistics, the United States Department of Agriculture, temporarily suspended debt collection, activities related to farm loans, and farm foreclosures in an attempt to alleviate the financial stress plaguing farmers, particularly amidst the COVID-19 pandemic. (USDA 2020) This federal action provided short-term relief for borrowers reliant on the Direct Farm Loan and Farm Storage Facility Loan programs regulated by the Farm Service Agency (FSA), yet it failed to offer a long-term solution for this escalating issue. In addition to farm-based production costs, industrial farmers often rely on supplementary jobs in order to achieve financial stability. The pandemic impacted this source of income, further exacerbating economic vulnerability for farmers. While these threats to livelihood pushed many industrial farmers in the upper-midwest towards bankruptcy, it simultaneously highlighted emerging possibilities for the long-term sustainability of alternative agricultural systems. The local response to pandemic challenges further underscored the value of ingenuity and diversity in terms of means of revenue, the stability of community supported agriculture (CSA's), and the success of middleman organizations in supporting local, alternative farmers.

Methods:

In addition to consultation of existing literature, I engaged with local entities including

Common Harvest Farm in Osceola, Wisconsin, The Good Acre in Falcon Heights, Minnesota, and the Metro Justice Food Network in the Twin Cities to support my research.

Firstly, in early September, I attended the Fall Plenum & Learning Journey facilitated by the Metro Justice Food Network (MJFN) and The Social Gastronomy Network (SGM). This full day of programming was aimed at educating local and international food justice activists, community members, and stakeholders, building connections amongst these like-minded groups, and holding space to think radically about food systems change, in the upper-midwest and beyond. In late September, our People, Agriculture, and the Environment class from Macalester College traveled to Osceola, Wisconsin to visit Common Harvest Farm in the St Croix River Valley. Alongside Professor Bill Moselely and farmers Dan Guenthner and Margaret Pennings, we toured the 40 acre property, learned about varying soil types, production procedures, agricultural technology, recent environmental conditions, and the stories of neighboring farms in the larger area. We had the chance to ask Farmer Dan our individual questions as well, gaining insight which aligned with our personal areas of interest and into each of the six dimensions of the local food system: availability, access, utilization, stability, sustainability, and agency.

The Good Acre, located in Falcon Heights, is the largest food hub in Minnesota. The organization offers support to local farmers, resources for small-businesses, and works to create a more equitable and just food system. Although I had visited The Good Acre once before, the MJFN Fall Plenum allowed me the opportunity to receive an extensive tour of the facilities and talk directly with Executive Director, Theresa McCormick. Through this experience I was able to connect my understanding of local farming practices in tandem with the economic market and social values of the Twin Cities metropolitan area.

Findings:

Agritourism and Diversification of Income Sources:

The trip to Common Harvest Farm provided an introduction to agritourism and the value of ingenuity in terms of income for traditional farmers. The drive into Osceola, Wisconsin on the morning of our visit was cloudy. Farmer Dan's voice echoed on the bus speaker system as he relayed neighborhood stories, news, and hearsay. We passed endless fields of corn and soybeans, many grain silos right off the main road, the occasional pasture of cows, and even a Christmas tree farm. I was anticipating these large, traditional, monoculture farms, but what shocked me was the ingenuity of several residents who had faced severe financial pressures. Around the corner from Common Harvest Farm, we passed an extensive storage facility which held immobile Minneapolis city buses. And next door to Dan and Margaret was a converted-barn event space in the middle of preparing for a wedding. Farmer Dan mentioned that they had turned a profit of about $500,000 over the course of the last year through their wedding venue alone. The origins of these developments aren't fully attributed to farmers' individual ambitions, but rather a reflection of the state of industrial agriculture, corporate monopolization of production methods, and the rapidly changing climate.

Environmental changes have posed significant challenges for farmers for years, yet now more than ever. For the third summer in a row, central and southeastern Minnesota alongside western Wisconsin has been experiencing widespread droughts. As of September 14, 2023 the U.S. The Drought Monitor for Minnesota established that 98.58% of the state qualified for drought status, 61.53% was experiencing a severe drought and 19.21% was in an extreme or exceptional drought. (Huttner 2023) According to Farmer Dan, this atypical weather condition acutely impacted crop yields. For example, most corn plants' growth ended three weeks

prematurely and soybean yields similarly plummeted. Dan shared that soybean yield, which is typically around 60 bushels per acre, is now averaging about 40 bushels per acre. However, he expects the township average to be closer to 20 bushels per acre. Many farmers in the region rely heavily on crop insurance amidst these drought periods and receive a pay-out if their yield is below a certain amount. Yet evidently, this unproductive pattern of low yield and emergency government dependence isn't a stable cycle. Additionally, the majority of this row-crop land is controlled by large dairy. Within this context, farmers often have little autonomy in production practices, which further increases vulnerability to even the slightest variability in climatic conditions.

In response to the proliferation of vulnerability, many farmers of traditional monoculture systems have begun exploring further opportunities of income diversity. A significant example of this is agritourism, which is defined as "a form of commercial enterprise that links agricultural production and/or processing with tourism to attract visitors onto a farm, ranch, or other agricultural business for the purposes of entertaining or educating the visitors while generating income for the farm, ranch, or business owner" in the National Agricultural Library Database. (Vath 2023) Agritourism in the upper-midwest is visible at places like Pinehaven Farms in Wyoming, Minnesota and Afton Apple Orchard in Hastings, Minnesota. Afton Apple Orchard not only sells apples, but they also host an annual all apple festival with activities including hay rides, a corn maze, pick-your-own apple areas, a small pumpkin patch, a touch-a-tractor event, small-scale child entertainment shows, and food sales. In the same way, Pinehaven Farms advertises over thirty attractions featuring JD's grain train, Charley's corn pit, and Farfel the Pumpkin Eating Dragon. We observed this in our field study as the neighboring farm had experienced enormous success in converting their classic red barn into a banquet hall

and wedding venue. The number of U.S. farms participating in agritourism have increased in recent years. (Dhungana, Khanal 2023) In fact, agritourism generates an estimated $949 million in sales per year in the U.S. according to a 2017 USDA Census. The industry is expected to increase by 13.4% by 2027, as reported by Allied Market Research. (Steever 2022) This development has most notably impacted farms within relative proximity to metropolitan areas, meaning Afton Orchard, Pinehaven Farm, and Common Harvest are all located in prime geographic locations for this form of economic revenue. Agritourism has proved to be a critical opportunity in terms of diversification of income for traditional farmers and often guaranteeing financial stability in the face of varying environmental factors.

Community Supported Agriculture and Food Hubs:

Community supported agriculture provides producers of alternative agriculture a sustainable system for revenue access. In contrast to traditional and industrial agriculture, alternative agriculture often serves consumers across a short supply-chain through routine sales at farmers markets, farm stands, local grocery stores, and CSA's. Community supported agriculture (CSA) is defined as "a growing social movement that endeavors to make direct connections between the producers of food and those who consume it". (Abbott-Cone, Myhre 200) Through this economic model, customers purchase shares of a farm's harvest at the beginning of a growing season, which guarantees financial stability for producers. The COVID-19 pandemic created uncertainty for small-scale farmers and business owners, yet according to Minnesota Public Radio news, demands for CSA memberships have consistently stayed high throughout the pandemic. (Yang 2023) In fact, many Minnesota farms have continued to max out their CSA membership capacity. Common Harvest Farm has had a CSA structure for the last 30 years, allowing them to supply up to 40 different herbs and vegetable

varieties to residents of the Twin Cities. Farmer Dan shared that although they used to have 200 members, they intentionally chose to lower their membership in the last few years to 140 buyers, to minimize labor costs and prioritize land rest. Members of CSA's are encouraged to subscribe in order to gain access to fresh, often organic, locally grown produce. Due to the preemptive payments, community connection, and ongoing demand, community supported agriculture offers long-term stability for farmers of alternative agriculture.

The recent emergence and success of middleman organizations such as food hubs has positively impacted the stability of local food systems and the success of small-scale farmers. The US Department of Agriculture defines a food hub as, "a business or organization that actively manages the aggregation, distribution and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand." (USDA 2013) Although food hubs have been officially defined by the USDA since the 1970s, over 60% of food hubs have emerged in the last decade. This statistic can be attributed to a growing consumer demand for access to fresh, healthy, organic, and local food. In addition, many hubs have been created with an overarching mission of food justice. The Good Acre is a well-known food hub in the Twin Cities with a brick and mortar location on Larpenteur Avenue that's been open since 2015. The founders created The Good Acre in an attempt to "bridge the divide between farmers and consumers while fostering economic prosperity for a healthy and sustainable future." The Good Acre has experienced immense success in recent years, guaranteeing greater stability for farmers through various avenues of support.

As the largest food hub in Minnesota, The Good Acre (TGA) offers several programs including the Local Emergency Assistance Farmer Fund (LEAFF), wholesale, grower support,

and a full commercial kitchen. LEAFF offers market access support by buying a set dollar amount of produce from all the farms which participated in the program. After the produce is purchased, it's donated to hunger relief organizations such as food shelves/banks across the Twin Cities. It was initially created to address the market disconnect during the pandemic and assist farmers struggling to access their typical consumer group. LEAFF has purchased $1,072,000 worth of produce and coincidingly donated 592,000 pounds of produce since its inception in 2020. Not only does The Good Acre support local farmers with financial assistance, but they provide opportunities for networking, marketing support, storage facilities, food safety training, production planning, and more. The wholesale component of TGA provides year-long access to fresh produce for buyers including healthcare facilities, restaurants, Minneapolis public schools, and Bon Appetit food service. Finally, The Good Acre holds a shared commercial space at their Falcon Heights location which food makers can rent on a regular basis. Currently, the commercial kitchen at TGA is used by 15 local businesses such as Nani's Sweets, Well Rooted Teas, and Cornelius Pasta Co. The Good Acre is one of over 500 food hubs in the US strengthening connection between farms and the local marketplace and community. (UC Davis 2017)

Conclusions:

In the US, industrial and alternative farms have been faced with increasing instability in recent years. Agricultural producers in the upper-midwest have been significantly impacted by record high production costs, low commodity prices, unpredictable environmental conditions, and disconnect from marketplaces following the COVID-19 pandemic. Ingenuity has proven to be critical in the stability of individual farms as well as reimagining and rebuilding strong, connected, and sustainable local food systems. On the individual scale, the agritourism industry

has been developing across the midwest as a way for farmers to regain economic agency. This diversification of income allows farmers to be less vulnerable towards environmental changes such as the recurring and widespread summer droughts of western Wisconsin and central/southeastern Minnesota. The COVID-19 pandemic drastically impacted the supply chain, posing endless challenges for local farmers, while simultaneously highlighting many deeply-rooted flaws of the industrial food system. More than ever, there's a widespread social awareness of systemic flaws and call for transformative change. Food hubs like The Good Acre are examples of efforts to strengthen and redesign the local food system. Creativity and ingenuity are key ingredients in constructing sustainable and stable food systems which support the livelihoods and autonomy of farmers, as well and the needs and values of the community.

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4.2 Ensuring Instability: Crop Insurance and Stability on Conventional vs. Organic and Alternative Farms

Jesse Terry

Introduction:

Crop insurance is the largest federal agriculture program in the United States, costing $38.5 billion in the last Farm Bill (National Sustainable Agriculture Coalition) and covering over 300 million acres of agricultural land across the country (Morris et al. 2019, 16). What started as a recovery initiative after the Great Depression and the Dust Bowl has vastly expanded into a program crucial for the stability of many US farms. The huge amount of resources devoted to the program and the broad number of participants make crop insurance policy a key influence on agricultural practices in the United States. Not all farms purchase crop insurance equally, however, with various studies showing conventional farms participating at a significantly higher rate than organic farms. (Morris et al. 2019; Belasco & Fuller 2021). How does crop insurance (or the lack thereof) contribute to stability on conventional and organic farms and what explains this difference in usage rates? I argue that crop insurance provides short term stability but long term instability for conventional farms, while organic and alternative farms have lower participation in crop insurance and thus find other measures to ensure stability. In discussing stability, I am mainly referring to economic stability, or the ability of farms to stay in business. Environmental stability is often intertwined with long term economic viability. In this essay, I will first describe my research methodology before analyzing crop insurance and stability on conventional and organic farms, respectively, with special attention to farms in Minnesota and the Upper Midwest region, and then concluding with policy recommendations and my contribution to the broader literature.

Methods:

The catalytic resource for this paper was a class trip to Common Harvest Farm in Osceola, Wisconsin. Common Harvest Farm, owned and operated by Dan Guenthner and Margaret Pennings, is a 40-acre, diversified produce farm that uses a Community Supported Agriculture (CSA) model. Our six hour visit included a bus tour of the neighboring farms (which were mostly conventional and growing corn) from Dan, an overview of the farm's CSA model from Margaret, and a walk around the farm with descriptions of production operations with Dan. I took detailed notes, focusing specifically on the measures (both market and production-based) Dan and Margaret took to ensure stability. After the visit, I followed up with Dan via email regarding his opinions on and experiences with crop insurance. The rest of my research, making up the bulk of my findings and analysis, involved searching for scholarly articles and publications from agriculture-related organizations on the subject. In total, my sources include both quantitative and qualitative analysis, from land use data to farmer focus groups and surveys, and discuss crop insurance on both the national and regional levels.

Findings, Analysis, and Discussion:

<u>Conventional Farms: Short Term:</u>

Crop insurance, as it is designed to do, provides important stability for many conventional farms, which insure roughly double the acreage percentage of organic farms (Morris et al. 2019, 16). From the program's Great Depression-era beginning, its goal was to ensure that farmers could survive a disaster or a year of bad weather, thus also ensuring the stability of the country's food supply (Land Stewardship Project 2018, 4). Another motivation was to make the agricultural safety net less reactive and not leave the government responsible for funding individual disaster relief payouts on its own (Jaworski 2016, 1690). In 1980, crop

insurance was expanded and privatized. Since then, crop insurance has been administered by the U.S. Department of Agriculture's (USDA) Risk Management Agency (RMA) but provided by private insurance companies. Because the USDA requires these companies to make insurance available to every farmer growing approved crops, regardless of risk or other factors, the government subsidizes the high premiums, typically covering over 60% of the average farmer's premium (and leading to the billions of federal money spent on the program each year) (Land Stewardship Project 2018, 4). Crop insurance comes in two forms: yield protection, which provides coverage when farmers' yields fall below a certain threshold of an expected yield, and revenue protection, which does the same for revenue and can be triggered by yield loss or a price drop for a given crop. The vast majority of federal subsidies are for revenue protection (Jaworski 2016, 1693). This protection is necessary due to the risk inherent in farming, with farmers at the mercy of drought, flooding, frost, fluctuating crop and input prices, and more. Randy Krzmarzick, a corn and soybean farmer in Brown County, Minnesota, who used crop insurance to recover from hail damage in 2016, described how "Farming is a uniquely risky business" (Land Stewardship Project 2018, 5). Crop insurance, and its vast federal subsidies, thus helps manage risk and provide stability for many farms in the United States, allowing farmers to stay afloat during bad years.

