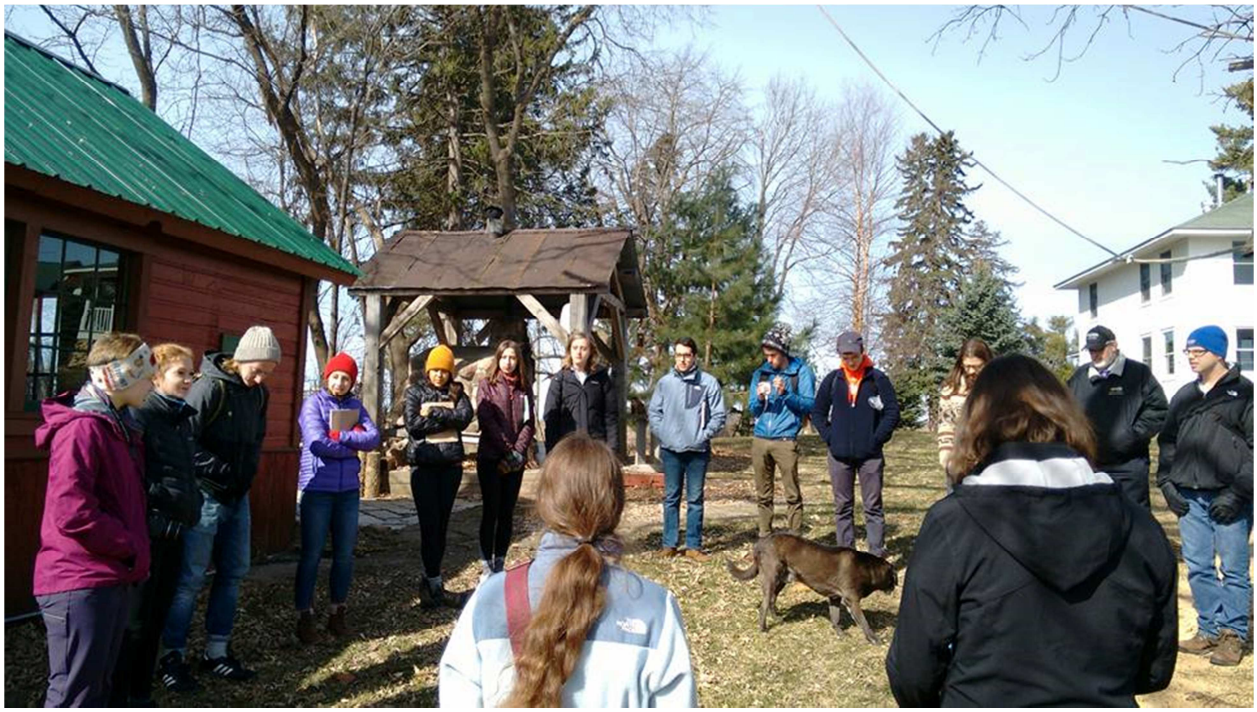
Exploring Community Supported Agriculture in Context



A Collaborative Research Exploration between Common Harvest CSA Farm (Osceola, WI)

&

The Students in Geography 232: People, Agriculture and Environment
Macalester College

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Prologue and Acknowledgements

The following report represents the collective efforts of 30 students co-investigating a series of critical questions related to Community Supported Agriculture (CSA) in Northwestern Wisconsin and the Twin Cities Metro area of Minnesota. During the March-May 2016 period, students in Geography 232 (People Agriculture and the Environment) engaged in a collaborative research exploration with Common Harvest CSA farm in Osceola, WI. Following on two previous years of collaboration, the course instructor and the co-owners of the farm developed a set of research questions that were of mutual interest. The questions identified were as follows:

1) How strongly do CSA members identify with the farm as physical place and a source of food and why?
2) What are the patterns of farming & livelihoods in Polk Country WI over time (& related explanations)?
3) How might CSA farms in the region anticipate and cope with climate change?
4) How might CSA farms better cater to minority and low income populations?

The class was divided into six research groups of five students. Research questions 1 and 2 were assigned one research group each, whereas questions 3 and 4 each had two groups. In order to prepare for their exploration of these questions, all students in the class read background materials on the region, soil ecology, farming, and the CSA concept. Common Harvest CSA co-owner Dan Guenther visited the class on March 31 to guest lecture about soil ecology, farming practices and the CSA movement. The class spent a full day on the farm on Saturday, April 11, during which time they received a tour of the area and then moved to the farm to learn about farming practices and the logistics of running a CSA. The six groups then spent the following two weeks collecting and analyzing data for their respective research questions. Students working on the first question interviewed CSA members, whereas those addressing the second question liaised with the Polk County, WI GIS officer to access local and state level spatial data to perform their analyses. Those working on the third and fourth questions combed through the academic literature, and reviewed case studies from around the country, to assess and assemble potential strategies for addressing the challenges of climate change or the needs and limitations of minority communities with respect to CSAs. The various groups presented their preliminary findings to the farm owners in late April before penning their reports which are each included as sub-chapters in this document. While the quality of the individual reports may vary, together they represent a rich and exciting 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.

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. We are also grateful to the Civic Engagement Center of Macalester College, and especially Paul Schadewald, for providing financial and logistic support for this exercise.

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Chapter 1: How strongly do CSA members identify with a farm as physical place and a source of food and why?

The Findings of Research Group 1 (Mara Short, Mollie Donohue-Meyer, Mike Curran, Steven Placht & Laura Gould)

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Motivation and CSA Membership

Introduction

Community Supported Agriculture (CSA), gaining popularity over the last 25 years, is a way for people to purchase food directly from a farmer. This supports local and seasonal eating habits and encourages exposure to new vegetables and cooking techniques. Generally, a CSA farmer will have a specific number of shares available for people to buy, and, in return for purchasing a share, the consumer receives an assorted box of whatever vegetables the farm harvests for each week throughout the season. This allows farmers to have a sure customer base and more capital to work with at the beginning of the season (LocalHarvest.org, n.d.). Variations of this basic model are seen depending on the farm.

Common Harvest Farm is a CSA located in Osceola, Wisconsin. The farm is owned and run by Dan Guenthner and Margaret Pennings, who work hard to embody the CSA philosophy in their work through commitment to the land and various community-building efforts. Most years they welcome all members to their farm for the Fall Harvest, a potluck. “It feels like a recipe for community building. The celebrations are good, and not just business,” said Informant 22. Growing a wide variety of vegetables on the land, the forty acre farm provides fresh produce for around 220 shareholders each year. Common Harvest stands out from some other CSAs for the variety it offers (Informant 20), the open communication between the farmers and members, the transparency of the operation, and the community it builds.

The overarching purpose of this investigation is to explore how strongly CSA members identify with a farm as a physical place and source of food and why. To unpack this question, it is important to understand CSA members’ reasoning for buying into the model. By

understanding motivation, we can determine whether or not the farm as a physical space, source of food, or other factors are important to the CSA member experience. In order to do so, I investigate the sub topics of why people are CSA members and their motives for joining and continuing to be shareholders.

Literature Overview

Looking at past research and literature on CSA membership can be useful in framing the situation at Common Harvest Farm. Especially allowing us to compare the membership of Common Harvest to broader trends in CSA membership. Studies of CSA operations in Illinois and New Hampshire reveal quality of food to be the strongest motivator for membership. While community building and development of social capital are common in rhetoric surrounding CSAs, these did not play a key role for members of these CSAs nor were they noted as significant benefits. At the same time, the community aspect of these CSAs was an important motivator to members who wanted further develop their sense of community or to support local growers (Brehm & Eisenhauer, 2008). This is supported by many similar studies revealing that motivations for CSA membership stem from environmental concerns, supporting local farmers, and access to healthy foods (Cox et al., 2008). Convenience is another motivator that emerges. Often times if this is a strong motivator, the burden for community building falls heavily on the farmers' shoulders (Cox et al., 2008). Overall, the literature supports the major media representations of CSAs: people join for the food, the desire to support a local farmer, and environmental concerns.

Methods

In order to determine CSA members' reasons for joining, interviews were conducted by myself and four others. In total, we spoke with 30 Common Harvest members either over the

phone or in-person. These members were those who responded to an email sent to each of the 220 shareholders gauging interest in participation in this study and were also available for an interview in a week-long time frame. Of the 30 interviewed, 28 identified themselves as female, the average age was 49 over a range from 35-68 years with 18 members over 50. Despite this skew towards older, female members, CSA membership is generally a family affair and the average length of time those interviewed had been a member was almost 12 years. In addition, 20 lived in suburban areas, five in urban areas, and two in rural areas. We asked each member the same set of five questions and, if time allowed, further questions were asked to supplement members' responses. The questions are as follows:

1. How long have you been a member? How did you hear about Common Harvest?
2. What made you want to join a CSA?
3. Have you ever visited the farm? Why/why not? If not, how do you imagine the farm?
4. What is the community of the CSA like? What is your relationship with other CSA members and Dan and Margaret?
5. What are your values when you buy food/produce?

Findings

Through these interviews, different motivators were found for CSA members. While a range of motivators for joining CSAs was found in the literature, the interviews revealed that other motivations may be important in determining the nuanced relationship members have with the farm. To follow are the main motivators in food purchasing choices, motivators for joining a CSA, motivators for renewing Common Harvest membership year after year, and reasons that make CSA membership difficult at times. By looking at all of these factors, one can better understand the overall motivations for CSA membership.

While some members used similar valuation systems to buy produce, whether from Common Harvest or other retail locations, others admitted to their food choices changing

depending on a variety of factors. One member referred to her “CSA values” and “grocery store values” separately (Informant 8). Grocery store values are those values that come into play for members while shopping at traditional grocery stores like Cub Foods or Whole Foods. This still includes a broad range of consumer habits. These, for some interviewed, were often less about the quality of the food itself and more about factors such as price, practicality, and taste preferences. For those whose CSA values, which will be unpacked further in the findings for motivation for joining a CSA, carry over more into other consumer choices, different factors were elevated in importance. Buying local, organic, seasonal, and healthy were some of the most important factors for these members. While buying organic was mentioned as a priority value by over 75 percent of those interviewed, a few expressed that it was not important for food to be labeled as organic but instead that they knew where it came from and that it was produced in a way that was not harmful to the land. When supplementing CSA shares, about a third of members interviewed chose to go to co-ops or farmer’s markets instead of conventional grocery stores.

While values for general food purchasing were often similar to reasons for joining a CSA, they were only part of the reason for many members interviewed. Some of the most common reasons why members joined were for an opportunity to try a wide variety of high quality, fresh, and organic vegetables, and to keep healthy food in a household with young children. Although this was true for many, membership is often about more than just the vegetables. Members joined the CSA due to a desire to know their farmer and where their food is coming from, to support more sustainable agriculture, and to share the risk with a farmer. It is important to note that, although not all members referring to sustainable agriculture of knowing

their farmer explicitly mentioned this, multiple members interviewed specifically mentioned supporting Common Harvest because of the ethical labor behind it (Informants 5, 6, 8, 22).

While motivation for remaining a CSA member is well-aligned with reasons for joining, a few new motivators emerge or gain importance. The relationship many members have with Dan and Margaret, which goes far beyond the business, is key to continuing membership. In addition, members embrace the model of the CSA and taking on shared risk whether or not it was part of their reason for originally joining. In addition, the option offered by Common Harvest to "share a share" fosters relationships between members and even attracts people to the farm (Informant 23). Finally, when you have been a member of the CSA for a few years and experienced the fluctuations of the farm, changing membership simply does not cross the mind.

A couple of those interviewed were previously members but decided not to renew their membership for this season, or chose not to receive the winter share (Informants 9, 12, 19). One obstacle to membership is travel. If one plans to be out of town throughout the summer months, they cannot access the shares. Another obstacle is time. Although joining a CSA is convenient because the fresh vegetables are brought to you, chopping, storing, and cooking them, especially when one is unfamiliar can be burdensome to an already busy lifestyle. Despite this, the creativity and exposure to new foods and meals are also major draws of a CSA. Finally, when overwhelmed by the large quantities of food, waste may become a large issue. One member decided not to renew membership partially because her share partner was no longer able to do it and she felt that being part of a CSA, even for a short time, taught her how to shop, eat, and cook more conscientiously (Informant 9).

Almost all members interviewed learned about Common Harvest through another member or from the farmers. Very few interviewed chose Common Harvest Farm over other

CSA farms (Informants 7, 8, 20, 25). Informant 25 had the most unique case, having started with Common Harvest, switched, but returned to it because of its more "bountiful" boxes. This is important to note because it reflects the community of Common Harvest as well as alludes to the types of people who hear about Common Harvest. The two largest reasons for choosing Common Harvest by those who chose Common Harvest over other CSAs were the variety of vegetables and the farm's model (Informant 20). Dan and Margaret are very experienced -- emerging with their venture when CSAs first began to gain popularity -- and are constantly innovating to more sustainable farming techniques and teaching these to others. Common Harvest's transparency, open communication, option to split shares, and organic practices were also important draws mentioned by CSA members.