Conventional Farms: Long Term:

While crop insurance provides year-to-year stability for conventional farms, it contributes to their instability in the long term, through masking risk, disincentivizing adaptation strategies, prioritizing certain crops, subsidizing production on marginal lands, and accelerating consolidation. Farmers covered by insurance simply have less incentive to adopt risk management adaptation practices, which can be expensive, with the insurance guaranteeing

losses will be repaid. Instead, farmers can use the resources that would have been devoted to adaptation to prioritize increasing production and even adopt riskier practices to do so. A 2015 study found that insured corn and soybean farmers were less likely to implement extreme heat adaptation measures compared to farmers who were not using crop insurance (Jaworski 2016, 1687). Contributing to this phenomenon is the way premiums are calculated. Crop insurance premiums are set based on historical risk and do not incorporate potential future risk (like climate change), further disincentivizing long-term adaptation (Jaworski 2016, 1694). In discouraging risk adaptation and not accounting for potential future risk, crop insurance leaves farmers more vulnerable to future adverse events.

Another way crop insurance policy hurts long-term stability is through which crops it encourages through subsidies and where. Through higher subsidies and more expansive coverage, crop insurance promotes the production of certain monocultures. These crops dominate the Upper Midwest and much of the country: in 2018, corn, soybeans, wheat, rice, and cotton made up 76% of federal crop insurance subsidies. (Morris et al. 2019, 15-16). Monoculture itself can be a detriment to stability, as it is more vulnerable to weather events, market shocks, and input price changes than diversified production, a more common practice on organic and alternative farms. The location-blind promotion of these crops also impacts long term stability. Different crops are better suited to different locations, be it based on soil, climate, or other environmental factors, and these different suitabilities will inevitably be altered by climate change (Jaworski 2016, 1685). In incentivizing certain crops regardless of location and disincentivizing adaptation, crop insurance promotes the planting of crops ill-suited to their geography, which often requires more inputs and resources, and leaves farmers vulnerable to future climatic changes.

Beyond the promotion of specific crops, the impact of crop insurance on land use in general also engenders future instability. By masking risk and providing high subsidies, crop insurance encourages farmers to plant on environmentally marginal land that would typically not be in production due to the high chance of potential yield losses. In a 2006 study, "The land most likely to be moved into cultivated production because of crop insurance was found to be both economically and environmentally marginal, with lower yields, higher erosion, and higher nutrient loss than other land" (Jaworski 2016, 1697). This result is consistent with other empirical literature studying the relationship between subsidy increases and production expansion to less productive, more erodible, and more likely to include vulnerable wetlands or other animal populations (Sumner & Zulauf 2012, 11). Due to the large subsidies, it is often more economically viable to produce on marginal land and insure it than to enroll it in a USDA conservation program that pays to keep land out of production (Jaworski 2016, 1697). As Minnesota farmer Darwyn Bach put it, "Land was being put into production that should have never been put into production… there's a lot of guys not farming the land anymore, they're farming the crop insurance program" (Land Stewardship Project 2014, 3). Farmers dedicating increased acreage to insured marginal land creates more reliance on the crop insurance program and further risks future stability. The relationships between crop insurance and risk assessment, monoculture, and planting location decisions will only become more important as climate change worsens. As extreme heat, drought, erosion, and rising temperatures become more common, current crop insurance policy moves away from adaptation and towards riskier behaviors, ultimately undermining the long term stability of insured farms.

Finally, crop insurance's contribution to agricultural consolidation is a measure of long term instability for all but the biggest farms. In general, the largest and most profitable

operations

receive an outsized portion of crop insurance subsidies. In 2014, farms in the top ten percent of sales received almost 70 percent of the total premium subsidies and farms in the top two percent received a per-acre subsidy four times higher than the average (Bekkerman et al. 2018, 1). The problem is similar in Minnesota, where the top ten percent of subsidy recipients, representing 4.1% of the state's farms, received 46% of total premium subsidies in 2011 (Land Stewardship Project 2014, 4). This phenomenon is largely due to the fact that, unlike other federal farm programs, there is no cap on the amount of subsidies a farm can receive, allowing the largest farms to receive more as they grow. In 2015, farms with gross incomes over $1 million took home 33% of total insurance payouts (Land Stewardship Project 2018, 5). Ironically, these larger farms tend to be the least vulnerable to production shocks and market changes, nominally what crop insurance is supposed to protect them from (Bekkerman et al. 2018, 10). Recent empirical research has quantified this consolidation effect, identifying a strong relationship between subsidized crop insurance and a subsequent decrease in the number and size of farms based on an analysis of the long run effects of a subsidy increase (Azzam et al. 2021, 1167). How this consolidation happens in reality is intuitive. Bigger farms with more financial power, boosted by their disproportionate subsidy benefits, are able to outbid smaller farms for land purchases and rentals. This scenario is heightened after an adverse event hurts yields or revenues and triggers indemnity payments, of which the larger farms receive more (Azzam et al. 2021, 1168). Furthermore, bigger operations can drive up rental prices and bar access for small and beginning farmers. Crop insurance enables the holding of large swaths of land, as it ensures owners will make some money off of all the land. Southern Minnesota farmer Jon Jovaag described this conundrum:

> "A lot of those guys who are running a lot of land, they know worst case scenario they're going to walk away with at least a few bucks an acre in their pocket. That's if all else fails and they never even start their combines in the fall, they're going to walk away with that.
>
> So they are able to drive rental prices up to where they can still clear a little profit, and then if things go well they'll make a huge amount." (Land Stewardship Project 2014, 6)

High land prices and farm consolidation were evident on the tour of the area surrounding Common Harvest Farm, as Dan pointed out many examples of both how land prices have drastically increased over time, remembering how he was able to buy his farmland for a comparatively tiny sum 30 years ago, and how many smaller operations have left the business and sold their land to bigger farms in recent years, describing where different families have moved after selling. In this case, it is not the individual, farm-level function of crop insurance causing long term instability but rather the systemic design of the program and who benefits the most. By obscuring real risk, removing the economic incentives for adaptive practices, encouraging the production of main monoculture crops, prompting planting on environmentally marginally land, and contributing to agricultural consolidation, crop insurance policy leads to long term instability for conventional farms. A different relationship with crop insurance exists on many organic and alternative farms.

Organic and Alternative Farms:

Various figures show organic and alternative farms purchase crop insurance at a significantly lower rate than conventional farms. Lacking the safety net provided by crop

insurance, organic and alternative farms take other measures, both production and market-based, to ensure stability. At this point it is worth adding nuance to these broad categorizations. A wide range of farm types can be defined as organic or alternative, as was shown in Michael Pollan's *The Omnivore's Dilemma: A Natural History of Four Meals* with the vast difference between "big organic" and Polyface Farm (Pollan 2006). Only about one percent of farms in the United States are certified as organic by the USDA, with a majority of farms that use organic practices deciding not to become USDA certified (Morris et al. 2019, 9, 27). Unfortunately, available data and research as well as USDA policy largely limit analysis to using the broad term of organic.

Organic and alternative farms cite a variety of reasons for their lower participation in crop insurance, including, practical, economic, moral, and cultural explanations. Two surveys identified the main motivations for not participating and top responses included that crop insurance is unnecessary due to having alternative risk management methods, coverage is inadequate for organic crops, premiums are too expensive, farms are too small, and farmers are unfamiliar with the insurance options (Glenn et al. 2014, 8; Belasco & Fuller 2021, 1556) Questions about usefulness were common across various qualitative sources. For farmers with small, diversified operations, other risk management strategies were simply more practical than crop insurance, which is used most by larger, typical monoculture-based farms. Additionally, crop insurance coverage is largely limited for the horticultural crops common on organic farms (Morris et al. 2019, i).

Farmers cite economic motivations for foregoing crop insurance generally related to coverage not reflecting the higher prices often garnered by organic products (Hanson et al. 2004, 225). In my email correspondence with Dan Guenthner, he mentioned that other

insurance costs (for property, equipment, labor, etc.) can be a significant expense on their own for smaller farms (Guenther 2023). Economic concerns also have a historical element: organic farmers were not even able to meaningfully access crop insurance until 2002. Until 2014, a 5% surcharge was added to all organic crop insurance premiums. Since then, when there is a lack of sufficient data on the organic yields, USDA has applied a 35% reduction to county yield averages to organic farms when determining premiums (Morris et al. 2019, 7). Organic farmers are more appreciative of Whole Farm Revenue Protection, a newer program that rewards diversification (Land Stewardship Project 2018, 7).

Finally, moral and cultural ideas about the nature of farming also informed organic farmers' opinions on crop insurance. Many farmers shared that they view organic farming, relying on proactive risk protection (Morris et al. 2019, 4), as fundamentally different from conventional agriculture and crop insurance, which they saw as reactive and a "band-aid," respectively (Hanson et al. 2004, 224). An Ohio farmer with a diversified farm declared that "A sustainable farm is diversified and able to "sustain" itself through a few tough years, otherwise it's not a sustainable farm. Therefore, sustainable farms don't need crop insurance. Crop insurance funds unsustainability" (Morris et al. 2019, 26). Some farmers also expressed concerns about crop insurance largely benefiting larger farms (Hanson et al. 2004, 225). Additionally, hesitancy about crop insurance stems from the origins of the organic movement: many felt that collaborating with the USDA to bring organic to the mainstream necessitated an unwanted betrayal of their original ideals of challenging industrial agriculture (Morris et al. 2019, 8). Many organic and alternative farmers also generally hold anti-government opinions and prefer not to use federal programs (Singerman et al. 2010, 14).

These varied motivations are largely inseparable from how organic and alternative

farmers ensure stability in the absence of crop insurance. On the production side, diversification is a central strategy. Unlike monocultures, diversified farms do not live or die based on the success or failure of one crop. Via email, Dan explained the benefits of diversification: "we know that in any given year some things will do well no matter what the growing conditions might be" (Guenther 2023). Other strategies, including investment in soil quality, use of crop rotations, intentional development of insect populations, lack of inorganic pesticide and fertilizer use, and seed saving, all contribute to stability. For example, healthy soil can better hold water and help withstand droughts (Hanson et al. 2004, 222). Use of crop rotations, insects, organic fertilizers, and saved seeds in the place of inorganic fertilizers, pesticides, and commercial seeds lessens the potential instability of fluctuating input prices. The tour of Common Harvest Farm showcased a number of these adaptive and organic techniques, like hosting cows from a neighboring farm to regenerate soil and using cover crops to retain nitrogen in the soil. An especially potent example when compared to the impact of crop insurance on conventional farms was the National Resources Conservation (NRCS) program that paid Dan to take marginal land out of production and plant perennial trees. Not dependent on one crop's price point and not incentivized to produce more, Dan was able to aid the long term stability of his farm by limiting production to non-marginal land. In sum, without crop insurance, organic and alternative farmers ensure stability by diversifying production, limiting inputs, and prioritizing adaptation.

The market is an equally important medium for ensuring stability on organic and alternative farms. Community Supported Agriculture (CSA) is an increasingly popular model and an effective way to maintain stability on organic and alternative farms. In CSAs, the members assume some of the production risk, understanding that weather and other factors will impact the contents of each batch. Receiving payments from members upfront guarantees a more stable

income for the farmer throughout the season. A New York farmer described it as a "subsidy of goodwill" from the community (Hanson et al. 2004, 224) and Dan remarked that "our diverse group of members are in effect our insurance program" (Guenther 2023). An interesting point from the tour of Common Harvest Farm was when Margaret described how they previously had 200 members, but had since found a better balance at around 140 members in order to let their land rest. In this way, CSAs can achieve stability by tuning their market to their production capacities and thus not being forced to constantly produce more, as is common in more conventional agriculture. The CSA model also fosters strong consumer trust and loyalty, which are both beneficial to long term stability. Farmer cooperatives are another way organic and alternative farms ensure stability. These cooperatives allow farmers to pool their resources, raise capital, and manage market risk (Hanson et al. 2004, 224). CSAs and cooperatives thus allow organic and alternative farmers to shield themselves from price spikes and input changes, the causes of much instability for conventional farms.

Conclusion:

While federally subsidized crop insurance remains the principal way many farmers in the United States protect the stability of their farms, the system does not work for everyone. In fact, crop insurance provides year to year stability for conventional farms, but undermines their stability in the long term. Organic and alternative farms, which use less crop insurance, employ other methods, from diversified production techniques to collaborative market models, to ensure their stability. This essay contributes to the broader literature by analyzing crop insurance through a lens of short and long term stability and by making use of field work, qualitative data, and quantitative analyses. To improve crop insurance in the United States and address these discrepancies, policymakers should implement the following reforms: rework incentives to stop

promoting production on marginal lands and increase participation in conservation programs, introduce a cap on the amount of premium subsidies a farm can receive, and reward farmers for non-insurance methods of managing risk.

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4.3 El Niño Southern Oscillation Effects on Farming Near the Twin Cities

Laura Williams

Introduction:

Since 1980, there have been 11 El Niño Southern Oscillation (ENSO) events (*Past Events: What Years Are ENSO Years?*, n.d.). This past year has increased that number to 12, with a strong El Niño occurrence. During neutral (non-ENSO or La Niña year), trade winds below the equator blow westward, causing upwelling which results in warm water flow from South America to Asia. During El Niño Southern Oscillation, these trade winds reverse and blow easterly, resulting in an accumulation of warm water off of the South American coast (Trenberth, 1997, 2771-2777) (*What Are El Nino and La Nina?*, 2023). In the northern hemisphere, El Niño causes warm winters in the midwest due to the warm waters in the southern hemisphere causing the Pacific Jet Stream to move south instead of being along the equator. El Niño also causes drought in the midwest United States, which combined with the warm winters, can have an extreme effect on farming.