Analysis and Discussion

From these findings, I realized that it is possible to categorize the different motivations of CSA members into three general groups. The first is all about the food. These motivations are more about the business transaction that occurs than any of the deeper CSA philosophy. People are motivated to join CSAs because of the fresh vegetables they will receive in return for a not-so-expensive payment at the beginning of the season. Convenience and practicality also fall into this category. People who want to access a variety of vegetables and learn new cooking techniques like the "surprise each week" (Informants 4, 9) and that "you get what you get" from a CSA (Informant 30).

The second category pertains to the farm and farming practices. These motivations come from a place of environmental consciousness and a desire to connect with the land. Knowing where your food comes from and knowing who grows your food were the two ways members most often used described this type of motivator. Common Harvest is a local source of produce,

which 13 members mentioned as a strong motivator. This locality is valuable to members not just because their food travels less distance to their table, but because they are supporting a small-scale farmer who has the land's best interests at heart. This is exemplified in the 23 members who mentioned "organic" as an important value for supporting Common Harvest Farm.

The final category of motivators is that of the community and relationships Common Harvest creates. Only four members interviewed did not hear about the farm by word of mouth either from Margaret and Dan, another member, or a Common Harvest intern (Informants 5, 8, 17, 23). The five members interviewed who had been with the farm the longest (~20-26 years) all knew Dan and Margaret personally, many through their faith community, and two even mentioned wanting to support their friends in what was a new business venture at the time (Informant 24, 30). Only one member interviewed mentioned having never met Dan and Margaret and two additionally reported that they did not know them well (Informant 4 and Informants 8, 9, respectively). Those who did not know Dan and Margaret prior to joining usually got to know them and even considered them friends, which was a strong motivator to sustain membership.

Conclusion

Although almost all members interviewed mentioned motivators in two or more of the categories outlined above, it is important to see where motivation to participate in a CSA originates. There are business members, sustainability members, and community members. Each values a different aspect of the CSA: the food, the stewardship of the farm, and the relationships. A strong CSA caters to all three of these categories. Similarly to what the literature states, Common Harvest's members value the quality and variety of the vegetables they receive, but do not stop there. Many are motivated to sustain their membership because of the care and

commitment Dan and Margaret put into the land and the welcoming community they foster through transparency, open communication, and hosting farm events like the Fall Harvest potluck or work days at the farm. Broadening its member base through more outreach is one way Common Harvest may strengthen its community and spread sustainable ideals farther.

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Interview with Informant 8 via phone, April 18, 2016.

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Interview with Informant 30 via phone, April 21, 2016.

Building Community Through CSAs

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5 May, 2016

Introduction

To understand how Common Harvest CSA members identify with the farm as a physical space, it's important to understand how members participate in the community outside of traditional producer to consumer-based relationships. Food is a moving thing that can be experienced and shared in endless ways, so the physical spaces we should be unpacking shouldn't be confined to Osceola, Wisconsin — they extend to the CSA's drop-sites, connections with faith-based communities, and links to larger trends in the St. Croix Valley. This paper looks at the ways Dan and Margaret have built a community hub through their years of relationship-building, and how that community impacts members' lived experiences around food.

Methods

This paper builds on geography's long tradition of field work. In addition to a farm visit and an interview with Margaret, these findings are based on interviews with thirty CSA members who were each asked a standard five questions about their reasons for joining, consumption behavior, and overall impressions of Common Harvest. The following analysis works with one question in particular, which stated, "What's the community of the CSA like, and what's your relationship with other CSA members?", and the anecdotes that followed. I wanted to ground these voices in more concrete theory, so I've incorporated literature from the fields of community organizing and an environmental study covering the changes to the St. Croix Valley.

It's important to note that the general makeup of those interviewed was White, educated, female-identifying, middle-aged, and solidly middle-class. Thus, there was a lot of food privilege tied to their responses, which is a point we'll touch on later.

Discussion

The State of our Farms

It's important not to over-romanticize Common Harvest's community. The image of 220 families coming together over a shared box of food is touching. But members' experiences don't exactly reflect that sentimentality. Nearly as many members joined for the convenience of the farm's drop-off sites and fair prices as those who joined for these communal aspects. However, when compared to our current industrial food landscape, the Common Harvest model takes on a lot more significance.

Members were fed up with the anonymity of industrial food. They defined the current landscape as invisible and obscure, and saw their participation in Common Harvest as a form of resistance to that system.

> I still have family that farm the traditional way in Iowa and my dad has told me stories over the years about the change in those plants and how those plants they raise now on a traditional farm have been so genetically modified (Informant 18).

Genetically modified foods are a symptom of larger concern surrounding transparency. One member described the broad food scene that local farmers are "going up against" as feeling "a little like an underdog story."

> With local farms, you can see it [food production] with your own eyeballs and understand that information on a local level. It's not hidden behind some huge corporation. I prefer to have more transparency and understand where my money and my support is going (Informant 19).

Compare these anecdotes to the prevalence of food deserts in Madison (Heyn, 2012) — a city in the middle of some of the most agriculturally-productive land in the country — and the statistic that each United States-based farmer feeds an astounding 155 people (Pollen, 2006), and it's clear that our current food landscape has replaced community with convenience and cheapness. When we recognize the current system for what it is, we can recognize Common Harvest's work as a form resistance.

Spreading the Word

Margaret made it clear that the farm is grounded in relationship-building. "We want to welcome everyone to the table of sustainable agriculture. It's about people knowing people knowing people" (Pennings, 2016). Dan and Margaret have denounced competition in favor of a system that "gets rid of middle men to make stronger relationships," building a food culture that's absent from the modern food complex.

The community that Common Harvest has fostered also has strong, faith-based roots. Margaret cites their faith community in Minneapolis as the jumping off point for Common Harvest.

> We'd go to different groups who'd asked us to come and speak. People could sign up with the farm that way. We used to live in the Seward neighborhood and we were also a part of a couple peace and justice communities — one was the Community of St. Martin, and we grew out of that community. (Pennings, 2016).

Twenty-seven percent of those we talked to were actually led to Common Harvest through church affiliations. The CSA's connection to faith communities doesn't end with the sign-up. A member said her church relationships have been deepened through the CSA. "We belong to a church and we've had a few people who

also participate in the farm, so it's another way of connecting with church members" (Informant 18).

Faith communities — particularly those tied to liberation-based theologies — have a long history of community organizing at both a local and national scale. "Despite their limitations, churches may be the likeliest American institutions to serve as a base for widespread civic involvement," (Swarts, 2008). Once mobilized, this involvement is typically sustained. Many of the members with the longest-running shares signed up fifteen or twenty years back through their congregations.

Margaret said that their marketing strategies rely on "connecting through shared values." In faith-based communities, a foundation for building solidarity through common identity is already in place. Common Harvest's outreach plan begins at a community-level and goes on to deepen these communities, creating a virtuous cycle that all begins with the word of mouth. In a place like Minnesota where there are long-standing traditions of valuing the collective over the individual, building community in this way makes a lot of sense.

Sharing the Share

For a lot of members, particularly those in smaller households, buying a half share is the more realistic option. This reality allows an opportunity for meaningful relationships between folks who divide shares. One member has actually been able to maintain a friendship because of her shared investment.

> I actually split the share with a woman I used to work with ... That's been interesting because, even though I no longer work with her, she and I have split the share for so long ... It's kind of a cool way to stay in touch with her, but I probably haven't seen her in two years (Informant 15).

More than a couple members brought up a hypothetical question: “What am I supposed to do with all this kale?” While folks posed this half-jokingly, it brings up an important point. Sharing food helps rebuild a culture whose destruction food activists like Michael Pollan have written about extensively in their efforts to promote fresh food. The farm’s fourteen drop-off sites create platforms where members share recipes and notes about how they used all that cabbage or squash from the previous week. When you put this experience in conversation with the sterile, uniform shelves of the average grocery store, a share becomes a tool that’s able to connect and begin conversation.

Placemaking and the Nostalgia Factor

Beyond shared shares is an idea of shared place. The concept of placemaking gained traction in the 1960s when researchers like Jane Jacobs began focusing on the social and cultural importance of lively public spaces (Parham, 2012). Though this research centered on cities, Common Harvest has also become the site of vibrant social life and countered the industrial food system’s tradition of obscurity. The word “connection” came up in nearly seventy-five percent of interviews — whether that be connection to the farm, the food, or the farmers. Regularly hosted events like the annual Fall Gathering, which gives members a full walkthrough of the farm, allows folks to truly *connect* to both the fields and their neighbors.

This boots-on-the-ground involvement allows many members to get back in touch with their traditions, as at least seventeen percent of respondents actually grew up on a farm. All of those folks now live in the Twin Cities metro area. This is a window into a larger trend, as the St. Croix River Valley has become increasingly fragmented by

urbanization and outward expansion of the suburbs. To many of those who grow up on farms, the idea of sharing risk is a particularly important part of their membership.

> My biggest thing is that I take the risk along with the farmers. Because if there's a drought, our box is not the same ... and they'll write a little note saying "It's a little wet, so we apologize," and I always write a note back saying, "That's part of why I belong, because I take the risk along with you (Informant 15).

So regardless of how rapidly the upper Midwest — as with the rest of the nation — is urbanizing, there's still a lot of folks living in metro areas that identify with agrarian ideals and hold solidarity in the struggle of working the land. CSA investment is an extension of these values and a crucial bridge between the rural-urban divide.

Natural Human Capital

Multiple members were able to connect the dots between the environment and their very own existence because of their involvement in the CSA.

> Natural human capital (NHC) may be thought of as a portable asset in which we invest time and resources over a lifetime to increase our knowledge of the natural world. And, like natural capital, NHC draws attention to our dependency on the natural world for our collective survival (Macias, 2014).

For member #18 who grew up on a farm but now lives in a metro area, Common Harvest is one of these grounding places.

> Growing up on a farm, you get to be really familiar with the rhythm of the day and from sun-up to sun-down there's a rhythm in working the land. And in the city, I don't feel like you get that same sense of rhythm (Informant 18).

When describing the area surrounding Osceola, ten members used the term "beautiful." Others defined it as a "respite" or called it "wonderful." Common Harvest, then, provides a counter-narrative to general growth trends in the area. Following decades of deforestation and urbanization, "the lower St. Croix watershed is now a

human-dominated landscape characterized by straight lines, more uniform patch sizes, and rectangular shapes" (Anderson, 1996). Dan and Margaret have built an institution that creates real connection in the face of industrial predominance.

Social Capital

Common Harvest invests in its community. The farm hires three interns each season. Ten percent of members said that they connected to Common Harvest because they knew someone who worked on the farm previously. That's significant when you again consider how each farmer in the United States is responsible for feeding an anonymous 155 people. One of the greatest success stories coming out of Common Harvest is their training of the future organizers of Stone's Throw Urban Farm in the Twin Cities, which has converted fourteen different urban spaces into mini-farms in the past eleven years.

Nested under these large-scale mobilizations are the smaller, equally valuable anecdotes. That 20-year member has only made it out to the farm twice, but still has vivid memories of her time in Osceola.

> I pulled leeks out of the ground in the pouring rain. I mean, pouring. We went there and they fed us lunch and they dried our clothes, and I remember pulling a lot of leeks out of the ground (Informant 15).

In addition to making local hirings and holding an open door policy to any members who want to come out to the farm and work, Dan and Margaret put on regular workshops that are open to fellow farmers and to the public. In December, 2015, they organized a Midwest CSA Conference in Eau Claire, WI. In springtime, 2016, they're holding beekeeping workshops where participants can learn to keep their own hives.

Beyond these memories, the literature backs up the idea that knowing one's neighbors and creating this sense of "generalized trust" actually fosters environmentally-responsible behavior. Because members of Common Harvest are innately bonded together by their shared risk every time growing season rolls around, they're more likely to trust in the integrity of others. That trust is an indicator of environmental activism and civic participation (Macias, 2014), meaning the community Common Harvest has created has impacts far beyond the bounds of the farm.

Conclusion

We should celebrate Common Harvest's success and credit their ability to build community in a number of different ways. The fact that more folks mentioned community than convenience as a reason for investing in Common Harvest is no small feat. However, this community has borders when it comes to educational level, class, and race. The question then becomes, "How do we make CSA shares accessible to folks in low-income areas, particularly of color?" Perhaps it's too much to ask Dan and Margaret to promote accessibility on an individual level. But it's reasonable to assert that state governments in Madison and St. Paul should recognize the work that farmers like Dan and Margaret are doing, and support their style of radical community-building.

There are many examples of subsidized CSAs taking off in the United States. In New York, Just Share is a program that allows families to buy CSA shares using their EBT cards and pay in two-week installments (Brown, 2015). Also, farmer's markets across the country accept EBT benefits. Why can't this model be scaled to CSAs? When these subsidies are extended, who's to say what other connections are possible.

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Common Harvest CSA: Distance and Members' Relationship With the Farm in Space

Mara Short

Introduction:

Community Supported Agriculture ventures are an interesting marriage of urban and rural spaces, designed to connect people with their farmers and the land their food is grown on. People join CSAs partly for the food, but the connection built between urban areas and pastoral environments is also an integral part of the CSA experience, and part of what makes it different from other alternative food movements (Press & Arnould 2011). In particular, Common Harvest CSA in Osceola, Wisconsin not only provides fresh food to people in urban spaces, but also allows these people living in largely built environments to have a conceptual and physical connection with a natural space, and to feel a deeper connection with the land their food is grown on. In this paper I set out to explore how Common Harvest's members view the distance between them and the farm, and how they value, visualize, and connect with it as a physical space and an escape from a fabricated urban environment.

I first look at the distance between where members live and the farm's location, and how they perceive this distance between their residence and their source of food. The impression of this distance and the time constraints of urban life have resulted in varied extents of physical connection with the farm, as some members visit frequently, and others have only gone a couple times or never been. This pattern is typical even of CSAs that are located closer to their members (Perez et. al 2003). The experience of physically visiting has affected the connections of members with the land, as well as occasionally deepening their investment in the CSA. Many members, regardless of whether or not they have visited, seem to reflect an agrarian appreciation of the rural space, continuing the American tradition of idealizing agricultural areas, and the

tradition of alternative food as an escape from urban corruption and disconnect (Press & Arnould 2011). The idea of geographic space brings up questions of how people see distance, and whether CSAs should focus more on reconnecting urban populations to the land.

Methods:

Most of the data in this paper was obtained through phone and in-person interviews with Common Harvest Members, performed by a group of five researchers. The interviews were transcribed as they took place. We had a standard set of five main questions and a few supplementary questions to ask if time allowed. We asked:

1. How long have you been a member? How did you hear about Common Harvest?
2. What made you want to join a CSA?
3. Have you ever visited the farm? Why or why not? If not, how do you imagine the farm?
4. What's your relationship with other CSA members? What's your relationship with Dan and Margaret like?
5. What are your values in choosing food/produce?

The subjects were those who responded to an email to all Common Harvest members asking for voluntary, uncompensated participation in an interview, and who then followed up with us when contacted. Out of approximately 220 members, we conducted 30 interviews, which is about 14% of total members. We interviewed 28 women and 2 men, with an average age of 51. 11 live in urban areas, 17 in suburban areas, and 2 in rural areas.

Locations of people in relation to the farm:

The Common Harvest members we interviewed were largely from urban and suburban areas of the Twin Cities. Only two out of the thirty interviewed are from rural areas, including one from Osceola, the direct area. Four members grew up on farms, and so have a concept of what farming communities are like. Approximately five said they are from urban areas, and about nineteen are from suburban areas. This data shows us that most Common Harvest Farm

members live in urban and suburban areas, and are therefore geographically and conceptually distant from rural areas.

Most members are physically distant from the farm, but some perceive this distance as more of a barrier than others. The drive to Common Harvest from the drop sites in the Twin Cities respectively is between fifty minutes and an hour and twenty minutes *(See Figures 1, 2).* Several people from the cities found the farm quite accessible, but others stated that it was too far away to visit often or at all. One interviewee said that Common Harvest feels very close to her, because it is quite close to her childhood home (Informant 1). One woman from South Minneapolis said that the farm is "not far from the Cities," emphasizing more than once that she thinks it's not that distant from the Cities (Interview 22). Others have not visited at all because they see it as too far away to simply "drop by" (Informant 25). Most CSA farms that supply the Twin Cities are about sixty miles away from their drop sites, so Common Harvest's distance from its constituents is pretty typical in the area (CSA Farm Directory 2016). However, CSAs in other states like California and North Carolina are usually about twenty to thirty miles away, a far shorter distance (localharvest.org).

Patterns of Member Visitation:

Dan and Margaret of Common Harvest encourage their members to visit the farm, an offer that is accepted with varying frequency. Dan and Margaret host a range of events for their members, including a bike ride from the city to the farm, and a fall harvest festival allowing members to mingle and experience the farm (Common Harvest Newsletter, Spring 2016). In addition, members are encouraged to volunteer on the farm whenever they want. Twenty-two of the thirty families interviewed have visited on at least one occasion, while eight have not visited at all.

Those who have visited have done so for a number of reasons. Most interviewees who chose to visit did so because of their children. Many expressed that they want their kids to understand where food comes from, and to have a connection with the farmers who grow their produce. Members place value on the fact that they and their children get the chance to participate in the workings of the farm, which many say is important to maintain and create what most called a "connection or relationship with the land." The adults interviewed also believe it's important for themselves to connect with the land where their food is grown, and to remember not to take if for granted.

Although most members have been to Common Harvest farm once or more, there is a large amount of variation in visitation frequency. The event members mentioned most often was the fall harvest. Most people have been to the farm between two and five times, although about three or four said they go more often, once a year or more. Seven or so said they only have only been a "couple" times, and many expressed the desire to go more often.

Those who have not visited expressed regret, but cited their busy schedules and the farm's distance as their reasons for not partaking in the available activities. With their children's activities and their own busy lives and workweeks, most explained that they just couldn't ever find time for the drive. Most implied that distance was inconvenient to the point of being a barrier. "They're kind of far away from us, over an hour drive," said one member (Informant 4). Six members said that, especially with a family and multiple children, time is an impediment. Multiple members also mentioned that they visited more often when their kids were young, but now that they are older or out of the house, the whole family goes far less frequently. Most expressed regrets that they don't go more often. Most members' tones and statements seemed to

suggest that going to the farm is too inconvenient to do frequently; clearly the farm's distance is an impediment.

For most CSA members who did visit, seeing the farm in person seemed to make a difference in their opinion and experience. One member says, "it changed everything" for her in terms of commitment to the farm and the amount she values her experience of membership (Informant 1). Parents who have brought their children to Common Harvest believe that it has indeed given their kids a stronger connection to land, both by showing them that food comes from the ground, not a grocery store, and by showing them the effort that it takes to grow it. The adults appreciate the greater connection with their food and their farmers as well. Many emphasized the importance of appreciating the value and meaning of food, which they don't believe that people get in the urban/suburban environment of the Twin Cities. Overall, visiting usually had a positive effect on members, but some did still seem ambivalent. In a study done on Mid-Atlantic CSAs, a correlation (weak but present) was found between the number of times that a member visits their CSA farm and their satisfaction with their membership (Lang 2005), especially for urban and suburban members. This correlation reflects the way that the Common Harvest interviewees expressed their feelings about visiting; visits to the farm inspired strong feelings in many, but not everyone finds it so transformative.

Analysis: Perceptions of the farm and agrarianism/agrarian ideal

Although it may appear that members don't visit all that often, this seems pretty standard for CSA farms. On one farm only about 19 miles from its consumers in Central Coast California, still "only 34% had been to the farm on a regular basis ([including] those who pick up their share at the farm, and members who have visited 6 or more times on their own). Additionally, only 5% of the respondents reported doing any work for the CSA in the past year" (Perez et. al 2003).

73% of the Common Harvest members we interviewed had visited at least once, but only about 13% said they go once a year or more. The case study farm in California is half as far from its members than Common Harvest is from its members, and yet still very few visit often. Although people appreciate the experience, CSA farms can feel too far away to regularly draw members to volunteer and attend events.

This disconnect and distance may influence the fact that many of the ways in which members speak about the farm reflect the influence of agrarianism on alternative food systems. Agrarianism is a term that describes the American tradition of valuing farming and rural life as a peaceful, natural ideal that is superior to urban life, which is unnatural and degraded (Major, 2007). People in cities can easily have little or no connection to rural areas because of their geographical distance, as our interviewees explain through their desires to connect with the land and their limited connection to the physical location of Common Harvest farm.

This spatial distance has, in a sense, informed the agrarian ideal. Urban dwellers have an image in their mind of what a typical farm "should" look like, and it is easy for this image never to go corrected. We asked members who had not seen the farm to describe what they thought it looked like. Many of them had seen pictures of the farm in emails and newsletters from Dan and Margaret, and on the Common Harvest website. However, most also said that they expected a red barn, a greenhouse, and vegetable fields, which are stereotypical "farm" attributes. Although Common Harvest Farm does have these elements, these descriptions still show that agrarianism informs what urban dwellers see when they visualize a "farm," and creates a farm as a conceptual location with a certain set of characteristics.

Agrarianism's "emphasis on the relationships between people and land is the basis of its social criticism" (Major, 2007). CSAs are a way for urban consumers to join the American

tradition of viewing farming as an escape from the ills of society and urban life (Press & Arnould 2011). Many CSA members spoke of the farm with tones of wonder, whether or not they had seen it. One woman said, “it was magical. It’s a beautiful farm” (Informant 1). Another described “beautiful fields in a beautiful part of Wisconsin,” and she was “intrigued with Dan’s commitment to small-scale farming and connection with the land” (Informant 18). Another said it “looks like a great place to raise your kids, a beautiful place” (Informant 10). The word “beautiful” came up quite frequently. One woman said that going to a farm is her way of staying in touch with the land. She says, “you’re familiar with the rhythm of the day when you’re on the farm, whereas you’re detached from this rhythm in the city.” A core theme of pastoralism is “the desire to escape the noise, filth, and moral degradation of the urban environment” (Press and Arnould 2011). Common Harvest members clearly feel this, and see their membership in the CSA as giving them the opportunity to be part of the agrarian lifestyle. One woman said that it is a “respite not far from the cities,” and mentioned that she appreciated connecting with what it means to get food from the land and to be in an agricultural community (Informant 22). The idea that members espouse about visiting changing their connection to the land is directly in line with the concepts of the pastoral movement in alternative food, which offers alternative agriculture and pastoralism as a way to foster community while building connections with land (Press and Arnould 2011).

Conclusions:

Common Harvest represents more than just food; it represents a connection to an actual place in space. It allows urban people to experience their concept of the agrarian ideal, and to use alternative food as a way of connecting themselves with rural land. Common Harvest, like other CSAs, gives people a sense of being part of a rural lifestyle, and provides a physical place in a

pastoral environment to feel ownership of. This conceptually distances CSA members from the city, and the associated disconnect from food sources that is associated with a corrupted industrial food system (Press & Arnould 2011).

Because CSAs have a role in connecting urban people to agricultural land, this brings up the question of how best to do it. Clearly, members don't take full advantage of their opportunities, despite the fact that almost all members who don't go regularly expressed the desire to see the farm more. A common sentiment among members is that they can't visit Common Harvest Farm enough or at all because of distance and time constraints. Distance is an important factor in this equation. It can't be changed, but the perception of difference is far more important than actual distance. As the California CSA study showed, even being situated geographically closer to a CSA doesn't necessarily change member perception of it being far away (Perez et. al 2003). In addition, members of Common Harvest in the Twin Cities don't all think the farm is far away. This idea of distance is the greatest barrier to members visiting and connecting with the land, but clearly if this perception is changed, the farm feels far more accessible. If Common Harvest CSA aims to provide its members more access to land and agrarian spaces, it must overcome the barrier of inconvenience. If members did visit more, they might see that the drive is not so far as they expected. Since this is difficult to make happen, perhaps the Internet can be used to the farm's advantage. Providing a virtual tour or more photographs and accounts of members visiting can give busy families a greater sense of connection with land, and help them appreciate the labor going into farming without actually going. Additionally, this strategy may actually encourage members to make the drive more often. Another strategy is offering discounts in exchange for the member working on the farm one day every month, as other CSAs have done (Henry 2011). This would make the distance seem less

like a barrier, and visiting more of a realistic opportunity. The agreement may encourage people who can't find the motivation to finally make the journey they want to make.

Figures:

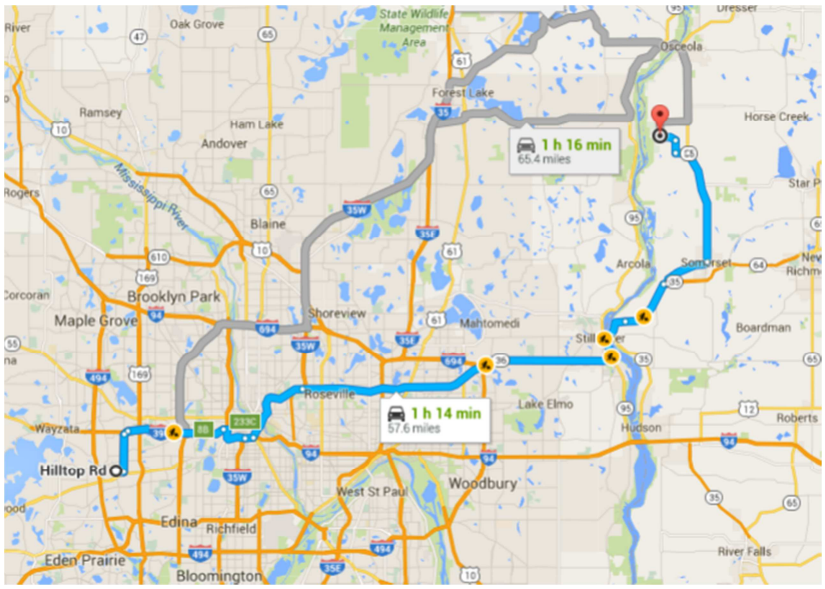

Figure 1: The Farthest Drop Site

The distance between Common Harvest Farm and the farthest drop site is approximately 61 miles, which is a drive time of about an hour and 20 minutes.