This paper will focus on how El Niño affects farming in the midwest with a focus on the region surrounding and including the Twin Cities in Minnesota. For the purposes of this paper, the region surrounding the Twin Cities is defined as 145 miles in all directions. The beginning of the paper will develop warm winter impacts on agriculture which will then tie in drought. Soil fertility in the face of drought will be heavily evaluated as well as how low moisture content in soils affects plants, plant growth, and crop yield. Irrigation use in times of drought and the economic and environmental effects of irrigation will be discussed. Some comparisons will be drawn between neutral years and strong ENSO years to better understand the previous growing season.

Methodology:

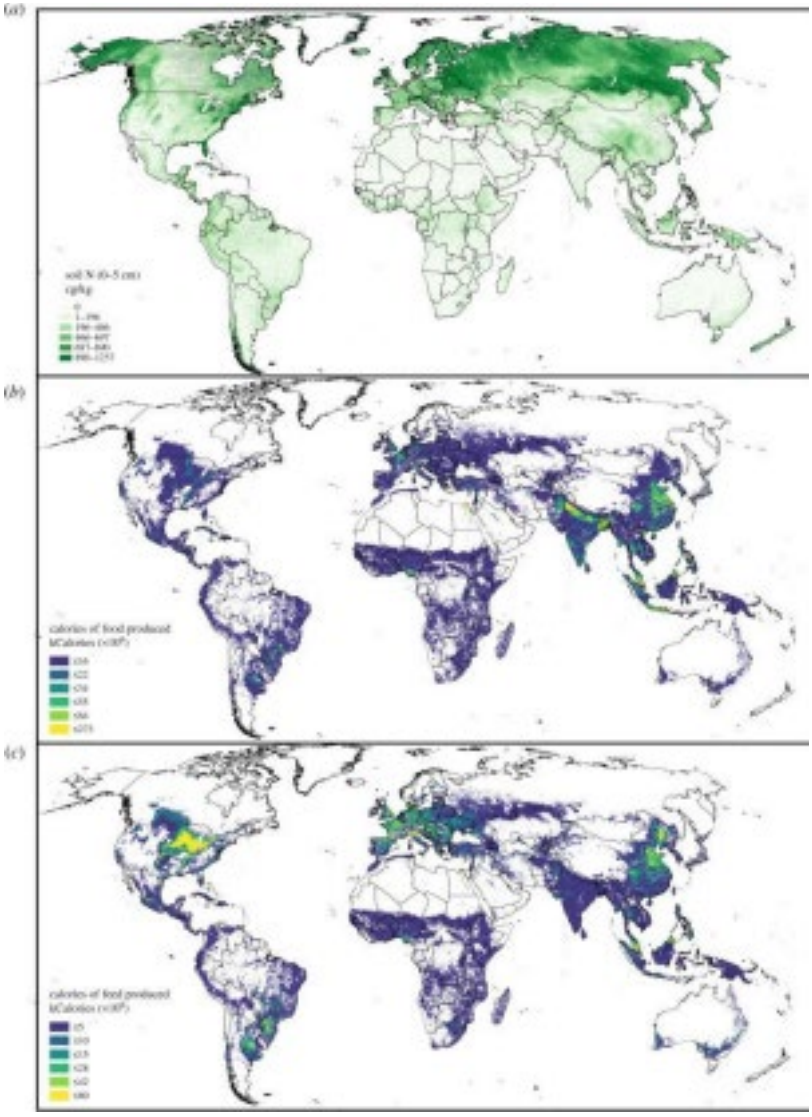
Research for this paper was conducted through the use of both online literature and in-person interviews. Two interviews were conducted: one closer to the Twin Cities and one closer to the defined boundary of research. The first interview was conducted at Common Harvest Farm, a small-scale CSA farm in Northwestern Wisconsin, 44.9 miles from the Twin Cities. I spoke with Dan and his wife Margaret who own and run the farm as well as toured the farm with my research group. Dan and Margaret explained the effects of recent drought on the agricultural productivity of their farm, as well as neighboring farms. Dan also highlighted the soil fertility of areas of his farm due to the extreme drought the farm has been experiencing. Our group also toured the surrounding area by bus with Dan who gave us information about the geography, the farms, and the continuities and changes with crop yields on neighboring farms between the 2022 and 2023 growing seasons.

My second interview was with Megan C., who grew up on a hay farm in Northern Minnesota near Duluth, 138.8 miles from the Twin Cities. Megan has grown up around farming, living on 10 acres of agricultural land and living adjacent to her uncle's farm of 100 acres. Both Megan's family and her uncle primarily farm hay. Her uncle also raises cattle, which allows him to rotate the use of the land between pastoral and agricultural depending on the year. Megan detailed the impact of ENSO-related drought on hay crop yields on both her land as well as her uncle's farm.

Findings:

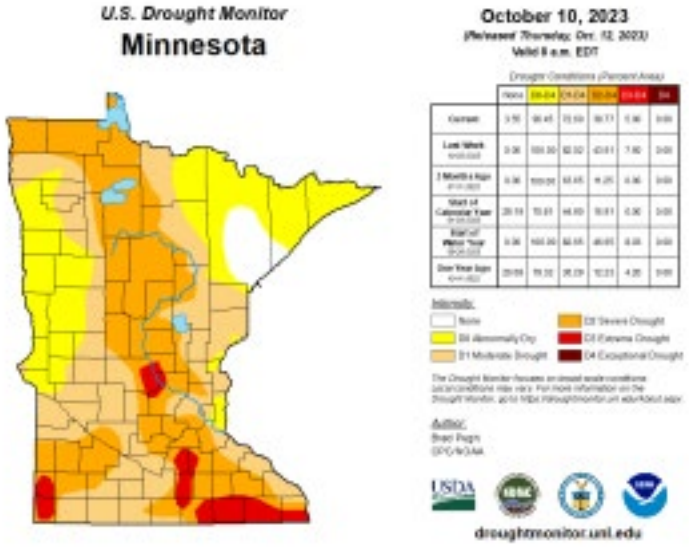
In the winter, soils freeze due to the low temperatures. In the Midwest, soils tend to be frozen for most of the winter season, with the average high temperatures in Minneapolis in December, January, and February all being below freezing (27*F, 24*F, and 29*F

respectively) (US Climate Data, n.d.). The Twin Cities experience a heat island effect, with higher average high temperatures in winter months than surrounding areas. This means that there is less of a chance of soils thawing in areas around the Twin Cities than in the Twin Cities themselves.



The freezing period is critical to retaining soil fertility. When soils are frozen, microbial function is limited which limits the breakdown of nutrients and organic matter (Farzan, 2022). In the spring when the ground thaws, the soil beneath will be nutrient rich. Soils rich in nitrogen and organic matter yield the highest crop productivity (Silver et al., 2021). The area around the Twin Cities primarily contains soil with 196-697cg/kg of nitrogen which is neither relatively high nor relatively low (Figure 1). Retaining as much nitrogen as possible is important for high productivity. ENSO events are commonly accompanied by warm winters. Depending on the strength of the event, the winter could be

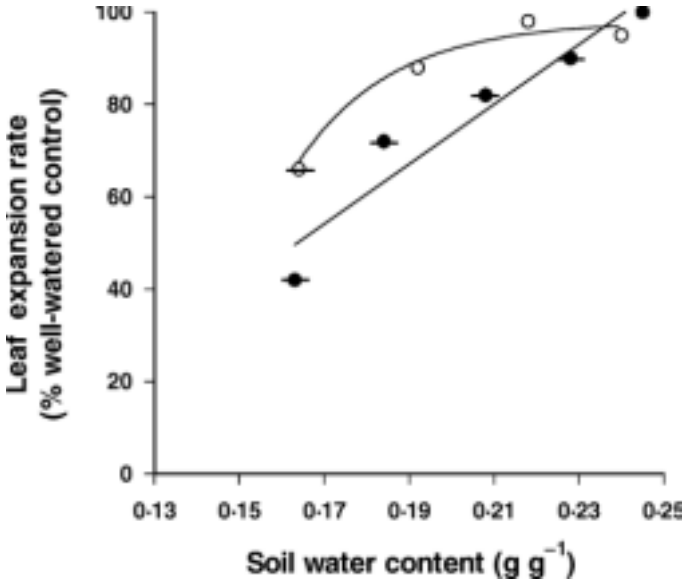
mildly warmer, or up to 11.7*F warmer than average (1997-1998 ENSO). In Minnesota, the average temperature of a winter during a strong El Niño year is 15*F, which is a 4.5*F increase from the average winter temperature of 10.5*F (La Crosse, WI Weather Forecast Office, n.d.). Wisconsin is even warmer during the winter of a strong ENSO year with the average temperature being 19.9*F, a 4.2*F increase from the average winter temperature of 15.7*F. While both of the average temperatures in Minnesota and Wisconsin during ENSO years remain below freezing, the average temperature is increased which suggests that days above freezing or closer to 32*F are more common. The more days above freezing, the less fertile the soil is by the time of planting. Warm ENSO winters also result in less precipitation in many areas. In Minnesota, strong El Niño years bring about an average of 0.16” less precipitation for an average of 2.13” per winter instead of 2.29”. This loss of precipitation adds to the drought caused by ENSO, even though the bulk of the drought occurs during spring and summer months. Given that any precipitation is crucial during ENSO years, the winters initiate the agriculturally destructive sequence.



In 2023, Minnesota has been severely impacted by drought conditions resulting from an ENSO event, despite starting the year with 29.19% of the state having no drought. As of last week (October 3rd, 2023) and as of three months ago (July 11th,

2023), 0% of Minnesota was experiencing no drought (Pugh, 2023). As of three months ago, 11.25% of the state was experiencing severe drought while as of last week, the percentage was up to 43.61%.

Farmer Dan further articulated the spring and summer drought developments, citing both what he has experienced on his farm as well as what he has witnessed and heard on and about nearby farms. The drought was incredibly prominent this past growing season with it being one of the "driest summers in many years" for Dan. His farm was 10-12 inches below average in rainfall. His crop production struggled without irrigation, which costs large amounts of money. Soil fertility on Common Harvest Farm decreased significantly with the soil being incredibly dry, a consequence of the drought. On the farm, Dan passed around handfuls of different soils found on the property that he dug up in front of us. The soil had an especially low moisture content due to the incredible loss in rainfall experienced. Crops growing in such soils struggle to secure stability since dry soil is less stable than wet soil which can lead to crops being uprooted by winds.



Crops struggle to grow in soil with low water quantities. Plants close their stomata to limit water evaporation in order to retain as much water as possible. Leaf growth is slowed as well. In wheat plants, the percentage of leaf expansion was 20% less than that of well-watered plants when the soil water content was under 0·19 g g $^{-1}$ in both low and high bulk density

drying soils (Passioura, 2002, 314) (Figure 3). This wheat plant struggle was demonstrated on Dan's tour of the industrial farmland surrounding his CSA farm. The wheat plants were wilted and shorter than normal. Corn and hay growth are affected by low water content in soils as well. According to Dan, corn crops in nearby industrial farms died before the first frost, an abnormal occurrence for that area. Hay growth on Megan's family's farmlands was severely reduced by this year's drought as well, "We usually get two crops of hay… this year we only got one because of drought… It wasn't great." Not only did the crop amount decrease, so did each crop's yield. Megan told me, "It's thinner, sparser. It's not as thickly grown. There's not as much hay per acre because of the drought."

Decreased crop yields can have many economic consequences for farmers. In the case of Megan's uncle, he was only able to sell one hay crop instead of two, therefore losing half of his hay-based income. The sparsity of the one crop yield decreases the amount of money he got from selling it as well. Land near Megan's family's farms is not very fertile. The ENSO-related drought stripped even more of the fertility which means that the soil requires fertilizers to yield larger amounts of hay. Fertilizers can be expensive, causing economic struggles for many farmers who use them.

Drought can also cause many farmers, especially industrial farmers, to turn to increased irrigation to maintain high crop yields. Irrigation is costly both economically for farmers and environmentally for farms. Irrigation depletes water sources in the area surrounding the farm, water sources that are already incredibly depleted due to a combination of drought and human use over time. Sustained irrigation can cause farmers to fully lose water supplies which can result in farms having to move to other land or access water from farther away. Using more distant water sources results in more energy usage and, therefore, higher

electricity bills. Economically, irrigation is expensive which can send farmers into debt or cause their debt to increase. Farm debts in the US have been increasing since 1988, totalling over 500 billion dollars in 2023 (Zwilling, 2023). This debt will most likely be even higher after this year's weak growing season.

Conclusion:

The research conducted revealed that El Niño has devastating effects on crop yields and soil fertility on farms in the midwest due to the drought that comes with the event. El Niño causes major droughts and warm winters in the midwest, especially during strong El Niño years. The warm winters cause a decrease in soil fertility due to temperatures being above freezing more frequently as well as decreased precipitation. The non-freezing temperatures allow microbes to continue to be mobile and to break down the organic matter and nutrients in the soil. Nitrogen is an important soil nutrient that is retained when soil is frozen but is broken down by the microbes in the soil when the soil thaws. Decreased precipitation in the winters strengthens the drought caused by El Niño. The drought negatively impacts crop yields, making yields small and crops sparse. Due to the smaller yields, farmers struggle economically during El Niño seasons. If farmers want to maintain high crop yields, they need to invest in irrigation systems which are costly. El Niño creates incredibly challenging farming seasons which can cause economic hardship for farmers in the area surrounding the Twin Cities.