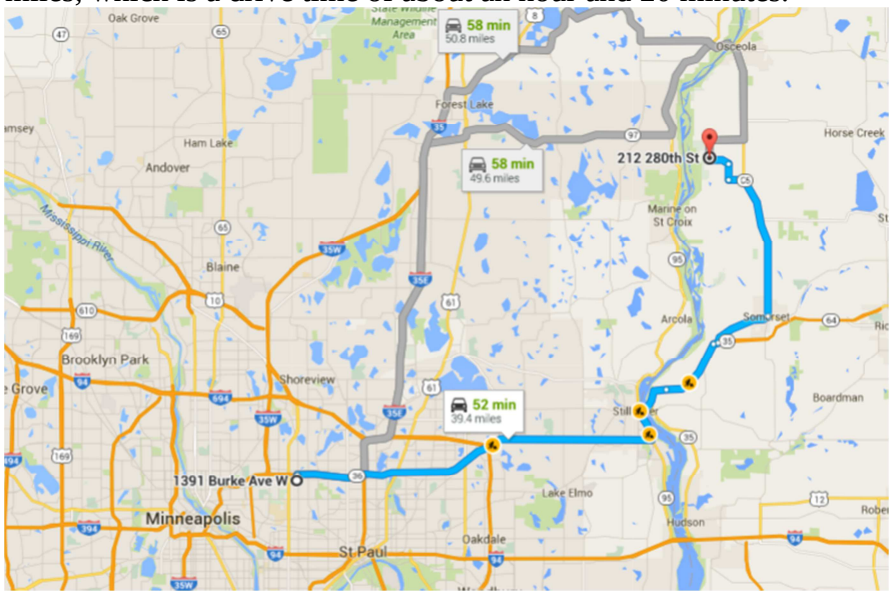

Figure 2: The Closest Drop Site

The nearest drop site to the farm is about 40 miles away from Common Harvest, which is a drive of approximately 52 minutes.

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Mollie Donohue-Meyer

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Geog 232: People, Agriculture and the Environment

6 May 2016

Common Ties to Common Harvest: Reflecting on Relationships of CSA Members

Introduction:

Since the 1960's, Community Supported Agriculture (CSA) has earned a place at the table of the larger alternative agricultural movement. CSA's rely on members to purchase a share in the CSA at the beginning of the growing season and those members in turn receive produce from the CSA throughout the summer. Because of this reciprocity, members of a CSA are more responsible than the average consumer for minimizing the vulnerability that is familiar to many farmers. How strongly members feel tied to the mission of their CSA has a strong impact on a CSA's success. In this paper, I examine the personal relationship of members to the farm, the farmers, and the food they receive, looking especially at the significance of urban, suburban, or rural positions that may or may not affect these relationships. Finally, I ask how these relationships and positions might tie a member to the farm as a physical place.

Methods:

We looked at the CSA model through Common Harvest CSA in Osceola, Wisconsin. Common Harvest, owned and operated by Dan Guenthner and Margaret Pennings, began in 1989 and now has approximately 220 members (Farm Visit 2016). Research into this topic began with an email to those 220 members asking if they would be willing to be interviewed about their experience with Common Harvest. We then devised a list of the same questions to pose to each member. From there, we emailed those who responded to Bill's initial email, and we were able

to compile 30 interviews. All the information shared will be kept anonymous. We began each interview by asking the interviewee how long they had been a member, how they heard about Common Harvest, and what made them want to join a CSA initially. Then we asked if they had visited the farm, and, if not, how they imagined it. We moved on to ask about the community of the CSA by asking what each person's relationship is to fellow CSA members and to Dan and Margaret as well. Lastly, we posed the question what are your values in choosing food? From the responses we were able to each analyze a different portion of the larger question: how do CSA members identify with the farm as a physical place and a source of food.

To supplement these interviews we also visited Common Harvest Farm. Our class spent a Saturday there learning from Margaret about the many aspects of their operation and what it means to run a CSA, and then later learning from Dan about the varying types of soils on the farm and more about their specific growing practices.

Analysis:

I initially set out to explore the broader question of how CSA members identify with the farm as a physical space. I expected to find that many members felt a strong connection to the land, but instead found that often a member's relationship with Common Harvest is based much more on a close relationship with Dan and Margaret. Therefore, ties to the farm are relationship driven rather than land driven. Because I found personal relationships to be more relevant than a connection to the land, I also found urban, rural, and suburban positions to be less important than I had originally imagined.

For the most part, interviewees who gushed about the farm or said they would always renew their membership also had close relationships with Dan and Margaret. Of the 30 members we interviewed, 10 said they had a close relationship with Dan and Margaret, 17 called them

friends or spoke of friendly interactions with them, 2 members said they didn't have a close relationship, and only 1 of the members interviewed had never met Dan and Margaret. Members who felt a close relationship to Dan and Margaret described them as "warm and welcoming" (Informant 1), so gracious and hospitable (Informant 12), and "like family" (Informant 14). One of these members described her relationship to Dan and Margaret as one "where you have the utmost respect and admiration for someone" (Informant 5). Across the board this kind of closeness led to stronger feelings of loyalty to Common Harvest as well. These members demonstrated their loyalty by describing their "investment" in the CSA or spoke about the importance of sharing in the risk of a CSA. Perhaps this closeness and loyalty simply grows over time as well; 4 of the 9 members who reported a close relationship to Dan and Margaret have been members for 20-25 years, the remaining 5 had all been members for over five years.

A lot of what Common Harvest does is foster these kinds of close relationships. And it makes sense: the nature of a CSA is to connect members to their food, and Common Harvest is no exception. Through their emails, newsletters, and drop sites, Dan and Margaret keep in good touch with their members and update them on the goings on around the farm. 8 of the members we spoke with currently host or had hosted drop sites, which provides them with more interaction with Dan and Margaret than the average member. One member said she had not had much of a relationship with Dan and Margaret until she began to host a dropsite (Informant 7). Another member who hosts a dropsite spoke about how appreciative Dan and Margaret are of that and will send thank-yous to members who host a dropsite (Informant 2).

For members who do not host drop sites, email is their most common form of communication with Dan and Margaret. Each week before sending out the boxes, Dan and Margaret send an email letting members know what to expect in this week's box, and many

members expressed an appreciation for the recipes they will share in the emails as well. Emails also connect members visually to the farm. Many people who had never visited Common Harvest, when asked how they imagine it, said that because of the many emails and newsletters they felt they had an accurate image of the farm. Though less frequent than email, newsletters are also a powerful method of communication. In the Spring 2015 newsletter, Dan and Margaret express appreciation to their members in writing "by being a member, you have protected this farm from development and made a long-term investment in building the soil" (Guenthner and Pennings 2015). The front of this particular newsletter featured "The Power of Community," a strong message which seeks both to foster this community within the CSA as well as remind members of the positive work they're doing in supporting Common Harvest.

Dan and Margaret also connect with their members through the annual Fall Gathering. Every fall they invite their members to the Fall Gathering, which gives members a chance to see the farm, meet their farmers, and see directly where their produce is coming from. For most members, the Fall Gathering is their main opportunity to see the farm, and many attend the gathering every year. While a visit to the farm would seem to strengthen ties to the physical landscape, it more often seemed to strengthen members' relationships with Dan and Margaret. This is not at all to say that personal relationships and physical relationships cannot coexist, but rather to reflect on the importance of Dan and Margaret's continued hospitality. It would be inaccurate to think of "visits to the farm" as separate from "visiting the farmers" because anytime a member visits Common Harvest, the farmers also become the hosts. In addition to the Fall Gathering, members spoke about visiting the farm separately for their children's benefit. For urban but food-conscious parents, showing their children that food comes from a farm rather than a grocery store was a common value among members.

Members often pointed to this idea of knowing where their produce is grown as the reason for their CSA membership. While a connection to the land does not seem to be a central experience for the majority of members, about two thirds of those interviewed said local, or "knowing where food comes from," is one of their values in choosing food. How local our food is has become an increasingly relevant value as our food system has grown murkier in recent years. This also means that the concept of what's "local" has changed over time. Today a farm doesn't have to be within walking distance, or even in our state, to be considered local. A 2008 article on the marketing of locally grown food suggests potential problems in the broadening of the local label:

> One of the more vexing questions is how consumers define the term "local." The ability for firms to differentiate along the "locally grown" dimension depends crucially on the consumers' perception of what qualifies as locally grown—a perception that is not well understood. Furthermore, if many farms qualify as "local" in the eyes of consumers, then "locally grown" food becomes less scarce and, hence, the market may become saturated and premiums for such foods may diminish (Darby, Batte, Ernst, Roe 2008).

Potential problems with overuse of the local label are much less relevant to the CSA model given that most farmers who operate a CSA are only willing to drive a certain distance to deliver food, and members are likely to drive only as far as they would for a grocery store.

Common Harvest feels local to members in part because of this relatively short driving distance, in part because of all their outreach, and perhaps in part because members can actually picture the farm or have even visited it. The Common Harvest newsletter promotes their local status in writing "Eating locally has a number of advantages. One of those being a lower carbon footprint due to reducing the miles your produce travels" (Guenthner and Pennings 2008). Many

of the reasons a farm like Common Harvest is considered local today are the same reasons few members mentioned any "connection to the land." Given the current state of agriculture and the food industry, as well as the culture of food consumption, we are already so disconnected from the food we eat that just being able to imagine the farm makes us feel much more connected.

Moreover, other forms of alternative agriculture have become increasingly disconnected from consumers, making CSA's seem like a better option. With a farmer's market for instance, consumers might still know their farmer by name, but there is much less of a loyalty component, and consumers are not as likely to visit the farm or feel connected to it physically. Members are not part of an effort to lessen vulnerability for their farmers, meaning a poor harvest one year could have strong consequences. One member admitted to becoming a food snob through the CSA in that now when she goes to farmer's markets and sees CSA farms selling their produce she thinks "they're not the good business people that Dan and Margaret are" (Informant 1). Numerous interviewees also expressed that they thought buying produce at a farmer's markets would be much more expensive. At a co-op or organic market, a shopper is further removed, knowing neither the farmers or the farm that grew their produce. At a store there is also much less of a guarantee that the food is actually local; one member spoke about the CSA making her more aware of what is in season and now when she goes to the co-op she sees out of season things (Informant 26). In this way the idea of seasonal produce becomes a division between CSAs and other forms of alternative agriculture.

Conclusion:

As Dan and Margaret wrote last spring, "Caring about and for each other may be our real hope for new solutions to climate change" (Guenthner and Pennings 2008). The concept of knowing one's farmer has been integral to the CSA movement, and it's clear that CSA's are able

to foster a closeness in a way that even a farmer's market cannot quite. In the case of Common Harvest there's a definite correlation between a strong relationship with Dan and Margaret and overall loyalty as a CSA member. CSA's will continue to be successful given their ability to create closeness with members as well as their inherent local quality.

The more involved the members of a CSA are, the more successful a CSA will be. Similarly how often members visit the farm and how well they know their farmers also has a strong impact on a CSA. Getting members more involved could certainly look like the Fall Gathering, but it could also be simply inviting members to a pick-your-own event when a certain crop is particularly abundant. It could be offering a discount on a share in exchange for a couple hours of weeding. It could be a barn raising, a class on canning tomatoes, an invitation to come braid extra garlic, a walking tour of the farm. There are hundreds of events that could get CSA members further involved in their CSA and strengthen their relationship to their farmers and their food supply. Thus, even the simple act of coming together could have a tremendous effect on the current state of agriculture.

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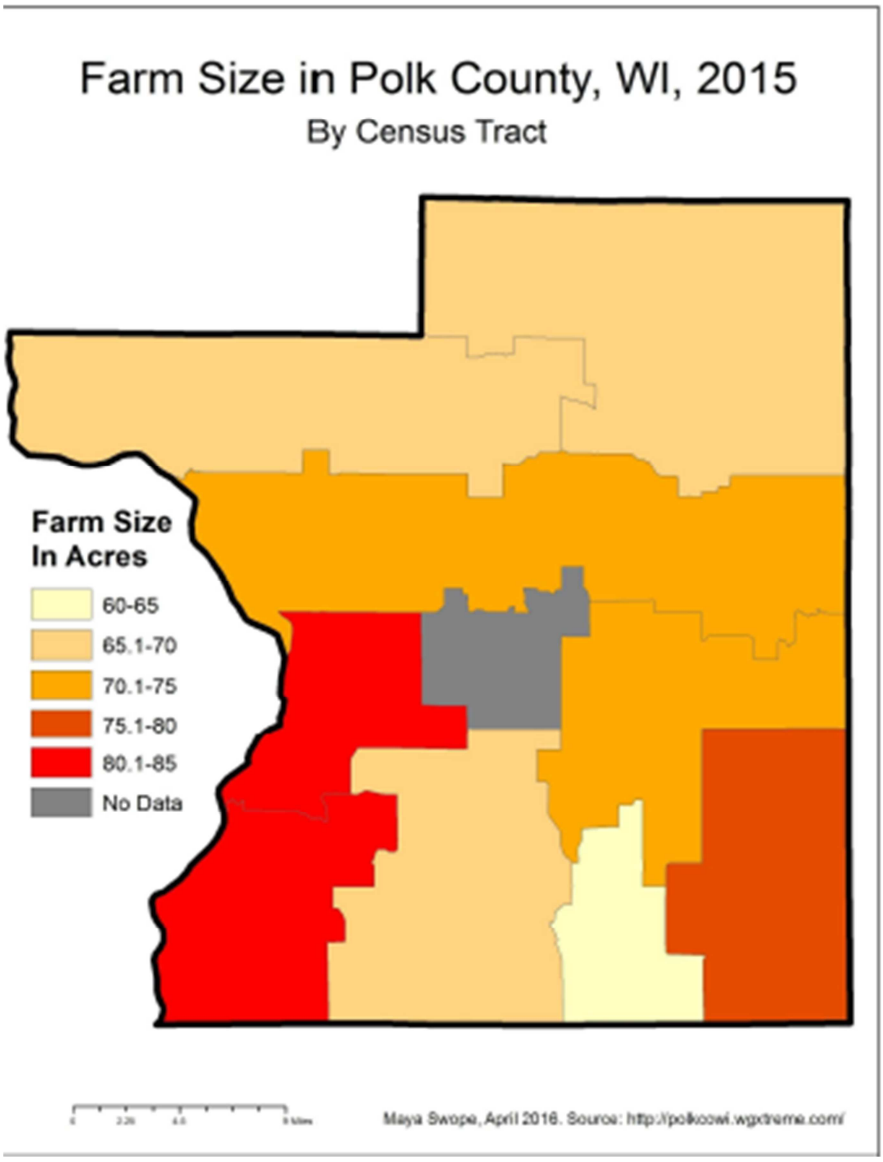
Chapter 2: What are the patterns of farming & livelihoods in Polk Country, WI over time (& related explanations)?

The Findings of Research Group 2 (Kenzie Maidl, Sarah Aldama, Maya Swope, Caleb Arries & Wiliam Feeney)



William Feeney

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GEOG-232

4/22/2016

Patterns of Land Use Change in Polk County, WI

Analysis, Implications, and Recommendations

Introduction

While the agricultural sector may seem unchanging, it is anything but. Farmers are often forced to shift cultivation strategies, crops grown, or to downsize or expand, according to economic fluctuations or government policy. These shifts can have great implications for land use, such as requiring expansion of cultivated land, utilizing new chemical inputs, or risking increased erosion. Changing patterns of cultivation can additionally result in the drainage and development of wetlands and the clearing of forest cover, drastically altering ecosystems in the process. Because of its potential for impact, it is very important to be aware of the changing patterns of agricultural land use and the potential consequences. Polk County, WI is home to a number of farms on every scale, growing a variety of crops, and employing vastly differing environmental stewardship strategies. From dairies with 500 head herds of cattle, to "feudal lords" ruling over acres of corn and soybeans, to small scale organic CSA farmers, Polk County is a relatively diverse agricultural sector. This makes it a particularly interesting area to examine questions of land use and land change, as theoretically each type of farm will have somewhat different policies, and will take different actions. In this paper I will examine patterns of land use

change in Polk County, WI--I will then investigate the implications of such patterns on the development or conservation of wetlands and forest cover, in addition to examining the diversity of the new landscape. I expect that overall there will be a net loss of forest cover and wetlands, and that recent landscapes will experience reduced land use diversity.

Background

Polk County was first settled in the early 19th Century, beginning as a hotspot for the timber industry due to its ample forests and proximity to major waterways (Andersen et al, 1996). Soon after its settlement, the region began to undergo significant ecological transformations. Subsistence and later commercial agriculture necessitated a specific kind of landscape, one which the land did not embody. Forest and prairie alike were removed to make room for agricultural lands and townships--combined with the deforestation of the timber industry, this greatly changed the landscape. At the turn of the 20th Century, over 50% of the region's land was agricultural. Twenty years later, the number of farms in Polk County was estimated at 4,500. Today it stands at around 2,000 within the county (Andersen et al, 1996). The landscape of Polk County continues to change, with increased fertilizer and pesticide inputs affecting ecological community composition, and intensive agriculture that often facilitates erosion and monocultures. Today these changes are equally important, with wetlands, forests, and land use diversity put at risk by patterns of intensive farming.

Methods

To conduct my research I first selected data files from the USDA and the USGS that displayed land use in 2011, and land cover change from 2001 to 2011. I chose a number of layers from the Polk County GIS portal, such as roads, public lands, land parcels, and aerial imagery. I additionally found easement and wetlands data from the U.S. Fish and Wildlife

Service. I then began the mapmaking process, overlaying and combining various layers to create the best tools to visualize land change in Polk County, WI. While nearly all data used in the mapping process is self explanatory, two require explanations. The Land Use Change data file represents differences in land cover between 2001 and 2011 with different colors representing differing uses, such as red for urban development. Black, the majority of the data, represents no net change. The Land Use 2011 data file represents each land use present in Polk County with a separate color, for example dark green for forests. A key point to note in my process is that while much of my research examines Polk County as a whole, for my maps I chose to focus on the areas roughly within a four mile radius from Common Harvest farm, as they displayed the most interesting and visible patterns of change.

Findings, Analysis, Discussion

The initial results of my analysis were surprising, however further analysis is necessitated to ensure that I did not misconstrue certain datasets. Looking at my land use and land cover change maps , I expected to see strong correlation between areas of cultivation and areas of land cover change. This assumption was based off of information from Farmer Dan, who pointed out that farms in the area have recently been changing, either expanding in size (the 500 head dairy farm) or changing their farming strategies. I assumed that these changes would correspond with development of forested land and the drainage of wetlands to accommodate such expansions--this assumption is only partially correct.

Specifically examining the tracts of land surrounding Dan and Margaret's farm, there has been relatively little land cover change over the past ten years. My Land Cover Change map displays differences in land cover between 2001 and 2011, so the layer does not account for multiple changes in the time period, and may ignore areas of land that have changed and then

changed back. However, it is strongly unlikely that within a ten year period, farmers would have made significant structural changes to their farming practices and then switched back, or that they would have embarked on intensive development plans only to restore wetland and forest regions afterwards. Based on this, it is safe to assume that there was minimal large scale farm expansion occurring during the ten year period, or if there was, it did not necessitate significant land development outside of previously owned land. Land change did not occur on a large scale, however there are notable smaller changes within individual tracts that reveal certain patterns.

Wetlands

Individual examples of wetlands do exhibit change, typically in the form of farmland conversion by way of small scale development. Small, isolated wetlands located away from the edge of a parcel appear to be the most vulnerable to this trend, which makes sense as they would be seen as "in the way" of agricultural production. Larger wetlands tend to go undeveloped, as do wetlands located on the edge of a property (Feeney[1 and 3] 2016). This runs somewhat counter to what I hypothesized earlier--while wetlands are certainly being developed, it occurs on a property by property basis--there is no county-wide trend of development from 2001-2011 (Feeney[1] 2016). Additionally, larger wetlands appear to be preserved, even if they lie in the middle of farmland. Regardless of how extensive this land change is, it has troubling implications for ecological health and agricultural productivity. Wetlands are important for a number of reasons, but especially so for farmlands--they mitigate flooding damage in cases of heavy rainfall, and can provide a measure of hydration during periods of drought. In addition wetlands create new habitat, leading to greater biodiversity and a more resilient ecosystem as a whole. It appears that wetlands are among the first types of land to be developed in cases of farm expansion, as forests within parcels containing developed wetlands are intact. Small wetlands

are particularly vulnerable, as they may be seen as inconsequential, or are not protected under conservation legislation. This makes sense from the practical perspective as forests are far more costly to clear, and wetlands often do lie in the middle of farms, however it is still a deeply flawed decision, sacrificing environmental health and stability for marginally increased production.

Forests

In contrast to the development of small wetlands, forests appear to actually be preserved across the map. The color black, the majority of the map, symbolizes no change across the decade. Comparing the black areas on the Land Change map to the cover on the Polk County Land Use map, we see that nearly all areas of forest present in 2011 are colored black, showing no change (Feeney [1 and 2] 2016). There are certainly areas of potential forest loss, but there is relatively little indication of development of previously forested areas--all urban development is located in already urbanized areas (symbolized in varying shades of red), and the only instances of large scale agricultural development represent shifts from hay to cultivated crops on previously cultivated land (Feeney [1 and 2] 2016). The data indicates that overall there is close to a net positive change in forest cover, with certain areas being reforested and little evidence of forest loss. However, there is no way to tell exactly how the forested areas are expanding; young trees could be planted by conservationists, or forests could be expanding naturally. Depending on how "forest" is classified, shrubland that is home to a handful of growing trees may receive the designation, skewing the data. Even though forests appear to not be at risk of development, they still face a threat in landscape fragmentation from roadways and land parcel boundaries Oftentimes farmers will not allow forest to expand in a natural manner, and will manage it on one side of a parcel boundary, but not another. Additionally, roads and property boundaries

create edge effects such as increasing exposure to sunlight or pollution, putting edge communities at risk. Differing land management practices create difficulties as well, as some forested landscapes may be subject to pesticide and fertilizer runoff contamination, affecting biodiversity and ecosystem health.

Land Diversity

Land use diversity on the whole is high in Polk County. Uses include open water (lakes, ponds, the St Croix), multiple classifications of forest such as evergreen and mixed, shrubland, and agricultural zones supporting hay, wheat, soybean, and corn production, among others (Feeney [2], 2016). For a county that is heavily used for agricultural and pastoral industries this is fantastic, but within the agricultural sector there are problems. While Dan and Margaret manage a farm that embodies ideals of environmental stewardship, and grow a wide array of crops, they are far from the norm. The majority of farmland in Polk County is still monocultures--the Polk County Land Use map demonstrates this, as the number of agricultural parcels with more than one use labeled are few and far between; this is additionally backed up by commentary from Farmer Dan (Feeney [2], 2016). There also has been very little change in crop cover from 2001 to 2011, indicating that farmers maintain these monocultures for long periods of time. (Feeney[1], 2016) This has implications for environmental health, as well as the economic stability of the region. Lack of crop diversity puts Polk County at risk of being targeted by agricultural pests, blights, or diseases that could rapidly tear through the county's agricultural sector. Additionally, undiverse farms lead to a net loss in biodiversity, weakening overall system health.

One potential explanation for the relative lack of land development is conservation legislation, or State land ownership. Conservation easements are areas contained within

farmlands that farmers donate to conservation organizations, or pledge to maintain in their original habitat--such areas typically could be wetlands, forest groves, or streams that run through a property. Conservation easement, however, is not a sufficient explanation for relative lack of land use change in Polk County, there are only three significant easement areas, all located along waterways in the southeastern area of the county. Easements are, however, quite popular in central and southeast Wisconsin, which has a far greater abundance of such areas than Polk County (Feeney [4] 2016). Public lands present another possibility--while public lands certainly are developed, and experienced land use change, they are not available land for farmers to expand farms onto, which I hypothesized would be the major driver of land use change. There are a number of public lands in Polk County, but most are concentrated in the northern corners of the county--thus, public lands do not explain the lack of development either (Feeney [4], 2016). A less palatable possibility is that development is occurring, but not at the scale to be recognizable in the data used. Aerial imagery may not be at high enough resolution to make minute changes in steam systems and small wetland ecosystems visible. Another possibility is that while land use change may not be occurring on a large scale in Polk County, it may be occurring elsewhere in Wisconsin. Information from Dan seems to point to this possibility--he mentioned that many owners of large properties buy far flung land parcels to get around lack of available lands in an area, this can lead to hard to track development of mega-properties that cross county boundaries. If this were the case, it could explain how farms manage to expand without corresponding changes in land use.