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Chapter 5: Sustainability

By Ranoromiangaly Andriamihaja-Rabe, Corinne Byus, Charlie Chinander-McFaul and Unitas Vang

5.1 Alternative agriculture in the Upper Midwest (USA): Weed, pest management and soil quality at Common Harvest Farm

Ranoromiangaly Andriamihaja-Rabe

Figures 1, 2, 3: *Common Harvest farm*

All photographs were taken by the author unless stated otherwise

Introduction:

Our world faces challenges such as global hunger, food insecurity, global climate change, and pandemics. However, hunger is not due to the lack of food but rather its uneven distribution. Preserving the favorable soil quality of the Upper Midwest and limiting freshwater pollution should be local priorities, calling for alternative forms of agriculture, such as agroecology. In the scope of the sustainability pillar of the 6-dimensional food security framework, the research question will be: **How does weed management in agroecology/truly organic agriculture allow for reduced use of chemicals and the preservation of soil quality?**

Introduction to the Spatial Study Area:

Common Harvest Farm is a Community Supported Agriculture farm located at 212 280th St, Osceola, Wisconsin, USA. The Upper Midwest of the USA benefits from rich soils due to the melting of the Laurentide Ice Sheet. The fresh sediments it deposited, as well as the unweathered rocks it left at the surface, give this region young soils rich in nutrients, carbonate debris, and granular aggregate resources. (Fulton & Prest, 1987) Silt or glacial rock flour, which is among those deposits, boosts agricultural productivity and traps carbon dioxide from the air. This “wonder material” (Minik Rosing, University of Copenhagen) has proved to increase agricultural crop yields by 30% in both Denmark and

Ghana (respectively, barley and maize).

(Gronholt-Pedersen, 2021)

Fig 4. The Laurentide ice sheet and the Upper Midwest (Guenthner)

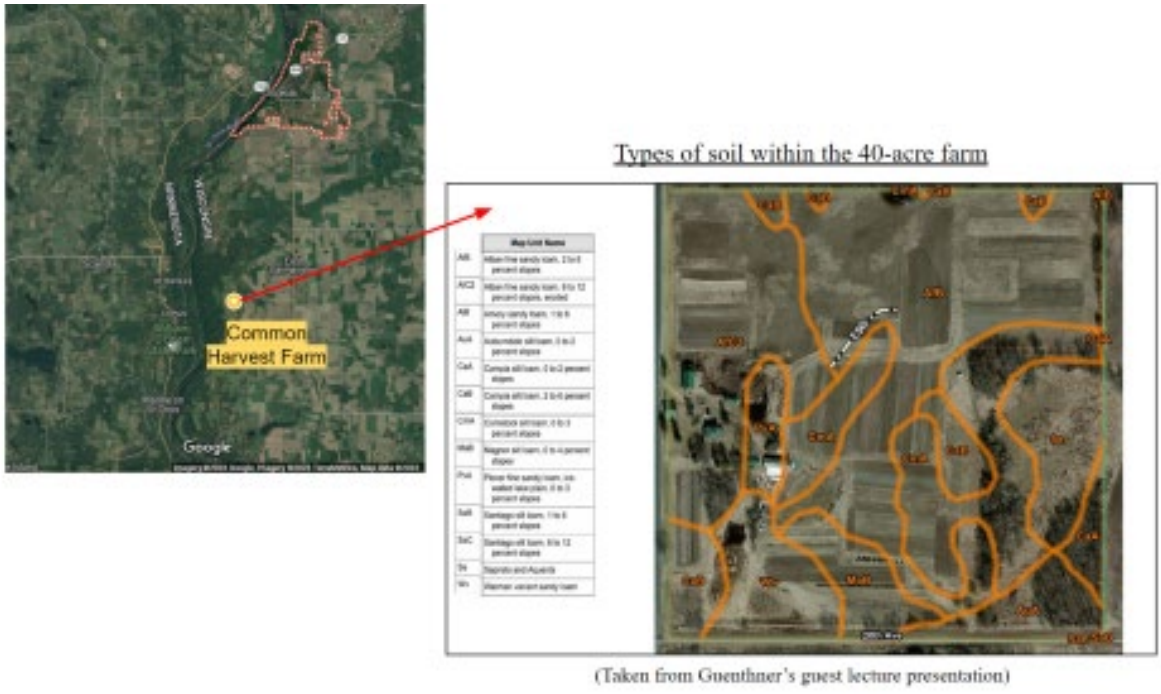

Fig 5. Localization and types of soil on the Common Harvest Farm

As shown in the figure above, several areas of the Common Harvest Farm contain silt in their soil, meaning that the farm's soils are rich and favorable for crops.

Research methods:

This study will be based on primary data collected during a Community Supported Agriculture Farm (CSA) visit: Common Harvest Farm in Osceola, Wisconsin. An interview with Mr. Dan Guenthner will determine the following:

- The farmers' practices to increase soil quality in organic farms
- The contents of the fertilizer used on the farm and its cost
- The overall economic inputs per acre on this organic farm
- Examples of major weeds on the farm
- Mowing as a way to control weeds
- Gophers and gopher control

Secondary data will complement those findings.

Although weed management and soil quality preservation management work hand in hand on this agroecological farm, those parts will be treated separately. The reader is advised to think about the relevant links between the two.

Soil quality:

According to Farmer Dan, the practices used by organic farmers include:

- Minimizing disturbance of the soil so as to not over oxidize the soil thus converting stored carbon to CO2 (a gas) and losing it.

Compacted soils are not really appropriate for optimal plant growth.

- Crop rotations (exp. fallow cycles) in order to balance the intense vegetable production with soil-improving crops, adding more organic

However, our visit to the farm revealed that its overall surface and available soils (that is to say, outside of the marginal soils and overly sandy soils) were too small to allow for

crop rotation.

- Matter such as tilling in straw mulch and crop residue, crop covers

This green manure, which is becoming increasingly popular in organic agriculture, is an alternative to perennial cropping (Zanzotti & Mescalchin, 2018) and the export of nutrients caused by organic matter leaving the farm. Urban areas then become nutrient sinks. According to Zanzotti and Mescalchin, this manure also improves soil structure with the roots of the sown plants and the establishment of bacterial communities producing soil-stabilizing substances. Thus the soil is more able to retain water and nutrients, which are not lost in the air, but also feed the plants through the decomposition of the mulch. On a squash patch, the cover crop species are selected for their ecosystem services, such as barley which can outgrow weeds. The weeds are also put under pressure as they are shaded with vines and squash. This practice allows for nutrients to return to the soil. Very light tillage cuts the vines of squash, and grain drill seeds of oats and peas are lined on other patches. For instance, oats have shallow lateral root systems that allow them to grab the soil rapidly, limiting erosion. Farmer Dan says that "adding compost is likely the best way to improve soil organic matter. However, the amount needed to offset losses requires a considerable amount of time and equipment that most small farms do not have." Common Harvest Farm faces a few problems concerning the fertilization of the soil. Although vermiculture is employed, it is a small and very localized method. The challenges are due to the absence of cattle (apart from a few cows "vacationing" before joining the intensive, industrial livestock farms) and thus of animal manure, and because of the fact that most of the organic matter that leaves the farm in the form of produce does not return to the soil but is exported. Also, costs associated with the production of said fertilizers are also much higher than conventional farms as this organic fertilizer has a smaller amount of available nutrients (8-3-4)

compared to synthetic fertilizers - which can be formulated to give 100-50-40. According to our farmer, their organic fertilizer is composed of two products: chicken litter compressed into pellets and steamed poultry feathers coming from a feather mill.

Product 1: Chicken litter	Product 2: Steamed poultry feathers
Approximately 5-3-4 (5 pounds nitrogen/100 pounds, 3- pounds phosphorus/100 pounds, and 4- pounds potash per 100 pounds) Roughly 300 USD per ton	12-0-0 containing 12 pounds of available nitrogen per 100 pounds. It is steamed poultry feathers. The feathers are steamed in order to make the nitrogen more available to the plant. 1.380 USD per ton
Farm area in production: around 8 acres Fertilizer costs: around 500 USD per acre = 4.000 USD for the farm's fertilizer	
Farm gross income: 10.000 USD Net without fertilizers: 6.000 USD -> The fertilizer costs are relatively small compared to the sales	

Table 2. Some notable examples of weeds on the farm

Fig 6. Lambsquarters

A notable animal pest example would be gophers (notably pocket gophers), a type

of rodent building underground passages and building mounds, digging holes to join the surface. Gophers damage crops and infrastructures. Furthermore, by eating tree roots, the gophers can decrease soil retention. However, the rodent's galleries also allow water to circulate more easily. (Prairie Public, 2020) and according to Farmer Dan, the gophers actually have a positive effect on soil quality by airing it through those tunnels. A gopher bounty (3.25 USD per animal) was put in place to regulate the gopher populations, thus limiting their degradations. One method of killing them is to asphyxiate them by injecting CO2 into their tunnels.

In terms of management, a few strategies can be implemented by organic farms, that avoid the use of pesticides and GMO seeds (such as Monsanto's Roundup Ready) which have been genetically modified to withstand particular herbicides, reducing the labor required on the farm). Those strategies were taken from the interview with Farmer Dan. The issue with synthetic fertilizers is that they "may actually decrease soil fertility due to chemical nitrogen stimulating excessive microorganism growth, which, over time, depletes organic matter in the soil." (Milorganite, 2020) Furthermore, their use can pollute groundwater storage and cause eutrophication in nearby bodies of water. Also, pesticides reduce soil quality by contaminating it. Cow grazing can be used, allowing not only weed species control but also the spread of manure. However, this method requires a great amount of land and the presence of cows raised extensively in the first place, which was driven away by industrial agriculture (mainly *Zea Mays*, commonly called corn - Pollan, 2006). Also, very few seeds become nonviable after going through the digestion process of the cows, spreading them around the farm rather than eliminating them.

Another method would be mowing, which is not ideal because it is very labor-

intensive (a labor that is lacking in this area to the extent that high school students are hired to help farmers) and rather "prunes" weed species such as the lambs quarters; who perceive it as a stimulus to start seeding. Farmer Dan mentions that mowing still can be done in a way that reduces the amount of viable weed seeds that get incorporated into the soil. One of those practices would be to leave the seeds on the soil surface during the winter, which will either be eaten by rodents or germinate at the start of the spring, making them easily removable with the spring light tilling. Lastly, burning the fields to reduce crop residue and kill weeds does not require the use of pesticides but has too many environmental problems associated with it (including air pollution).

Conclusion:

To conclude, in order to turn away from industrial agriculture practices of weed and pest management and thus safeguard soil quality, farmers can adopt agroecological practices. Examples cited in this paper include the use of cover crops, organic fertilizers from industrial poultry farms, and manure; both green and animal, cow grazing, and calculated mowing. The economic model of this small CSA farm, Common Harvest, showed that the benefits of organic fertilizers outweighed their costs. However, this study was based on only one farm and one interview in a specific location, which limits the data. Challenges related to climate change and pandemics were also not touched upon.

Policy recommendations:

Agroforestry: planting more trees, especially fruiting species, with government incentives to preserve the soils from erosion, make them more porous, and benefit from ecosystem services as well as offsetting carbon. Land incentives to cut the parcels into smaller ones and have several smaller farms (reducing monoculture). More funding in

research on the specific weeds and more effective ways to kill them individually with a less labor-intensive method. Finding ways to make more people interested in working on farms to increase labor.

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5.2 Infertile Grounds: How Organic Farmers Maintain Soil Fertility

Corinne Byus

Introduction:

When you go to the grocery store, what are you drawn to? Which products call your name, what aisles are they in? If you close your eyes right now and imagine, can you picture the layout of your local grocery store? The smells of the bakery, the child grabbing a pack of oreos off the shelf, the organic produce getting in their morning mists every 15 minutes. We all notice these small things but how often do we notice what is going into our food and how it gets from start to finish. How does our “fresh” and “organic" produce get from seed to product?

Organic farming, according to the United States Environmental Protection Agency, is classified as food grown and processed without the usage of synthetic or chemical fertilizers (*Organic Farming | US EPA*, 2022). Under these guidelines in the United States, less than one percent of produce farms can be classified as organic. This means of the six percent of overall organic food sales, in the U.S, more than five percent of these products come from places outside of the U.S. The lack of organic farms in the United States may be because of the risks that organic farmers face, such as, climate change, loss of biodiversity and a lack of pest control options. So, how do these “organic farmers” maintain soil fertility without the use of chemical fertilizers and at what cost do these practices come to the environment?

Research Methods:

In order to answer the questions of 1) how organic farmers maintain soil fertility without the usage of chemical fertilizers/pesticides and 2) how these practices alter the environment, a variety of research methods were used. These included, a mixture of online data from various websites and databases, videos, personal experience from working on an organic farm and an

interview with an organic farm manager. My familiarity of having worked on an organic farm steered me towards the topic of soil fertility, the interview provided deeper context to the challenges that organic farmers face and the online sources provided me with additional evidence to support the claims of these challenges. While offering a wider perspective which I could not get with only one interview.

Findings:

The biggest risks that organic farmers face when becoming organic under EPA criteria are soil degradation due to previous lack of biodiversity, a lack of protection against pests, and competition from weeds. Unlike organic farmers, conventional farmers use inorganic materials in order to combat pest populations, chemical herbicides to prevent the spread of weeds and the usage of monoculture cropping in order to ensure profit. The combination of reliance from these kinds of products and methods strips the land of necessary nutrients and completely destroys biodiversity. In order to combat this organic farmers use tactics such as crop rotation, organic fertilizers, intercropping, and cover cropping to add much needed nutrients back into the soil. The more nutrient rich and biodiverse the soil, the higher the crop yield will be.

Analysis:

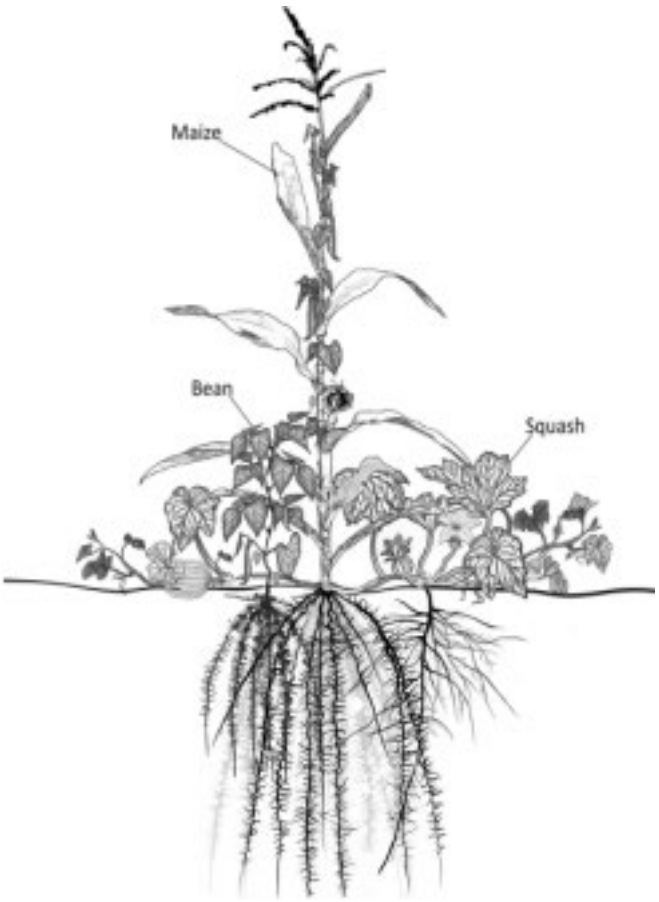
This past summer, in 2023, I experienced first hand working on an organic farm, in southern Vermont. In order to ensure the soil remained nutrient rich, we would use a combination of crop rotation, organic fertilizers and intercropping. Crop rotation is integral to

biodiversity, on any farm, because crops require different amounts of nutrients and minerals. For example, tomatoes are heavy feeders of nitrogen, phosphorus, potassium, calcium, and magnesium, so, if tomatoes are being planted in the same plot year after year without these minerals being reintroduced into the soil or the crops being rotated, the ground will become infertile and the yield will decrease year after year.