Conclusions

Agriculture is one of the most important industries in Polk County, and one that additionally greatly impacts the local environment. Shifting patterns of land usage have defined

the landscapes of Polk County for two centuries, from the initial boom of the timber industry to the shift towards commercial agriculture. Today with deeply ingrained and established patterns in place the changes take place on a smaller scale, but are no less consequential. Small wetlands face risk of development by farmers eager to expose cultivable soils--actions that threaten the ecological resilience of entire ecosystems. Forests have experienced little recent net change, but still face threats from issues such as fragmentation and chemical inputs. Land use diversity on the whole is high, but the farming sector is remarkably undiversified and facilitates environmental degradation. My findings echo the sentiments towards the end of Andersen's (et. al.) history of the St Croix river valley--that modern farming practices have put biological diversity at risk, and that continued development of the landscape leads to the loss of key small scale water resources. These issues are not unique to the St Croix region--they occur in areas of heavy agricultural usage across the US; this does not have to be the case, however. I have three recommendations that could potentially help ameliorate the situation. Firstly, I recommend promoting the use of conservation easements. Such arrangements benefit farmers (who either make money off of selling their land, or gain tax breaks for engaging in conservation efforts), as well as boosting ecosystem health. Additionally, I recommend creating or focusing conservation programs on small scale wetlands--there are many wetlands protection initiatives run by governmental organizations such as the US Fish and Wildlife Agency or the USDA, however they tend to focus on larger wetlands such as those along the St Croix (USDA, 2016). Small scale wetlands are at risk of development, and are key to ecosystem health. Offering incentives to farmers for conserving these unique ecosystems could lead to widespread preservation. Programs that promote these ideas are already being implemented, such as the USDA's Farmable Wetlands Program, which pays farmers to restore former wetlands on their property (USDA,

2016). Lastly, I recommend promoting land use diversity within the agricultural sector--one possible way to achieve this would be to re-visit the Ethanol Mandate, perhaps by providing incentives for growing crops other than corn to counterbalance widespread corn monocultures across the Midwest. While these suggestions are certainly not comprehensive, hopefully they could provide a base standard of farmland stewardship that future generations could build off of.

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[2] Feeney, W. R. (n.d.). Polk County Land Use 2011. *Self Generated. USDA. Polk County.*

[3] Feeney, W. R. (n.d.). Polk County Farm Parcels and Wetlands. *Self generated. Polk County. USFWS.*

[4] Feeney, W.R. 2016. Polk County Public Land and Conservation Areas.*Self generated. Polk County. USFWS.*

Figure 1

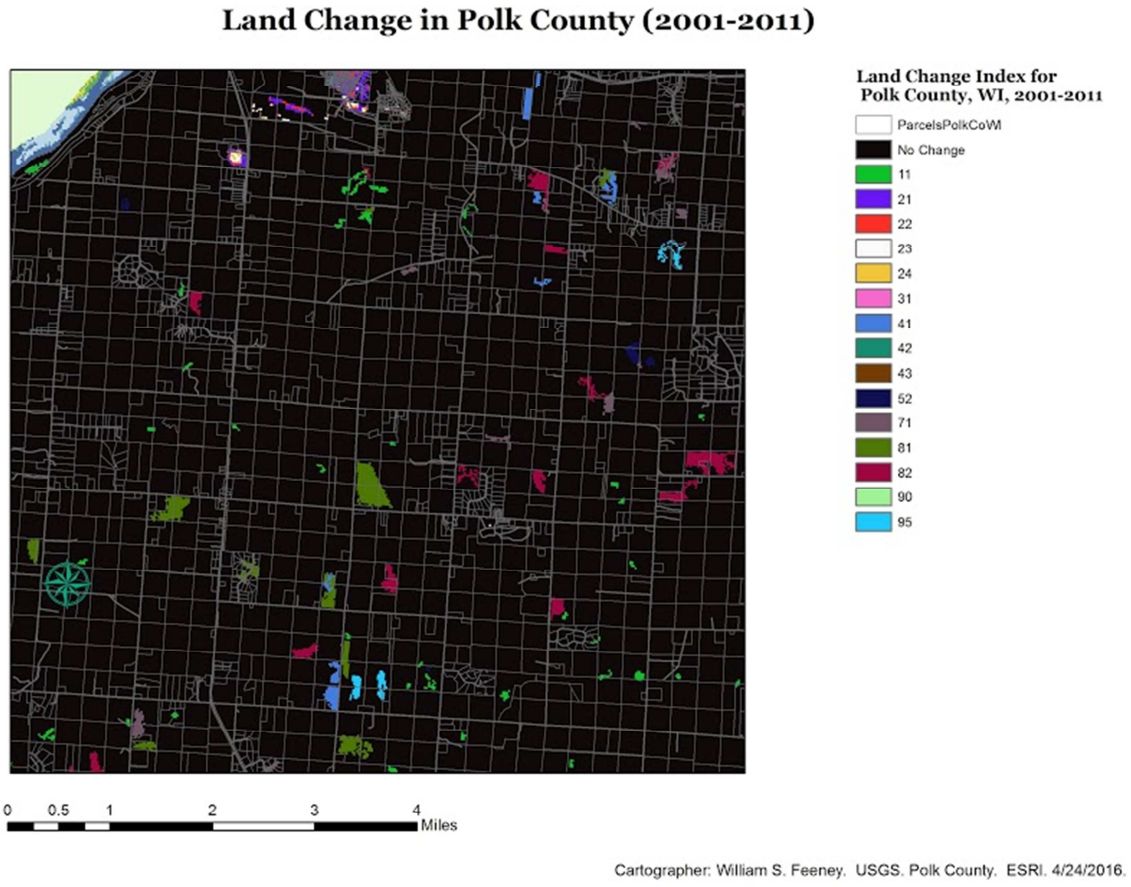
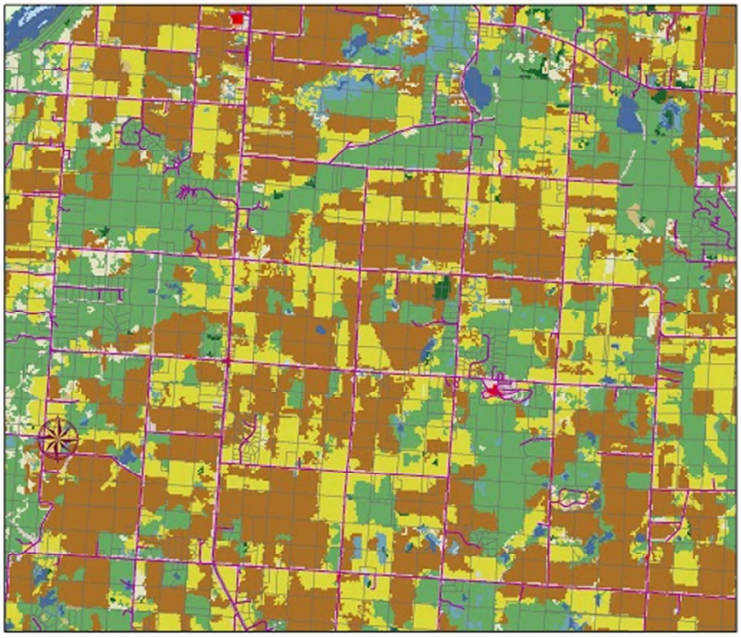

Land Change in Polk County (2001-2011)
Land Change Index for
Polk County, WI, 2001-2011
ParcelsPolkCoWI
No Change
11
21
22
23
24
31
41
42
43
52
71
81
82
90
95
0
0.5
1
2
3
4
Miles
Cartographer: William S. Feeney. USGS. Polk County. ESRI. 4/24/2016.

Figure 2

Polk County Land Use 2011



Cartographer: William S. Feeney. USDA and USGS. 4/20/2016.

Figure 3

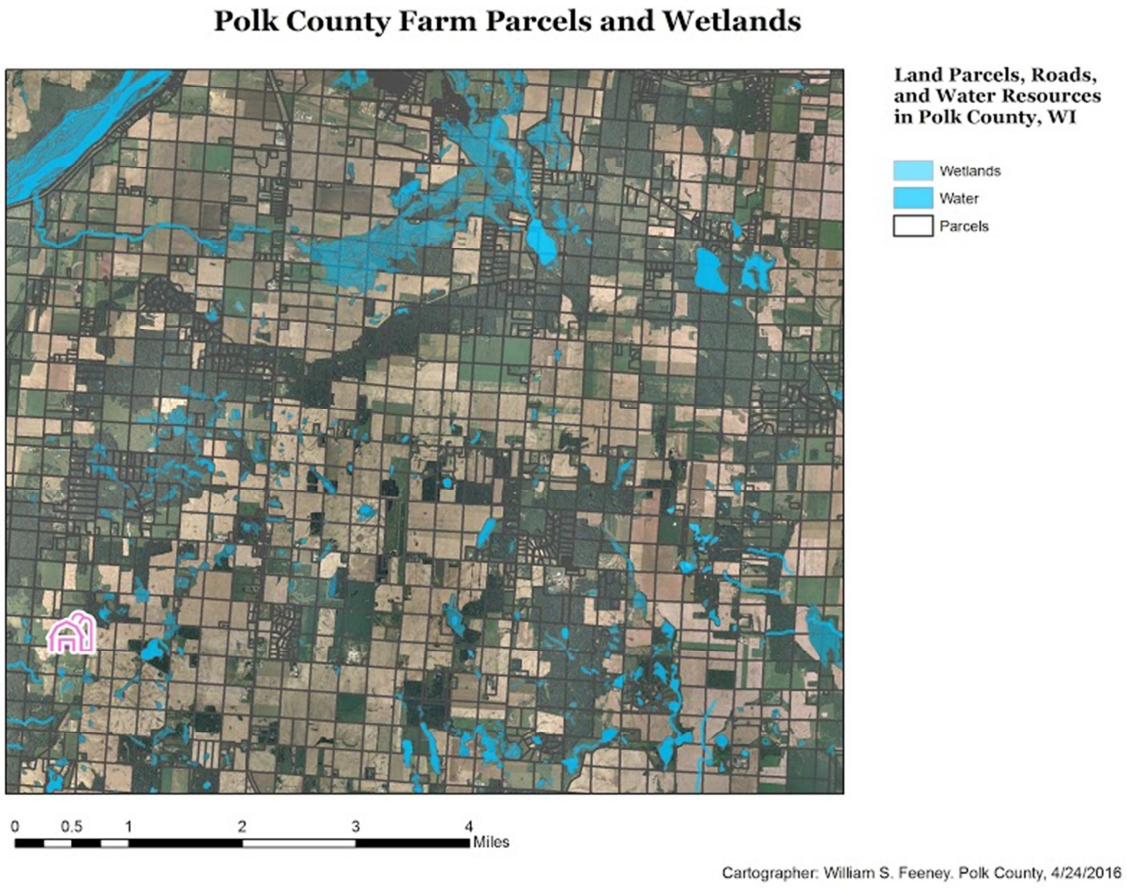
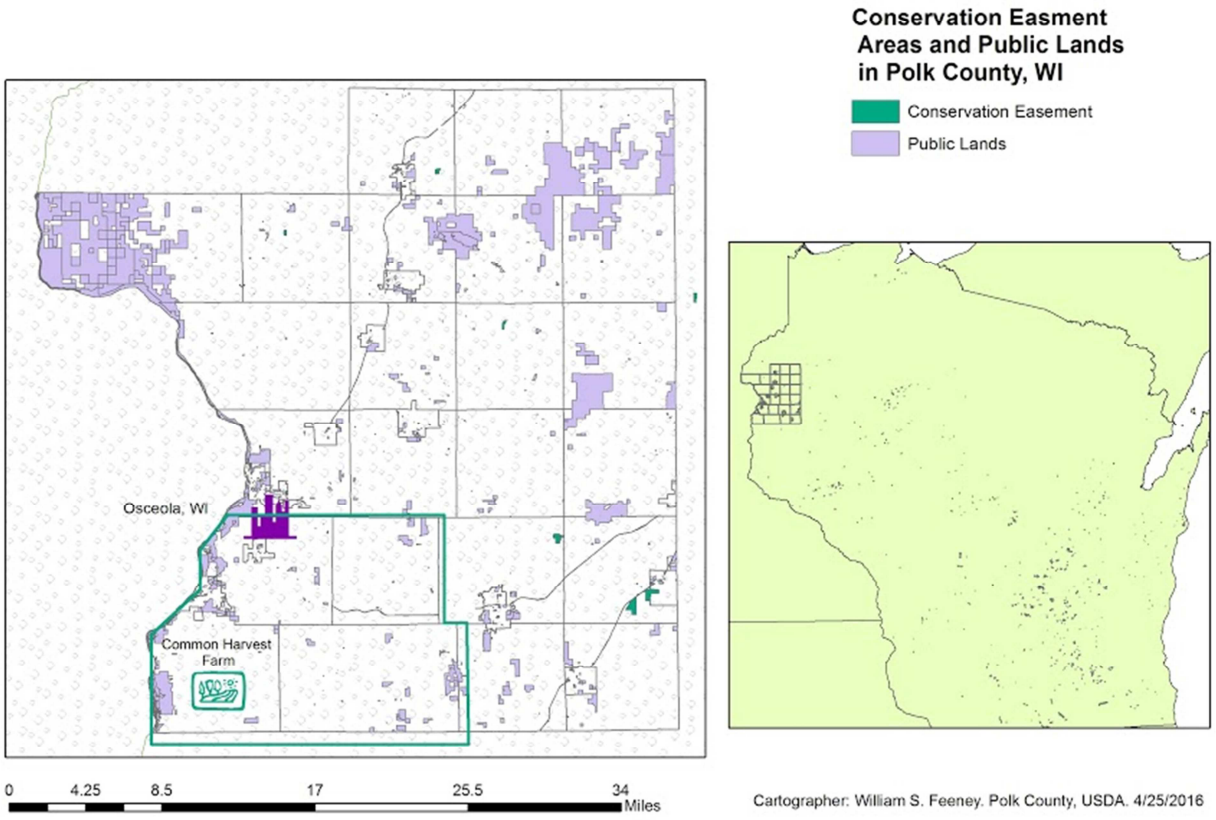

Polk County Farm Parcels and Wetlands
Land Parcels, Roads, and Water Resources in Polk County, WI
Wetlands
Water
Parcels
0 0.5 1 2 3 4
Miles
Cartographer: William S. Feeney. Polk County, 4/24/2016

Figure 4

Conservation and Public Lands in Polk County



Demographic Transformations in America's Agricultural Heartland: A Geospatial Analysis of Polk County, Wisconsin

McKenzie Maidl
People, Agriculture, and the Environment
Professor Bill Moseley
May 6, 2016

Introduction

Polk County lies on the western boundary of northern Wisconsin. A rural area, its two largest cities failed to hit even the three thousand mark in the 2010 decennial census. The county boasts of its "rolling hill sides" and waters that provide recreational space appealing to every range of outdoor enthusiast. But such a place does not remain rural for the intrinsic value in its landscapes. It serves an important purpose through its resources. Polk County is covered in acres upon acres of farmland. It is mostly conventional, with corn and soybean monocultures engulfing the countryside. But situated in the middle of those fields, in a township called Farmington, is Common Harvest Farm – a forty-acre, community supported agriculture (CSA) style farm. Dan Guenthner and Margaret Pennings, a couple who, along with the help of their children and seasonal employees, own and operate the farm.

This type of small, family farm, however, is coming to be more of an exception than the rule in the Unites States. It is widely known that farms are growing in size and becoming more homogeneous in their crops, but experts are saying that farmer demographics are changing across the nation as well. In order to test this idea on a small scale, this paper utilizes a geographic information system (GIS) to explore changing demographics in Polk County, Wisconsin, specifically. It focuses on the race, country of origin, educational attainment, and occupation of residents in Polk County, asking how they have changed over time, what their implications might be, and what they say about farm culture in Wisconsin and the United States in general.

Background

In 2014 the U.S. Department of Agriculture released a report from the Census of Agriculture on the demographics of American farmers from 2007 to 2012. It brought up issues such as aging farmers, gender structures, the decreasing number of U.S. farmers, and increasing

diversity within the agricultural labor force. Another major point of the report was that farmers are becoming increasingly reliant on multiple sources of income. It noted that in 2012, over fifty percent of farmers considered occupations other than farming as their primary occupation, and over sixty percent worked some days off the farm (USDA, 2014).

The USDA report noted that farms were becoming "more diverse," without specifying whether such diversity was of American origin or not. But a study conducted in 2005 found that in 2000, over 60 percent of farm workers were unauthorized (Huffman, 2005). And in 2015, the U.S. Department of Labor reported that over three-fourths of all farm workers were foreign born (USDL, 2015). These changes in labor have also instilled changes in farm management and hiring practices. Farmers can face heavy fines for knowingly hiring unauthorized workers, so most work through farm labor contractors (FLCs). FLCs are usually made up of immigrants themselves, which means they have fewer assets, and are targeted by the U.S. Immigration and Naturalization Service less often (Huffman, 2005). In the Midwest specifically, agricultural labor is mostly composed of Mexican immigrants. Labor in the Midwest has historically been migratory, meaning that during the growing season workers live on land provided by their employers and afterwards return to Mexico and in some cases, Texas (Hovey and Magana, 2002).

Methods and Results

Utilizing a GIS program called ArcGIS; six maps were produced to analyze changing demographics in Polk County, Wisconsin. Data for the first four maps was collected by the U.S. Census, either on decennial years through a 100 percent population count, or by the American Community Survey, a sample-based count. All of the data was from 1990 or 2010, because 2010 represents the most recent total count, and 1990 was the earliest year for which complete data could be found for all of the variables mapped, and consistency is important for comparison. The

data was sourced from the American Fact Finder database, which is produced by the U.S. Census, and National Historic GIS – a database managed by the Minnesota Population Center at the University of Minnesota. All of the data was aggregated to the census tract level. It should be noted that census tract boundaries for the county did change between 1990 and 2010, but this issue was minor because the change involved a merging of two tracts into one, so the 1990 data from the two tracts could be easily aggregated to fit the 2010 boundaries.

The first map (Figure 1), visualizes the percent change in foreign-born population for each census tract. The variable does not differentiate between nations of origin, and is normalized by the total population of the county. Map two (Figure 2), strengthens the argument of the first map, as it displays the percent change in the non-white population from 1990 to 2010 in Polk County.

Figure 1.

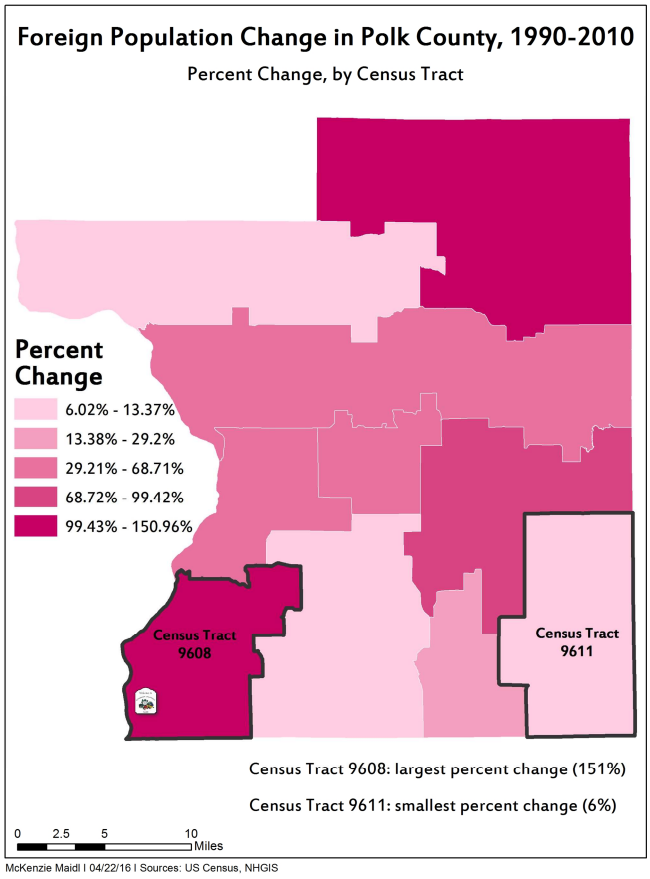
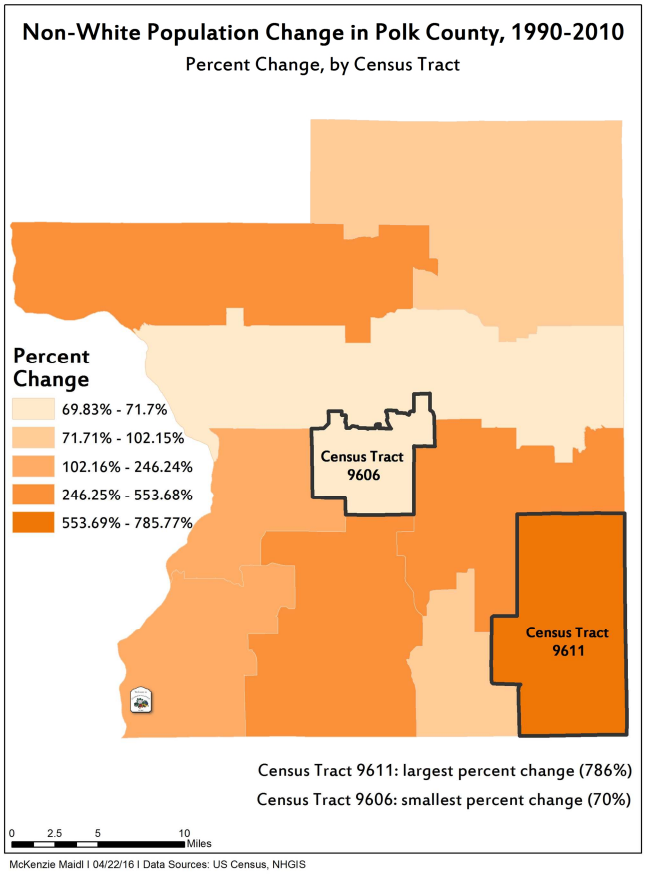


Figure 2.



All ten of the census tracts within Polk County increased in percent foreign born over the twenty year period. The largest increase was in Census Tract 9608, in the left bottom corner of the county, with a jump of over 150 percent. Common Harvest Farm and its surrounding area fall within the census tract. The smallest increase was in Census Tract 9611, in the right bottom corner, which resulted in a percent change of just over six percent.

Every census tract in the county also saw increases in non-white population from 1990 to 2010. In contrast to the foreign born increase, the largest increase in this map was in Census Tract 9611, which resulted in an almost 800 percent change over the two decades. The smallest change took place in Census Tract 9606, in the center of the county, with just under 70 percent. It should be noted that although these percent changes seem very drastic, the county is still very white. In 2010, the county as a whole was almost 97 percent white, so any small changes in the non-white population can make a major impact.

The third map (Figure 3) measures the percent change in the portion of Polk County's work force over sixteen who recorded their occupation to be in farming, fishing, or forestry in the 1990 and 2010 censuses. This was the most specific breakdown of the category; farming could not be viewed alone. It is supported by the fourth map (Figure 4), which displays the percent change in the population age 25 years and older with a Bachelor's degree or higher. Dan talked in depth about his knowledge of soil ecology, which he uses when making decisions at Common Harvest. This map is meant to follow up on this idea by giving an education profile of the county, and seeing generally if his experience is usual in the area. It can also give some insight into perceived education requirements in farming, and help explain factors that might be keeping young adults from entering it.

Figure 3.

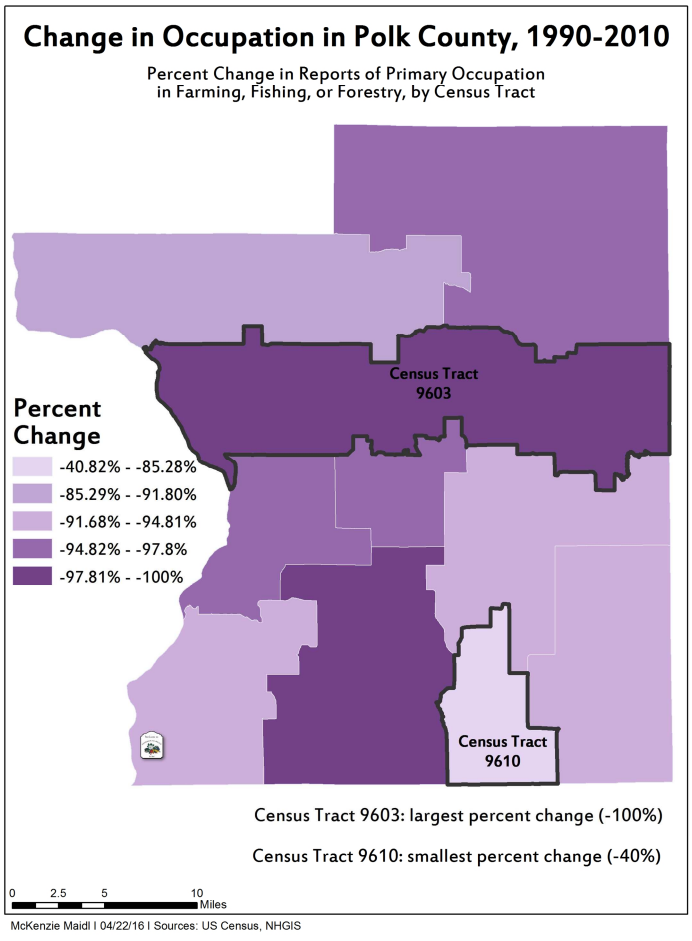
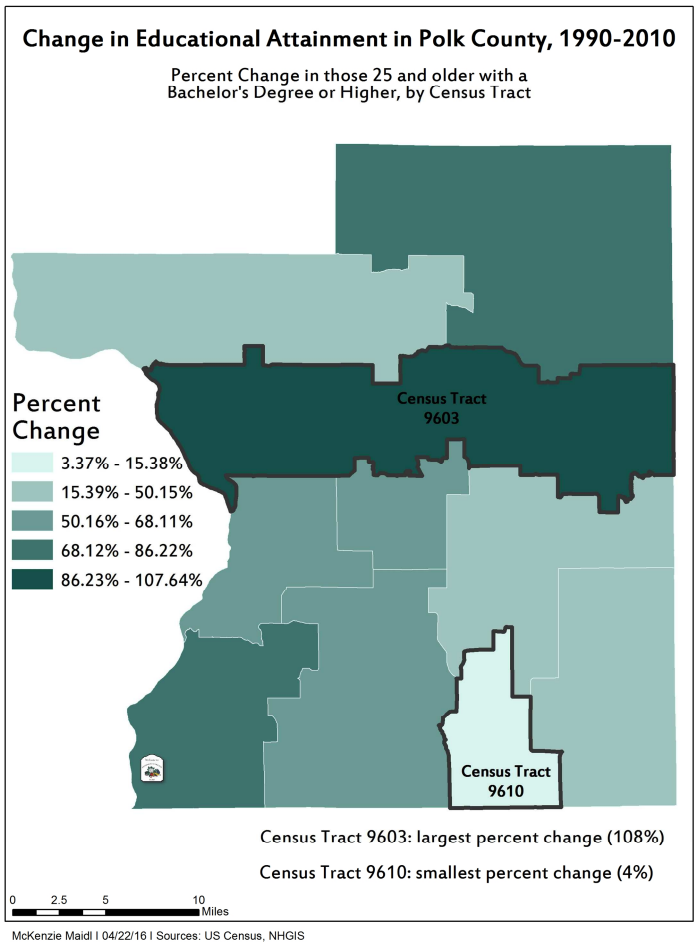


Figure 4.