A natural method to combat this extreme drainage of nutrients would be to switch up the crops in the bed and introduce natural and organic fertilizers/mulches into the plots. A few natural fertilizers that we used to put nutrients back into the soils were blood meal, fish emulsion and hay mulch. Blood meal is a by-product of animal slaughter, usually cattle and pig, where the blood of the animal is turned into a powder and acts as a high source of nitrogen for the soil. Fish emulsion fertilizer is made up of fish guts, fish waste and sometimes even whole fish. Both blood meal and fish emulsion fertilizers are used for plants that develop best in soils that are high in nitrogen. The last way that we would incorporate nutrients back into the soil was by spreading decomposing hay mulch and compost around the crops. As the hay mulch was in the first stages of decomposition it would add nutrients back into the soil as well as serve as a cover over the ground so that there was less room for weeds to compete with the intentional crops. Another method of nutrient reintroduction, which was not used on my farm, is directly using animal waste. At Common Harvest Farm, in Osceola Wisconsin, farm managers Dan Guenthner and Margaret Pennings rent farm animals, such as cattle and goats, to graze their land for short periods of time and these animals provide manure which goes back into the ground as important nutrients that plants need to grow. This is a beneficial relationship because nutrients are being

put back into the soil and the animals are gaining access to new grazing spaces.

The methods of intercropping and cover cropping go hand in hand. Intercropping is the practice of growing multiple different crops in close proximity, and cover cropping is the practice of planting crops that cover the soil and may later enrich the soil via decomposition later on. A prime example of intercropping and cover cropping working together to enrich the soil and protect the crops is the Indigenous method of planting the Three Sisters. The companions in the Three Sisters are corn, squash or pumpkins and beans. The first sister, corn, provides stalk which serves as support for the beans to climb up, the second sister, beans put nitrogen back into the soil through the *rhizobia bacteria,* a nitrogen fixing bacteria, which live in the roots of the crop. Additionally, the beans add an additional means of stability for the corn by climbing the stock. The third sister(s), squash and pumpkin, interchangeably, provide wide spreading leaves which cover the ground and prevent the growth of weeds which would be competition for the crops. These leaves also shade the ground which prevents the evaporation of moisture from the soil. When squash is planted in the Three Sisters, rather than pumpkin, the leaves provide an additional support as pest control. This is because squash leaves are prickly which deter animals from stepping on or going through them to get to the fruits.



Another organic method of pest control which ties into soil nutrient enrichment is that the smell of blood meal is a deterrent to animals such as deer, rabbits, and moles. While talking to Dan, he outlined that in his gardens he chooses to use “Have a Heart” traps, which are a catch and release trap.

Additionally, in the beds that he had spread out blood meal there had been a lower presence of herbivorous behavior - although, there was no exact confirmation as to whether or not this lack of activity had to do with the blood meal.

Limitations:

A big limitation that I had run into during my research process was a lack of multiple inputs from farmers. I was unable to attend the field trip to Common Harvest Farms, so I did not get the chance to see how their organic farm ran as well as ask the farm managers specific questions regarding being an organic farmer in the Midwest. Although I did have an interview with a farmer, he does not work in the midwest, so his experience and expertise may not be one hundred percent transferable to farming practices here. Because of this I tried my best to supplement this lack of multiple in person professional farmer inputs by using a short interview/documentary I had found online, and research and academic articles written about organic agriculture.

Conclusion/Repercussions:

As we continue on through more western methods of farming we are seeing an increase in organic farming which is contrary to the projected trajectory. Organic farmers face many

challenges and risks by being a minority in their field. Organic farming reintroduces nutrients into the soils, increases biodiversity and symbiotic relationships and produces food that has a healthier effect on the surrounding communities. With this being said, although this method is sustainable it is not free of environmental consequences. A big consequence of organic agriculture is land usage. In order to produce a profitable crop yield without the usage of chemical/inorganic materials, organic farmers need an increase of acreage in order to plant more crops. The increased production of these organic crops yields the same amount as a conventional farmer yields.

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5.3 When the Water Runs Dry

Charlie Chinander-McFaul

Introduction:

Minnesota, Wisconsin, and many parts of the upper midwest are currently in their third year of drought. Agriculture in these areas has been seriously affected and the need for drastic overuse of irrigation has only grown. Long and unprecedented droughts like this are only expected to increase in the future due to climate change, threatening the long term sustainability of agriculture in the region. This has led me to ask the question: What effect will the climate change induced droughts and compounding overuse of water for irrigation have on agriculture in Minnesota and Wisconsin? In this paper I will first detail the methods of research I used to answer my research question. I will then discuss my findings in two major sections: the drought's effect and the sustainability of overusing groundwater for irrigation. Next, I will conclude my findings and discuss possible solutions or alleviations to these problems

Research Methods:

I took a few different steps to answer my research question. Initially our class visited a CSA (Community Supported Agriculture) farm in western Wisconsin called Common Harvest run by farmers Dan and Margaret. This portion of my research was the only field research I conducted. The visit consisted of a tour of the surrounding countryside near the towns of Somerset and Osceola. Then, a tour of the entirety of the farm grounds themselves. At the farm we were free to ask questions and take notes

about our observations. During the tour of the surrounding countryside and the farm itself, I was able to take notes and ask questions on crop yield observations, drought observations, and irrigation trends.

After this, my research switched gears to reading articles and government updates. I looked at various articles from the New York Times or agricultural specific newspapers to get a wider sense of the drought situation in Wisconsin and Minnesota. This is where I found many helpful facts and broader themes to fill in the gaps of what I had learned on the Common Harvest farm tour. However, I wasn't entirely done yet with my questions about Common Harvest and their opinions on irrigation and drought. I ended up emailing Dan and Margaret to ask clarifying questions about certain costs associated with irrigation and what their opinions on the future of agriculture in the region would look like.

Findings, Analysis & Discussion:

For the past three years the upper Midwest has faced unprecedented droughts, with the drought of the summer of 2021 being one of the worst Minnesota has ever recorded (Searcey and Rojanasakul). This year, as of October 3rd, 100% of Minnesotan acres are in drought, and while of course these acres range in severity of drought, this is still an incredibly troubling statistic. Crop yields have been significantly reduced due to this region-wide drought (Hefley).

When visiting the Common Harvest farm in western Wisconsin run by farmers Dan & Margaret, we were shown a tour of the surrounding farms. Here the effect of yet another year of unprecedented drought became starkly apparent. The corn was a few feet shorter than what was usual and looked to be somewhat drained of color. The fields of soybeans were overrun with weeds, and we were told that the total amount of soybeans in the field was less than half the usual amount at this time of year. Even the bodies of water in the surrounding area had shrunken by multiple feet.

The corn had shrunken so significantly because it had not rained during corn's crucial pollination period. Corn has roughly two weeks during which it pollinates and if it faces stress

during this period, commonly due to water shortage, it can have a detrimental impact on the crop's health and yield (Moseley). The soybeans, as well, had not received enough water during important stages in growth making the crop not tall enough to tower over weeds, leading to the situation we saw on the farm in which many of the crops died in competition over water, sun and land with weeds.

Both of these crops are incredibly abundant and important to the agricultural industry in the upper midwest. Corn and soybeans are grown on about 75% of all of the Midwest's agricultural land (USDA). This really puts into perspective how important these crops are to the region and just how disastrous these droughts are for Minnesota and Wisconsin.

The aforementioned reduced crop yield comes even after excessive irrigation of crops has been required for farms to stay financially afloat this year. Without irrigation, the devastation caused by the drought could have been expected to be significantly worse. Dan and Margaret of the Common Harvest farm stated that irrigated farms have seen three times the amount of crop yield than farms that have not, as well as much higher quality crops as well (which overall have still significantly less quality and quantity than previous non-drought years). Significant water is also required for crops to be rated highly in the USDA's crop grade, as they need to be aesthetically pleasing without significant blemishes or strange sizes (Searcey and Rojanasakul). This all adds up to an extreme competitive disadvantage if you do not use excessive irrigation in times of drought. Consequently, Farmers both big and small have relied on irrigation an enormous amount this summer. This type of over reliance on irrigation is incredibly unsustainable for a multitude of reasons.

Dan and Margaret told me that the cost of irrigation is one of the biggest of their annual expenses in dry years. This is because of the large amount of energy it takes to pump the water

up from aquifers, and the cost of maintaining and purchasing the capital required to irrigate. Capital such as the pumps themselves and the various networks of pipes, hoses and sprinklers.

While I was touring the surrounding countryside outside of the Common Harvest farm, Dan spoke about how it was incredibly common for farmers to work second jobs, rely on family members working outside of agriculture, or to somehow utilize their land for making money in some sector outside of agriculture (eg. hosting wedding venues or leasing land for radio towers). This was due to the fact that farming is already not a lucrative job as rent is high and it takes a lot of costly capital to maintain a modern industrial farm.

Additional large costs associated with having to irrigate compounds with the significant loss in agricultural yield means that the cost of maintaining a farm has increased a significant amount. This is especially worrying because of the difficulty farmers already have from making a living from just farming.

Another cost of irrigation comes from labor. Margaret told me that in years where a lot of irrigation is required the amount of physical labor that is needed increases by a significant degree, as there is a near constant need to set up and tear down irrigation pipes and sprinklers. This can change on a day to day basis, meaning hours upon hours of extra work added to an already physically exhausting and demanding job.

This also comes at a time when finding labor to work on farms in the upper midwest is fairly difficult. On our tour, Dan spoke about how a lot of farms struggle to find labor to help upkeep their farms, as a lot of people are not interested in working on farms for the amount of pay that can be provided. A lot of times the work is done by a few seasonal workers, many of them being high school students.

Perhaps the biggest long term negative impact on our increasinging reliance on

irrigation is the draining of well water from aquifers. In Minnesota 75% of drinking water and 90% of irrigation water comes from aquifers (Minnesota DNR). During these past three drought years, both Minnesotan and Wisconsonian farmers have been pumping water from aquifers far beyond the state allowed amount at rates beyond the natural recharge rate of aquifers (Searcey and Rojanasakul). This has caused the expansion of pumping for irrigation into aquifers that we don't know the full extent of yet, or aquifers that have been historically used for non agricultural reasons, like residential areas, forcing a competition between the two (Searcey and Rojanasakul). Ellen Considine, a hydrologist who works for the Minnesota DNR said, "we may not be leaving enough groundwater for future generations" (Searcey and Rojanasakul).

This issue is also mainly being exasperated by large scale corporate farms such as the ones of the agricultural company R.D. Offutt. R.D. Offutt was responsible for almost a third of the 6.1 billion gallons of groundwater that was pumped above Minnesota's groundwater collection limit for the year of 2021 (Searcey and Rojanasakul). With the rising costs mentioned earlier in this section, such as diminished crop yield and expenses around pumping and irrigation, as well as the eventual shrinking number of aquifers, it appears that smaller farmers with more of a vested interest in maintaining their homes and farms will be pushed out. This will leave large companies who have the money and influence to meet these costs to absorb more and more land - companies like R.D. Offutt who have shown their disregard for sustainable groundwater management.

This practice of excessive groundwater extraction is plainly obvious to anyone with even a bit of foresight to be completely and utterly unsustainable. As Dan said to me in one of our email correspondences, "across the country we are seeing aquifers pumped at entirely unsustainable rates. Aquifers are simply not being replenished at the rate that they are currently

being pumped. At some point in the near future we may have to make some difficult choices about water use and distribution." If things continue on as they are, we will simply not have enough water to meet all of our societal needs. However, realistically we cannot just stop the pumping of groundwater either, as climate change is only set to increase the severity and frequency of droughts across the World (C2ES) and reducing irrigation would cause disastrous crop disturbances. We are currently driving towards a brick wall at top speed. The future of agriculture in the upper Midwest is bleak, and drastic action will be required to create a sustainable system for agriculture, or there will almost certainly be a disaster that will make our current three years of drought look like nothing.

Conclusion:

In conclusion, climate change and the increased need for irrigation points towards a future of incredibly unsustainable groundwater use which will have detrimental effects on the agriculture of Minnesota and Wisconsin. Increased costs for farmers associated with drought and irrigation together with a future of less and less water to go around for said irrigation likely means that large scale corporations will absorb more land, and continue to swallow up more and more water to feed their monocrops. This will likely not only be an issue in the upper Midwest, but the entirety of the United States of America. Possible policy changes to help alleviate this impending disaster and push for more sustainable groundwater use could be the polycultural agricultural practices. When touring the Common Harvest farm, I noticed they grew a multitude of crops, not just Corn, Soybeans and alfalfa like many of their neighbors. Dan said that many of their crops did suffer, even with irrigation, but some plants still flourished such as their tomato fields. Instead of using endless gallons of water to force a single crop like corn or soybeans to grow, farmers could diversify their fields so that even though they may not all succeed it is likely

a certain portion would, thus requiring less water overall. However, this is an incredibly complicated issue, attempting to completely solve it goes beyond my abilities or the scope of this paper. Though something must be done to both sound the alarm and alleviate the worst effects of the impending water shortages. The way water is being used as it is simply not sustainable.

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5.4 The Ecological Ramifications of Drought on Farmsteads

Unitas Vang

Introduction:

Since the 1800s, an increasing reliance on the burning of fossil fuels for energy has led to a long-term shift in temperature and climate patterns at an unprecedented magnitude in what has come to be known as climate change. Alongside an increasing global temperature, disruptions to the Earth's climate have led to an influx of detrimental conditions that include, but are not limited to, an increase in rates of water scarcity, fires, natural disasters, and, as will be discussed more in depth in this paper, droughts (Nations, n.d.). A drought can be best defined as a period of time in which the lack of rainfall leads to a shortage of water, which can especially impact agricultural regions of affected locations in a multitude of negative ways that extend beyond just an absence of water. On one end of the spectrum, opportunistic weeds take advantage of the weakened competition, proliferate vastly and extensively, taking resources meant for crops while animals and other potential pest species take from farm yields in search of water and food. On the other end, soil quality becomes at-risk as water and other nutrients dissipate from the surface and subsoil, leaving behind land that grows more difficult to deal with by the season. Faced with these complications brought on by drought, farmers often find themselves struggling to secure their harvest for the season. As a result of this, some are forced to resort to using methods that offer short-term solutions rather than long-term ones in order to remedy the problem, placing the sustainability of farmed goods at risk as time goes on. It is imperative to understand what these methods are and what effect they might have on farms in the future in order to create a more sustainable lifestyle and farming culture in the face of such trying times.

Methods:

One aspect of the research for this paper was a visit to the Common Harvest Farm in Northwest Wisconsin, led by farmers Dan Guenthner and Margaret Pennings, who provided us with a tour of their 40-acre farm as well as a tour of the surrounding farm territories. For context, Common Harvest Farm is a community supported agriculture (CSA) movement, which pushes for a more sustainable alternative to the industrialized food system by providing customers locally sourced products with the caveat that they share the risks and benefits of the farm's production. By doing this, they aim to create a mutualistic relationship between growers and consumers that directly contributes to sustain the future of the farm.

The two tours that occurred directly referenced the state of the crops, the soil quality, the interpersonal relationships amongst farmers, and the relationship between farmers and the government. Dan and Margaret also provided us with first-hand accounts of a multitude of scenarios relating to their experience with the care of their farm and the cultivation of their crops. Additional supplemental research was performed online as well in order to record statistics and to collect any other relevant information as well.

Findings, Discussion, and Analysis:

First and foremost, before the tour bus even arrived at the Common Harvest Farm, it was clear to me that this past summer was not the best harvest season. In fact, the National Centers for Environmental Information (NCEI) reported that about 41% of the Midwest was experiencing a drought, with the worst effects occurring in the Upper Mississippi River Basin – the location of the Common Harvest Farm. In fact, Wisconsin was reported to have reached a Drought Severity Coverage Index (DSCI) of 248 by the end of the summer, which tied it for first place as the highest since 2000, when the records first began ("August 2023 Drought Report", n.d.). Crop production was not doing well and was especially expensive due to the

need for irrigation; Dan mentioned that some farmers had already been forced to resort to using winter feed to sustain their livestock due to the inability to keep up with the trying conditions of the drought.

What caught my attention, however, was when we approached a field of short looking corn where I first heard of issues with weed management and competition between plant species. It was mentioned that the corn in that particular field was exceptionally short given the season; many of the crops planted there were in direct competition with the weeds that plagued the area. Competition refers to the system of interactions between organisms that both require a limited supply of resources. In a more normal scenario, the growing corn would have outcompeted the weeds by shading them, making it more difficult for weeds to grow due to a lack of sunlight. In this case, however, a lack of water stunted the growth of the corn which stood at about three feet tall as opposed to the normal eight to ten feet of properly hydrated corn. This flipped the dynamic of the competition on its head entirely, allowing for the weeds to completely dominate the field. In order to combat this, farmers must remove weeds manually or by herbicide, the former of which takes an incredible amount of time and manpower, and the latter of which can lead to numerous other problems including runoff, soil contamination, and toxicity to other unintended target organisms. When factoring in annual crop losses due to the proliferation of weeds, it is estimated that weeds cost agricultural institutions about 33 billion dollars nationwide (Wong et. al, 2022). Weeds are among some of the costliest pests farms face today and serve as

an extremely detrimental force both economically and ecologically in long-term cases and their removal calls for solutions that are neither time efficient nor ecologically sustainable.

Upon arriving at the Common Harvest Farm, another problem became apparent to me as

Dan led us through the fields of his vegetable crops. There were mounds in the dirt on many different occasions that he mentioned belonging to gophers, who frequently ate the roots and fruits of the plants he grew there. While he very briefly touched on the subject, Dan also mentioned that there had been an increase of animals taking food from the farm due to the drought in an effort to get water, especially from the tomatoes and eggplants. While he named raccoons and gophers as the main culprits in his case, the world has been seeing an increased rate of human-wildlife interactions as resource scarcity due to climate change has begun to affect human and animal behaviors (Abrahms et. al, 2023). During times of drought, this typically manifests in animals migrating into human spaces such as farms, villages, or cities in search of food and water. Gophers, which are such problematic pests in agricultural locations like Dan and Margaret's farm, are so detrimental to the cultivation of crops that there even exists a bounty for trapping and relocating them. For other species, like insects, the solution is not as simple as just trapping and relocating, however.

An example of a common pest that affects farms all over the U.S. is the Colorado potato beetle *Leptinotarsa decemlineata*. One of the most common ways to combat insect pest infestations is to utilize insecticides, which effectively poison and exterminate the proliferation of such a species. Ecologically, the use of insecticides has many of the same detrimental effects as using herbicides, but insects have the potential to develop resistance to such tactics. One of the biggest factors leading to an increase in insecticide resistance within pest populations can be traced back to neighboring plants not receiving the same amount of insecticides, which can be exacerbated by drought due to the varying amounts of water in the soil (Khodaverdi et. al, 2016). Because more moist soil favors water and insecticide uptake, droughts can lead to the opportune environment in which pest populations can develop resistance to such toxins. This

has disastrous implications for the future as pests that cause harm to crops become more difficult to handle, which places the sustainability of growing such crops at risk.

Drought does not only lead to insecticide issues in soil either. Dan spent much of the time touring the Common Harvest Farm explaining how detrimental the drought was to the soil quality. In fact, it was so detrimental that in an effort to explain the difference in soil quality to us, Dan had to dig at four different sites from opposite corners of the farm to help us envision what the dry, crumbling, clay-infused surface and subsoil was supposed to look like. As mentioned before, damp soil favors water uptake which is crucial for moving nutrients from the earth into plants and vice-versa. The drought makes it more difficult for this exchange to occur, which can cause complications for plant health as well as for the soil environment around it. Soil organisms and microbial communities that can beneficially affect plants are also impacted by this change in environment as they are generally controlled by how damp and warm the soil is, both of which change greatly when prolonged periods of drought are being experienced ("How Drought Affects Soil Health", n.d.). It is not only plants at risk when water runs low; soil depletion and the loss of beneficial soil bacteria can feed into a negative feedback loop of worsening soil quality.

In showing and comparing the different soil samples from the farm to each other, Dan also remarked at how difficult it was to reach the subsoil by shovel in certain places. This phenomenon is called soil compaction and can occur when the earth is pressed tightly against itself, reducing the space between soil particles. While this can be caused by the heavy machinery used to man the land, droughts often exacerbate the effect of soil compaction on the farm. Aside from the immediate issue of compacted soil being difficult for plants to grow roots in, which can cause development problems as crops grow, soil compaction can have negative

impacts on crops and soil microorganisms because of the reduced pore size of compacted soils, which have a reduced rate of water infiltration, drainage, and gas exchange due to their size ("Soil compaction", n.d.). The rise in water and aeration-related issues as a result of drought has been made clear time and time again in each of Dan's analyses of the soil quality of his farm. Some farmers might attempt to combat this by using fertilizer to reintroduce nutrients to the soil, but this often is only a short-term solution as issues like runoff, a decrease in soil fertility, and nitrogen leaching may occur, all of which threaten the sustainability of maintaining efficient soil quality for future seasons to come.

Conclusions:

At its core, climate change can be found responsible for many of the detrimental effects experienced by people all over the world. The Earth is a massive system that itself is built upon more interconnected systems within it; when one aspect of the world changes, so do many others, as can be observed with the many side-effects of drought that do not immediately correlate to a mere lack of water. To reiterate the points stated throughout this paper, drought has led to the proliferation of weeds and other non-native plant species that can now outgrow and compete with crops like corn for resources. It has also led to the increased rate of human and animal interactions as wildlife is forced to move into more stable environments like agricultural hotspots to find food and water even at the growers' expense. Finally, issues in soil management, specifically in managing the nutrient count and subterranean microbiome have all led to adverse long-term effects that can persist even after periods of drought have ended, which especially

harms the claims of a more sustainable alternative to agriculture that smaller farms like Common Harvest want to bring to light. Solutions to these problems, like the use of fertilizers,

herbicides, and insecticides, all culminate in band-aid level solutions that only work towards solving the immediate problem. In addition to this, they often introduce a multitude of negative impacts on the environment that lead to the propagation of other issues like water contamination, algal blooms, and a decrease in biodiversity. These kinds of solutions often leave out the true root cause of the issues themselves: climate change. While it is not simply enough to say to increase restrictions on the burning of fossil fuels or other potentially environmentally hazardous actions in an attempt to lessen the impact of climate change, it is a worthwhile proposition to make in order to lessen the effect it has on our agricultural lifestyle in the future. Alternative ways to manage voracious pests like weeds or the Colorado potato beetle are also necessary, perhaps by way of utilizing the natural ecological interactions between native plant and animal species in agricultural methods like agroecology. Either way, managing the sustainability of farmsteads in trying times can be difficult and is far outside the scope of this paper. In the meantime, it is important to understand how the methods we use in an attempt to achieve sustainability in the present affects the world around us in ways more than what we might immediately expect.

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Chapter 6: Agency

By Carmen McLaren, Isaac Owen and Ella Ruskusky

6.1 Farmer Agency: the Path to More Sustainable Agriculture

Carmen McLaren

Introduction:

Agriculture in the United States accounts for 10% of the country's greenhouse gas emissions, and this does not include onsite emissions (*Sources of Greenhouse Gas Emissions*, 2023). The number of farms in the US is steadily decreasing due to a multitude of reasons such as the declining economic viability of farming businesses and "corporate consolidation" (*The Number of U.S. Farms Continues Slow Decline*, 2023) (A. Schwagerl, personal communication, October 5, 2023). In addition, the agriculture industry is highly vulnerable to the effects of climate change, with crop yields, crop losses, annual variations in crop production, and soil and water quality and quantity being the major factors impacted in Minnesota (*Climate Impacts on Agriculture*, 2023). Farmers have experienced a second consecutive drought year, revealing that although farmers have always had to deal with adapting to climate challenges, climate change could be a "risk multiplier" that amplifies "existing risk factors" (Lane et al., 2019, p. 14). This combination of challenges–agriculture's contribution to climate change, climate change's impact on agriculture, and the immediate issues impacting farmers–require innovative solutions. "Greater [farmer] agency encourages innovation and creativity," which begs the question of how farmers' agency can be leveraged to address farmer-specific challenges and environmental and agricultural sustainability (D. Guenthner, personal communication, September 30, 2023). Therefore, the aim of this paper is to examine the most significant factors impacting agricultural sustainability and adaptation to climate change through the lens of farmer agency.

The rest of the body of the paper is organized into sections consisting of research methods and the findings, analysis, and discussion of the research. Five major factors impacting farmer

agency, sustainability, and climate change risk mitigation will be discussed. These factors are financial challenges in farming, the ways in which farming knowledge is retained and acquired, how farmers are hindered by ties to traditions and external systems, the social pressure farmers face, and the role of government and external bodies in encouraging and discouraging sustainable agriculture.

Research Methods:

To address this question, a variety of sources are referenced to compile factors that impact farmer agency and ultimately sustainability. Online sources from academic journals procured from the Dewitt Wallace Library databases and Google Scholar and non-scholarly articles are employed. Sources that incorporated interviews from farmers were found to be the most fruitful as agency is a very individualized concept. I will also draw on observations and information from a visit to Common Harvest Farm in Osceola, Wisconsin. This CSA farm is organic, small-scale, and situated on forty acres of land. The visit provides insight into the specific operations and challenges associated with small-scale CSA farming, as well as the recent condition of other conventional or industrial farms in the immediate area. An email correspondence with Dan Guenthner and Margaret Pennings, the owners of the farm, provides greater knowledge about my specific inquiry. I also received insight from an email correspondence with Anne Schwagerl, owner of the organic Prairie Point Farm in Browns Valley, Minnesota. Lastly, I conducted a Zoom interview with Jason Garms, agricultural program liaison of the Minnesota DNR and owner of an organic farm in Round Lake, Minnesota. The geographic scope of my research is the Midwestern United States, Kansas being the westernmost and Indiana the easternmost states considered.

Findings, Analysis, and Discussion:

Finances are a major theme in my research: "money is a real motivator" for farmers considering how "narrow the profit margins are" (D. Guenthner, personal communication, September 30, 2023). In the 1970s, the US government started removing policies from the New Deal era that established a reserve price for crops produced. Nowadays, commodity prices are mostly determined by the global market, which favors farms that can expand and become more industrial (Semuels, 2019). Farming as a business is becoming harder and harder to sustain, evidenced by 90% of farmers in Wisconsin having additional off-farm income (D. Guenthner, personal communication, September 30, 2023). In order to improve their livelihood or remain in business, farmers often must take the risk of buying new equipment and technologies to increase their yield. If this doesn't pay off, debt can accumulate and stunt a farm's economic viability. While driving through the farmland of Osceola, Dan explained that many farmers in the area have rented or sold some of their land to make ends meet. Dairy and livestock farmers in particular face financial challenges–these "were the only farm type to report lower earnings in 2021…down [by] 25% from…the previous year." Average milk price has been down and production expenses have also increased (Report on Minnesota Farm Finances). Those that are forced to leave farming often take "the businesses…with them," creating more disparities for farming communities (Semuels, 2019). Also, the organic premium "has narrowed considerably," creating a huge barrier to farming organically (D. Guenthner, personal communication, September 30, 2023). "Adaptive capacity is dependent on profitability," and therefore farmers are unable to adapt to climate change or implement more sustainable farming methods if they are unable to overcome financial constraints. The higher order concerns of farmers–"family, community, and lifestyle"--must be addressed before any real innovation can occur (J. Garms,

personal communication, October 11, 2023).

A series of financial pros and cons for conventional and organic agriculture exist that can help to explain the dilemmas farmers face. In the case of conventional farming, input prices--such as fertilizer and equipment–are on the rise, constraining farmers' budgets. In particular, chemical resistance poses a major threat to the livelihoods of conventional farmers. More and more chemical inputs are needed to have the same effect, and growingly there are pests that no longer respond to certain chemicals (Brown, 2021). Also, conventional farmers are subject to market and price volatility–"even a couple percent decrease in exports is enough to cause the dairy market to collapse" (Lane et al., 2019, p. 7). That being said, conventional agriculture is highly subsidized by the US government, and farmers can receive crop insurance when yields are low (Saylor Mase et al., 2017). Despite the very low corn yields due to the drought this summer, Dan explained that many farmers in his area were actually hoping that the rain would hold off so that they could benefit from said crop insurance.

In terms of organic agriculture, some farmers do benefit from the higher prices consumers are willing to pay: "the added value of organic crops makes it possible to make significant money off of even 25 to 100 acre (10 to 40) farms" (*More Consumers Buying Organic, but Farmers Still Wary*, 2022). However, according to Dan and as mentioned earlier, the supposed price benefit is becoming less and less relevant. As I observed at the Common Harvest farm, CSA farmers in particular have a lot of flexibility in marketing, meaning that there is a relatively shared understanding between farmer and customer. For example, farmers have the freedom to change what they give to customers based on the success of certain crops for that season. This along with a more diverse array of crops makes the model more resilient to climate change. Plus, the CSA model is detached from most external systems that can prevent

farmers from being given leeway (D. Guenthner, personal communication, September 30, 2023). However, “the caveat here is that [farmers] are constrained by the organic program rules,” which can impede farmers’ profitability by prohibiting practices such as selling produce that has touched the ground. Lastly, unlike with the case of crop insurance, “there isn’t really a ‘bail out’ option for organic producers” (A. Schwagerl, personal communication, October 5, 2023) (D. Guenthner, personal communication, September 30, 2023). Overall, money is a huge impediment to adaptation or consideration of more sustainable practices in agriculture. This issue of finances is a common denominator, but other factors to be discussed combine with it to create a vicious cycle.

Different cultures exist surrounding methods of obtaining or harboring knowledge farming knowledge. In this way, openness to sustainability and climate change risk mitigation practices may correlate with where and how farmers get their information. Many farmers are connected with others in their area, “[relying] on their farming peers and their own experiences,” especially those of “extreme weather and seasonal changes” to inform their decisions (Lane et al., 2019, p. 8). According to Dan, conventional farmers in particular are “not as independent as the narrative has led us to believe”: much of their decisions tend to be dictated by “seed and chemical reps or bankers.” Therefore, many farmers “rely on Extension, consultants, or companies [to] bridge recent research” (Lane et al., 2019, p. 9). Also, climate change-related “management practices [are] more likely to be recommended by conservation advisors, while financial and crop advisors” tended to provide more short term advice such as “hybrid seeds and crop insurance” (Church et al., 2018). Conversely, during the farm visit, Dan occasionally referenced scientific research articles while explaining phenomena on the property. After dealing with an unprecedented Palmer amaranth problem, Dan did research and theorized that the weed’s

seeds were being spread by the cows' manure. A farmer's access to and method of obtaining knowledge seems to influence the autonomy they have over their practice (and vice versa), thereby impacting their decisions about sustainability.

Furthermore, some farmers today are so disconnected from their business that they live miles away from the land. Some farmers have been bought out and have to commute to work on land they no longer manage (D. Guenthner, personal communication, September 30, 2023). Jason Garms' immediate neighbors live across the country, and he has never met them before. The owners have transferred all control over to a farm management company, and according to Jason likely do not know how the land is being managed and don't mind because they only have to give up a small fraction of the profits. This presented a problem when Jason wanted to install a wind turbine on his land as part of a program and was unable to get into contact with the neighboring property's owners for their required approval. The turbine would have awarded Jason and his neighbors thousands of dollars–"a total game changer" (J. Garms, personal communication, October 11, 2023). In this way, farming knowledge is growingly consolidated industrially, taking away the potential for independent farmers to innovate. A common theme in my research is that priorities and level of flexibility impacts implementation of adaptation strategies. Many farmers carry a responsibility to carry on a method of agriculture or are "beholden to past generational farming regimens," which can lessen their likelihood of exploring more experimental alternatives (D. Guenthner, personal communication, September 30, 2023). To deal with recent cold and wet conditions that are detrimental to cover crops, Anne is "shifting more to fall-seeded rotation crops…and heavy cover cropping to spread out that workload in tight planting windows" (A. Schwagerl, personal communication, October 5, 2023). Shortening planting and manure-spreading windows are a growing issue due to climate change

and a shortage of labor (Lane et al., 2019, p. 11). More industrial farmers have also had to choose between investing in "larger equipment to get more done in less time" or "buying smaller, lighter equipment to reduce soil compaction (Lane et al., 2019, p. 7). Conventional farmers' decisions rationally perpetuate their method of agriculture, but "there are some subtle changes taking place with the adoption of some conservation measures by a majority of the conventional farming community." Lastly, there are many barriers to transitioning to more sustainable agriculture such as organic: "organic systems require a totally new mindset with lots of challenges of their own" that farmers may be unequipped to undertake (D. Guenthner, personal communication, September 30, 2023). More immediately pressing, "switching to organic is expensive, and for farmers…who are already deep in debt, not an option" (Semuels, 2019). Therefore, it is very difficult for farmers to improve their environmental stewardship without proper funds and knowledge.

One of the greatest threats to conventional agriculture is chemical resistance, and this reliance on chemicals can leave a farmer with a lack of agency. Farmers are forced to try new strategies such as cover cropping and "planting [their] rows closer together," but they still have to make a profit and more frequent extreme weather events such as drought "ahead of the harvest can throw everything out of whack." A farmer in Kansas has expressed his reluctance to use a very dangerous herbicide paraquat, saying it's "something that [he] really [doesn't] want to use." He started using it out of desperation due to Palmer amaranth resistance, and even paraquat is becoming ineffective for him. The alternative to using chemicals "would mean totally rethinking [a farmer's] operations," risking abandoning the non-integrated approach that their business has been built on (Brown, 2021). In this way, many farmers experience a lack of agency that can prevent them from making changes they theoretically would like to.

Farmers also face a multitude of social pressures that can hinder their flexibility. Conventional farmers in particular "[receive] a mixed message from the USDA." The government still backs a productionist approach, encouraging farmers to expand, "maximize yields" and profit, "feed the world," and also paradoxically "be better stewards of the land and natural resources" (D. Guenthner, personal communication, September 30, 2023). This narrative can create an ideological barrier to sustainable adaptation, especially due to its frustrating nature. There are also anti-agriculture sentiments from consumers and external entities alike that tend to "[impose] on [farmers'] operations…with little understanding of the realities of [their businesses]" (Lane et al., 2019, p. 12). Increasingly farmers feel "that they are serving as scapegoats to the broader public," which can create mistrust of conservation efforts. Consumers can also have a limited understanding of sustainability, for example an abandonment of the use of rbST may force farmers to use more resources "because [their] income took a 10% hit" (Lane et al., 2019, p. 11). Lastly, mental health issues and suicide is a significant problem in farming communities, especially in those most impacted by corporate consolidation and indebtedness (Semuels, 2019). All of these social challenges farmers face are barriers to innovation.

Perhaps the most important or influential factor that impacts farmer agency is government involvement. For the purposes of this section, I am assuming that greater agency leads to greater implementation of environmentally sustainable practices. To reiterate, even though the USDA has been growingly encouraging environmental stewardship, US agriculture depends mostly on industrial, conventional farming and consequently subsidizes these crops immensely to offset market fluctuations. The National Organic Program has issues in many areas, one being the favored certification of industrial organic farms over small-scale farms (D.

Guenthner, personal communication, September 30, 2023). Regulation by governmental bodies such as the Minnesota DNR can also be frustrating for farmers. Because the standard for environmental stewardship is always rising, farmers often perceive the DNR as moving the "goalposts" (J. Garms, personal communication, October 11, 2023). There may not be adequate measures to reward early-adopters of sustainable practices. Farmers also face inadequate compensation for disasters: "crop insurance nor flood insurance would cover" an Iowan farmer's flood-destroyed corn that had "already [been] harvested" and "stored in a grain elevator." A small dairy farming family in Minnesota hasn't received much-needed aid because "the assistance goes to farms with the most farmland and animals" (Semuels, 2019). The shortcomings of government assistance and regulation contribute to a lack of stability for farmers.

Even so, there are many ways in which government and other external bodies encourage adaptation and sustainability in agriculture. In August 2022, the USDA rolled out a program to better assist farmers in transitioning to organic, "[committing] up to $300 million" (*More Consumers Buying Organic, but Farmers Still Wary*, 2022). Anne uses conservation programs through the Natural Resources Conservation Service such as the Environmental Quality Incentives Program and the Conservation Reserve Program (A. Schwagerl, personal communication, October 5, 2023). A newer, more experimental program called the Agriculture Water Quality Certification is being pioneered in Minnesota. Being MAWQCP certified provides farmers with marketing opportunities, priority for grants and implementation assistance, and fixed water quality "goalposts" for about a decade. The opportunities for compensation for carbon sequestration are growing as well, a concept that makes sense agriculturally no matter one's belief system (J. Garms, personal communication, October 11,

2023). Carbon markets are decentralized and difficult to navigate, and there is a push to keep monetary benefits within the supply chain. Several organizations and companies exist–some in collaboration with local governments–to assist farmers in this process, such as CIBO Technologies, the Iowa State University Extension, and the North Central division of Sustainable Agriculture Research and Education (Tammie). In general, the accessibility of and awareness around environmental incentive programs is growing, providing exciting opportunities for farmers.

Conclusion:

A main takeaway of my research is that a vicious cycle exists in agriculture, where the discussed factors affecting agency combine to create powerful barriers to both sustainable adaptation and stability in farming. This complexity seems to be understood in the sources I have gathered, as all discussed at least two factors at once. Farmers work within systems whether they are local, regulatory, governmental, regional, or global. Therefore, it is crucial that farmers are able to exercise agency within these structures to manage their businesses in the way they want to. Of course, agency does not always correlate with sustainability, but the goal is to empower and incentivize farmers who are interested. How can farmers voluntarily join the environmental stewardship movement?

Historically, governments especially at the federal level have significantly impacted the way in which agriculture is done in the Midwest. Due to the importance of economic viability, I see incentive programs as the most effective way to promote farmers' business interests and climate-smart practices. However, exacerbating mistrust, resentment, and scapegoating in the farming community through imposing means must be avoided. It is also important that private innovation is not impeded by government involvement. Overall, policy should be promoted

around what can be provided rather than what will be done. The potential for farmers' reliance on accurate climate and weather information to be leveraged in technological development has been established as a way to increase climate change resiliency in a less politicized context (Lane et al., 2019, p. 13). Also, it would be prudent for any program or initiative to have more accessible tool-kit resources as many farmers most likely navigate them outside of an advisor or their immediate community. Most importantly, I believe that a balance must be struck between addressing the need for environmental improvements in agricultural systems and recognizing the validity of farmers' knowledge and experiences.

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6.2 Agency's Climate Struggle

Isaac Owen

Introduction:

In recent years we have seen farmers struggling to maintain agency over their crops as the country has been faced with drought,rising temperatures, and other climate irregularities. This paper looks through the broad scope of agency, the control the farmer has over his decisions on the farm as well as the consumer's decisions of what to buy, and how it is affected by the environmental crisis in several different ways: In the midst of economic and climate shocks, are farmers feeling less agency over the running of their farms? Does the CSA model afford the farmer greater agency over running their farm? Does the CSA model lead to the loss of agency over food choices? What is the most effective way for consumers to express their agency in the local food system? The more specific question investigated in this paper is the relationship between the agency of a farmer and the agency of the consumer. If a farmer has more agency over their crops does that affect the consumers agency in a positive or negative way? Will they have more choices and/or cheaper prices when the farmer has more control over the decisions on the farm? Is this the same for large farms and CSA (Community Supported Agriculture) models?

Research Methods:

The first thing that needs to be looked at is the overlying problem that is being looked at, and that is just how drought, higher temperatures, and these climate irregularities affect the crops themselves. This is important because if the crops are negatively affected by these things then the farmer already has less control over what they are able to plant. It would also mean that they would have to put more work and money into making sure that their crops are able to

survive. Since soy, corn and wheat are the three biggest exports in Minnesota, those will be the crops looked at and referred to in the paper (Ye 2015). Looking into drought we know that the lack of rain means that crops will be more likely to wither and dry out, but how exactly will it be affected in the coming year? Hotter weather means the crops will need more water to survive so these two variables greatly affect each other as well as the crop yield.

After finding more information about how the climate irregularities impact crop yield. It is obvious that they negatively impact the crops and the farmers ability to produce the same yield that they might have been used to producing in years past. From the consumer's perspective, how does a lower crop yield affect the availability and price of the product? The only part that needs to be researched for this part is how the price is affected. This is because if there is a lower crop yield then that would directly translate to the product being less available and more scarce. In order to not find data that could be caused by reasons other than climate irregularities, data on both availability's impact on price as well as how drought impacts price. From there the relationship between the agency of the two have to be compared through the information collected in the data from the previous sections. To see if this is not just due to economic trends but is actually because the farmer has more agency, the next piece of data needed is on farms that can be used as a control. Farms like this are ones that are not greatly affected by climate irregularities and are able to produce a higher crop yield. The thought is that if they do not have to struggle against the climate then they are able to grow their plants in the way they want to much more efficiently. If the data shows that higher crop yield means lower prices then we can conclude that because more control equals higher yields and higher yield equals lower prices that the positive agency for the farmer equals positive agency for the consumer. They do not necessarily have to buy more to have more agency but the lower price means that more people

have the agency to purchase the product. This does not work in the opposite direction for farmers and if it does I do not aim to find that.

The final thing looked at was the CSA model and if it has the same agency trend that is exhibited by regular farms. The information needed from this other than the yields and consumer activity is just how differently the CSA model is. How are they different and how are they similar? Is there a negative financial impact for the consumer or will they just have less products? Do CSA farms have to adapt more than other farms that can just plant more crops?

Findings, analysis, and discussion:

Minnesota is the third largest producer of crop exports (in terms of money) in the United States (Ye 2015). Out of the 14.6 billion dollars the top three: soybeans (1.8 billion), corn (829 million), and wheat (377 million), make up 20.6% of agricultural exports from the state (Ye 2015). The University of Nebraska-Lincoln published a paper on a lot of data that shows how not only is Minnesota receiving less rainfall but this will directly impact the corn yields for this year.

More in general here is what they said about the middle of the country in terms of rain and crop yield, “Lack of rainfall and high temperatures during the last portion of the seed filling led to a reduction of the projected end-of-season rainfed yields by nearly 5% compared to our previous forecast” (Grassini 2023). Examining more closely table one shows that average rainfall is lower for each of the three farms that they looked at in the state of Minnesota (Grassini 2023). Not only that but the university claims that although it will not be as bad as last year there is still a fall off in the average crop yield for corn in most states:

> “Overall, the 2023 yield scenario appears to be slightly more favorable than the previous year (2022) but is still 6% below the long-term average. Compared to the 2022

> season, forecasted yield is higher for the current 2023 season for rainfed sites in NE, southwestern IA and southern KS. Conversely, 15% or more lower yield is forecasted for southern MN, northeastern IA, and MO compared with the previous year" (Grassini 2023).

In 2012 there were extreme weather conditions in terms of heat and lack of rainfall. This caused the price of corn to skyrocket to a price that was much much higher than it has ever been, "As a result of drought-related crop damage, U.S. export prices for corn soared nearly 128 percent above the 20-year historical average, as measured by the Bureau of Labor Statistics (BLS) monthly export price index" (Adonizio 2012). This price spike was attributed to the climate irregularities but prices can also vary based on availability of the product. Using this data we can conclude that not only did the drought cause the crop yields to fall by up to 15% for this year, but if trends are similar to 2012 there will also be a spike in the price of corn. The farmers are not able to produce the yield that they would like to due to the lack of rainfall in the area. This will translate to the supply going down. When the supply drops but the demand remains the same prices are likely to rise because people still have to purchase these products. The scarcity makes the product more valuable due to the fact that it is less available in the market. But what about CSA model farms?

The CSA model works in a very different fashion. These areas are supported by a community of people, hence the name community supported agriculture, and they pay not only to get the products that they need but also to directly support the farm financially. "Community Supported Agriculture (CSA) is a production and marketing model whereby consumers buy shares of a farm's harvest in advance" (Roos 2020). This type of farm is an investment that you have to make depending on how the season is. If the season is longer then there will be a

higher price but also more products. If there is a shorter growing season then the yield and price will each be lower. In this the consumers help the farm to increase their yield in the face of some of these struggles. Another big difference is the fact that these farms don't just grow one crop like some of these other farms that are big exporters. This means that they are more able to adapt to the climate. Some of these farms will even let you pick up your produce at different times, not just when the season is over, "In return for their membership fee, consumers receive a variety of freshly picked vegetables (usually organic) every week" (Roos 2020). Also because they give the farmer money and input before the growing season, the people have more of a choice over which crops are grown. This is a much different type of agency than we see in other models. With this one people have more of an option on what they get to eat and the price that they pay at the beginning could be used to divide the produce up based on the percentage contributed to the farm. So yes in times where there is less agency due to climate irregularities you will see a lower crop yield in almost every location. But the way it affects the consumer is different between the two models. In the CSA model less agency by the farmer leads to a lower crop yield but this does not cause the price to rise in the same way that it does in the other model. In the other one since it is not a "subscription" they have to pay for each individual item so the individual price for each item will go up. The CSA model will not cause the price to rise but instead it might actually go down since you will be receiving less products than in years with normal yields. These could in turn have similar effects since if something is more expensive you are likely to get less of it, but the amount you receive is not directly affected by this.

Conclusion:

In the midst of economic and climate shocks, are farmers feeling less agency over the

running of their farms? Does the CSA model afford the farmer greater agency over running their farm? Does the CSA model lead to the loss of agency over food choices? What is the most effective way for consumers to express their agency in the local food system? In conclusion, due to the climate irregularities farmers have less agency over their farms. They are not able to produce the yields they would like to produce and in some instances are not able to use crops that they may have relied on in the past. In the CSA model the farmer does not necessarily have more agency but instead they are able to specifically plant their crops to give the people that invest in them the crops that they want. This would make it seem as though the CSA model leads to the consumers having more agency of the farm during most regular circumstances. This model also gives you more variety when it comes to choosing which type of produce you would like. This might also be the most effective way for a smaller community to express agency for what kind of crops they would like. Sadly we do not live in small communities much anymore so it is much more difficult to make a model like this successful, because when there are climate irregularities, the smaller CSA farms lack the funding to maintain the success over a long period of time.

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6.3 Consumers' Agency in Local and Commercial Food Systems: The Relationship Between Agency and Sustainability

Ella Ruskusky

Introduction:

Within the Community Supported Agriculture (CSA) model, farmers have more agency over their produce compared to farmers whose crops are being mandated by large corporations. Instead of planting monocultures, CSA farmers choose to implement diversity into their agricultural practices. CSA farmers are not tied to commodity crops and can prioritize produce that will ideally result in the best outcomes considering the various environmental challenges. Because CSA farmers grow their crops without regulations from industrial corporations and often do not receive government subsidies, they can only stay in business through the support of their members. But, within a CSA system, consumers have arguably less agency regarding their specific produce choices than they would within a large commercial food system. Unlike walking into the grocery store and grabbing an avocado, CSA members do not get to choose what types of produce they will see when they open their CSA box. But, that is not necessarily a bad thing. CSA consumers are trading in their agency for the promise of sustainability and are given an integral role in the food system they chose to be a part of.

This essay will broadly address the relationship between consumer agency and sustainability within a local food system compared to a commercial food system. First, I will highlight the methods of my research which include interview questions and the positionality of the interviewees. I will then address how both non-CSA and CSA members perceive agency, or the lack thereof, regarding local food systems. This is followed by an exploration of unsustainable commercial produce practices. Lastly, I will suggest a possible option to increase

consumer agency within CSAs.

Research Methods:

Information for this essay was gathered through online sources and personal communication. The first step was a course-led trip to a CSA farm, Common Harvest in Osceola, Wisconsin, where I spoke with the owners Dan Guenther and Margaret Pennings. I later followed up with Margaret via email with some clarifying questions and background information. During my research, I relied heavily on interviews from both CSA and non-CSA consumers. Interviews were partly conducted in person but predominantly via email. All of the interviewees referenced in this essay consist of the mothers of my friends and I. All of these mothers, both CSA and non-CSA consumers, are white, suburban, and middle class. They all shop for a household between four to six people and live in Illinois, Minnesota, and Wisconsin. These interviews attempted to understand why some families prefer CSA farms while others choose to shop at the commercial level. How does agency and sustainability affect their perceptions of these two food systems? To get a better understanding of the CSA model from the consumers point of view, CSA members were asked these questions:

1. How long have you been a part of a CSA?
2. Why did you decide to join a CSA?
3. Do you think CSA's are worth the price?
4. What do you expect to find in your box each week? Do you have expectations?
5. How does the produce you receive fluctuate during the season?
6. Have you ever been disappointed with what you received in your box?
7. What do you do in the months in which you do not receive CSA produce?

8. During the CSA season - do you supplement CSA produce with any produce bought from grocery stores?
    a. Where else do you get produce besides the CSA?
    b. What do you think of the quality/price of grocery store produce compared to CSA produce?
9. Have you noticed any changes in the types of produce you have been receiving on average this season compared to past seasons?
10. Have you noticed a quality decrease of CSA produce this season compared to others?

In order to compare CSA members' experiences to the experiences of commercial consumers, non-CSA members were asked these questions:

1. Where do you shop for produce?
2. Are there certain fruits or vegetables you buy every time you go to the store? 3. Do you ever go home without being able to find the kind of produce you want? a. How do you deal with this? (go to a different store, substitute it with something else, give up and hope it's there next week)
3. Are you dissatisfied with the price of your produce?
4. Have you noticed a price increase of produce these last few seasons?
5. Have you had to change your purchasing preferences this season?
6. Have you noticed a quality decrease of produce this season compared to others?
7. Have you ever considered joining a CSA (Community Supported Agriculture)?

a. If so, what has deterred you from joining one?

Findings, Analysis and Discussion:

When asked, "what has deterred you from joining a CSA?", almost all of the responses from non-CSA members were in some way connected to the lack of agency they anticipated having over their produce. While all of the non-CSA members shared that they had at one time debated joining a CSA, not being able to control what fruits and vegetables they received was the main drawback in their decision to continue shopping at their local grocery stores. The most common response to this question was that the interviewees' children were too picky for them to justify buying into the CSA model. In these interviews many of the non-CSA members made a point to mention their efforts to minimize food waste. Perhaps they felt pressured by the nature of the interview to appear more eco-conscious within the commercial food system, but in many cases food waste is equated to financial waste. One interviewee expressed that her children refusing to eat butternut squash or bok choy would be throwing away money that could be better spent at the grocery store on a safer food like a potato or carrot. On the surface, having to throw away a piece of produce holds more personal and financial responsibility to the consumer than purchasing an avocado at the grocery store that was shipped from thousands of miles away. The commercial food system is more tailored to meet the individual needs of consumers than the CSA model. This approach often lures consumers into a food system that works for their family's preferences but is entwined with unsustainable farming practices.

Being able to get what you want whenever you want it has become a common expectation in the American commercial food system. Yet, CSA members continue to be satisfied within their local food systems. All of the CSA members that I interviewed reported that they have never been disappointed with the contents of their CSA box. Having a lack of

agency over specific produce in the CSA system does not mean that CSA members are voiceless regarding their food. It is quite the opposite. Marcia Ruth Ostrom argues that the "very concept of CSA restores a sense of agency to local communities" (Ostrom 2007). The close link between producers and consumers in the local food system allows consumers to have more choices over their economic and environmental impact in their community. CSA members may not be able to choose to receive three tomatoes, an avocado, and a pound of strawberries in their box each week, but they have chosen a food system that guarantees the produce they do receive are not contributing to unsustainable farming practices.

Over the summer my youngest sister, Laurel, wanted to go strawberry picking at a local strawberry field but, because of the low rain levels, the season was too short to drive to Schaer's Country Market in East Peoria, Illinois. This summer, Schaer's farm was only open for a total of six days compared to the three week long season in 2022 (Schaer's Farm Market, n.d.). Yet, my family is able to buy strawberries from the local Aldi all year long. Schaer's Country Market is a small local farm, but unlike CSA, they only produce one type of produce for each season. If a crop fails due to environmental conditions, the producers and consumers are simply out of luck for that season. In the last few years, there has been a drought significantly affecting farms in the Midwest, yet, none of the non-CSA midwestern consumers reported that they have had to change their purchasing preferences at their commercial grocery stores. Unlike Schaer's Country Market, large industrial farms that practice monocropping supplement their crops with additional resources to produce a yield during a season of drought. In times of drought, large food production companies with high-priority water rights are able to increase their irrigation usage. Increased irrigation causes erosion which decreases the productivity of the soil and forces industrial farms to supplement their crops with additional chemical fertilizer to reintroduce

nutrients into the soil. During a drought, the soil is often too dry to absorb the amounts of water that irrigation provides all at once. This water is not absorbed into the roots of the plants and leads to water runoff. Runoff picks up the pesticides and chemicals used on commercial monocropping fields and transports them into streams, rivers, lakes and oceans. This downstream degradation of water is a serious environmental threat to plants, animals, and humans.

In many areas of the United States, tropical and out of season produce are always available. If you can afford it, consumers are given the option to buy avocados in the Midwest and strawberries in December. Because more than half of the interviewees mentioned that they regularly purchase avocados at conventional grocery stores, one CSA member and three non-CSA members, I attempted to examine the unsustainable availability of year-round avocados in the Midwest. The orange “From Mexico” sticker found on 75% of avocados sold in the United States appears to many consumers as an authentic and organic stamp of approval. Consumers are often unaware of the environmental and social costs associated with avocado production and transportation. Transporting avocados from Mexico to the Midwest is an energy intensive process including shipping fuel and temperature-controlled storage resulting in a considerable carbon footprint (Eldridge, 2021). Avocado plantations have led to serious deforestation in Mexico and affect not only the environment but also local communities. In Michoacán, Mexico, the world's largest producer of avocados, forests have decreased around 20% between 2001 and 2017 due to avocado production (Kimin 2020). The level of agency that consumers are given in the commercial food system is detrimental to environmental sustainability. This Michoacán-to-US avocado supply chain is littered with exploitation of both people and the environment. Deforestation in this area is eliminating Monarch butterfly habitats, decreasing Michoacán’s

carbon mitigation capacity, and destroying yellow pine trees that local communities depend on (Kimin 2020).

Conclusions:

Commercial food systems in which consumers have a high level of agency over their produce choices subsequently result in low consumer agency regarding all other aspects of food production. For example, the consumers are only provided with shallow information regarding where their food comes from and how it is produced. Many consumers do not consider shopping at a commercial store to be a choice they are actively making. The United States has created an industrial food system that prioritizes fast and cheap food. There are many factors consumers have to take into account other than agency and sustainability like price, necessity, availability, and cultural norms. Non-CSA consumers should not be blamed for shopping within the food system that is marketed to them as the most convenient option. Large food corporations that are profiting off of unsustainable farming practices are the

In local food systems consumers have limited agency over specific produce choices, but they are reclaiming agency in areas that are lost at the commercial level regarding the production

and sustainability of their food. CSA members do not feel that it is necessary to choose what types of produce they will receive because they have invested their trust into the CSA model, the farmer, and the promise of sustainability.

While CSA members may not feel that agency is an integral part of the CSA model, there still remains an issue of non-CSA members refraining from joining CSA because of the lack of agency. A possible solution to bridge this gap and bring more members into the CSA model was raised by one interviewee. She mentioned that she is excited for her CSA to start a

"CSA tab" option as an alternative to the weekly box option. A CSA tab, also known as a flexible CSA, is often an upfront cost where members can pick their own produce from the CSA farm throughout the season. This option gives members the opportunity to pick the types of produce they want and avoid what they don't. The CSA model is not simply transactional; It is a partnership between the members, farmers, crops, and environment. CSA members are choosing to have a closer, more sustainable, relationship with their food and their community.

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