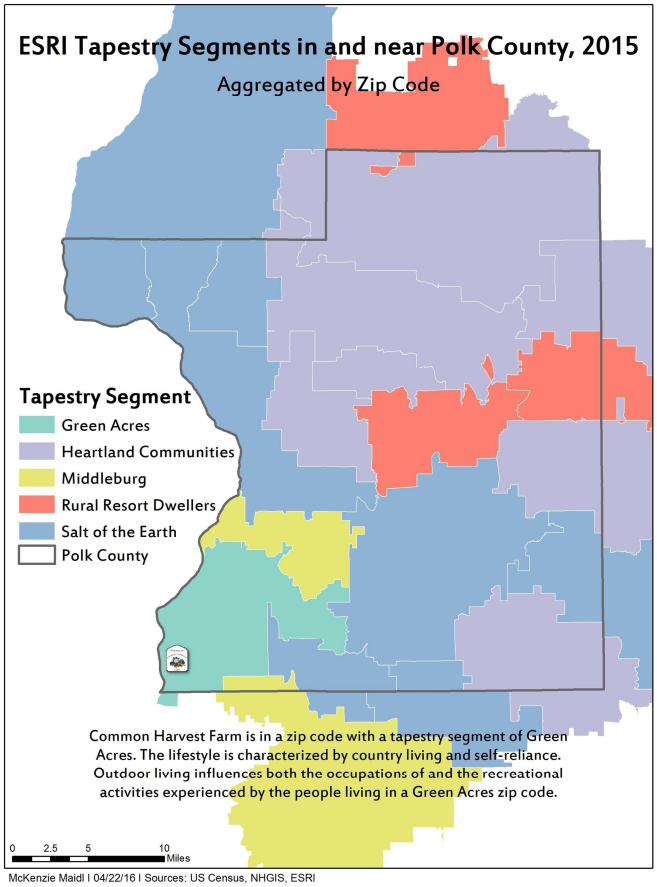


All ten of the census tracts in Polk County saw a decrease in percent change of people with farming, fishing, or forestry as their occupation, and an increase in the percent of people with a college education. The highest jump in education was in the same county with the highest reduction in the farming, fishing, and forestry. The smallest jump, at just three percent, was in the same census tract as the one with the lowest decrease in the occupation. This trend was tested across the entire county by calculating the Pearson's Correlation coefficient, which is a measure of linear correlation between two variables, for education and occupation. The test resulted in a

coefficient of 0.79, signifying very strong correlation. This means that as education levels rise in the county, the percent of people working in farming, fishing, or forestry should decrease. It should be noted, however, that even though the discrepancy between education levels across the county was large, every census tract placed below the 2010 national average in educational attainment, however, at 28.1 percent.

The final map (Figure 5) uses tapestry data released by the Environmental Systems Research Institute (ESRI) in California, which is aggregated to the zip code. Tapestry data provides resident profiles based on demographic and socio-economic data. Many of the categories are written in a tongue-in-cheek style, but they can give some interesting – and entertaining – insight into regional perceptions. Zip code boundaries do not follow census boundaries, so this map studies all zip code regions that fall at all within Polk County.

Figure 5.



Polk County fits into five ESRI tapestries: Green Acres, Heartland Communities, Middleburg, Rural Resort Dwellers, and Salt of the Earth. The two primary categories are Salt of the Earth and Heartland Communities. The first is characterized by traditional, rural families who work in service industries and are intimidated by technology. The second is to the first, but consists of semi-retired married couples

that work on the weekends and spend leisure time hunting, fishing, and riding motorcycles. Both categories fit into the Cozy Country Living Life Mode (ESRI, 2015).

Analysis and Implications

In 2012, 97 percent of all farms were family-owned. And while the majority of those were small scale, together they accounted for only one fifth of total agricultural sales that year. Less than five percent of family-owned farms were large or very large, but earned over half of all farm income in the nation (USDA, 2014). The concept of a family farm is hardly relevant when the size of one compares to that of an industrial farm, but it is becoming more common. This is partly because some agribusinesses have divided and sold off their cropland to family farmers in order to take on a management role, and also because large-scale farmers control enough financial resources to purchase technologies that improve their yields (DePillis, 2013). But increasing farm sizes necessitate a rising percentage of hired labor, most of which, as was mentioned before, is unauthorized and foreign born.

Agriculture carries with it a high risk of injury and adverse health outcomes such as asthma and some cancers (Kirkhorn and Schenker, 2001). And because foreigners are disproportionally hired into these types of positions, they are at increased exposure to such risks, but with few of the benefits. An implication of foreign labor is the likelihood of wage discrimination. A study on immigrant labor from Latin America in Chicago found that variables such as immigration status, English proficiency, time in the U.S. work force, and gender all had statistically significant impacts on wages. Latin American undocumented males, for example, on average had a 22 percent drop in their hourly wages compared to American citizens of the same gender. For females, that number increased to 36 percent (Mehta et al., 2002).

Even though wage and labor inequalities are a widespread and important issue, the U.S. agricultural system long has and continues to rely on foreign labor to compensate the labor shortages that have historically plagued the nation. According to the USDA's 2014 Farm Labor Survey (FLS), the number of full-time farm workers in the nation dropped over twenty percent between 2002 and 2014 alone (Bronars, 2015). This is largely because of slowing rates of entry by new, young farmers into the field. And while the reasons for the low numbers cannot be explained with complete certainty, some U.S. farmers have cited barriers to entry, such as increasingly expensive land prices and equipment, as the main obstacles (Kurtzleben, 2014).

In 2014 the New York Times published an article titled "Don't Let Your Children Grow Up to Be Farmers". The piece talked of the high input costs involved in farming, as well as the low wages and government dependence to make a livable income (Smith, 2014). This financial instability is the driving factor of the rising prevalence of year-round, off-farm employment. It is also a reason for decreased efficiency on-farm. Studies have suggested a negative correlation between employment diversity and farm efficiency, because the amount of time spent on-farm is directly linked to the amount of attention paid to ensuring smart farming practices (Goodwin and Mishra, 2004).

But the skepticism of farming extends beyond just economic insecurity. When a group of high school students were questioned on their views on farming as a career choice, they responded with buzzwords like "boring" and "blue-collar" (Mallory and Sommer, 1986). And it is true that farming requires intense manual labor that is demanding almost all year round. It is also not associated with high levels of education, as was seen in Map 4. But with mechanization and scientific advancements, farming is becoming increasingly high-tech. And with climate

change and other issues such as soil erosion and nutrient depletion, knowledge of local ecologies is necessary now more than ever.

A consequence of the diminishing number of new agricultural entries is an aging existing labor force. From 1983 to 2008, the average age of the typical agricultural worker increased from 34 years old to 41 (Schmitt and Warner, 2010). In 2007, principal farm operators, or the people who manage land and make day-to-day decisions, had an average age of 57.1. That number rose to 58.3 just five years later (USDA, 2014). And as farmers age, labor shortages not only increase in the short term, but in the long term as well. When fewer young farmers are joining the workforce, it also means that fewer children are being born and growing up on farms. This further exacerbates the labor problem, and makes farms more reliant on immigrant labor, which can be risky, especially in times of restrictive immigration reform.

Recommendations and Conclusion

The combination of aging farmers and a lack of enthusiasm about the career has a reinforcing effect that may have detrimental effects on the available source of agricultural labor in the near future. And while the immigrant population does supply much of the demand for labor, relying on the group may not be the safest decision. The best option it seems would be to improve the outlook and accessibility of farming as a career path for young, domestic generations. A technique for increasing accessibility could be to implement government subsidizes on land for young farmers. Government intervention initially could help prevent intervention on the income side of production, incentivizing young people to take up the endeavor. It would also increase the prevalence of small, family farms, meaning that more people would likely be born into farming. Another positive outcome could be the transition from

renting to owning land, increasing responsibility over land and potentially improving farming practices.

Education is also important to both improving the outlook on farming and, again, improving farming practices. If one argument against farming is that it is viewed as "blue collar," making it a more educated field could be beneficial for its continued viability. Along these lines, it would be vital to emphasize the technical aspects of agriculture, especially in a place like Polk County, which, as seen in the ESRI tapestry map, is still hesitant to adopt. The National Institute of Food and Agriculture (NIFA) is a government program that works toward these goals through collaborations with food scientists, policymakers, and educators. Created by the Farm Bill of 2008 under the USDA, the agency is dedicated to providing "leadership and funding for programs that advance agriculture-related sciences" and targeting the classroom to reach those who can "put knowledge into practice" (NIFA, 2016).

As the population of the United States continues to grow while the farming labor force shrinks, the nation falls into a labor shortage that makes it vulnerable to the willingness of foreign labor to work and the ability of a small labor force to provide food security. The changing demographics discussed in this paper are inherently intertwined. The increase in foreign labor results from a decrease in domestic labor, which is the outcome of a low willingness of young generations to farm. Perhaps the answer lies in government interventions and programs that promote farming. Or perhaps it is in the CSA movement, which, with its organic vegetables and sustainability, exudes a trendiness that appeals to young people. Either way, changes will be essential as farmers continue to age. Polk County may currently be living a "cozy, country" life of leisure and old age, but if the U.S. agricultural system wants to maintain its viability, it and places like it will need to revamp their lifestyle – and more so their image.

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Can Farm Animals Save Our Food System?

The Decline of Mixed Farming and How to Fix It

Caleb C. Arries

5/6/2016

Macalester College

Geography 232: People, Agriculture and the Environment

Professor Bill Moseley

Introduction: Background and Thesis Statement

Farms occupy a secure perch in our national imagination. When people visualize farms, they see red barns, neat rows of crops and lots of farm animals. Little do they know that livestock has largely vanished from American farms. In the early 1970s, the federal government responded to a crisis of rising food prices by encouraging farmers to plant more corn, "from fencerow to fencerow" in the words of then-Secretary of Agriculture Earl Butz. Direct subsidies to farmers incentivized them to sell corn at below the cost of cultivation, sending the supply of corn skyrocketing and cratering the price (Pollan, 2006, pp. 51-3).

This was revolutionary for American agriculture because before then crops and livestock could be found on the same farm. This made sense on multiple levels; draft animals were used to plow soil (and still are in areas where farm machinery is rare), manure was used as a ready source of fertility, the parts of the plants left over from the harvest could be used to feed the animals. In earlier decades, farmers grew hay and oats in addition to corn (Andersen, Crow, Lietz, & Stearns, 1996, p. 261), which meant their livelihood were less vulnerable to price fluctuations, bad weather, pests or disease than they would be in a monoculture. This method of farming created a localized cycle of soil fertility, in contrast to what would come after (Guenthner, 2016).

Everything changed once it made sense to grow corn from fencerow to fencerow. Farmers grew more corn and soybeans (the latter for fixing nitrogen) and less hay and oats. This glut of cheap corn and lack of hay and oats meant that Concentrated Animal Feeding Operations (CAFOs) could feed animals far more cheaply than farmers could, so it became less common for animals to be raised on farms. This deprived farmers of their source of motive power and fertility, so they had to purchase machinery and chemical fertilizers. Since monocultures are

more vulnerable to pests than are mixed-crop fields, farmers also needed to invest in chemical pesticides. The current system is called high external input agriculture (HEIA), which by definition relies on a strategy of "inorganic fertilizers, pesticides, and mechanization" in order to produce high yields from the same land year after year. (Mosely, Perramond, Hapke, & Laris, 2014, pp. 257-8)

Listing all the effects of the transition from mixed farming to HEIA is beyond the scope of this essay, but I will give several so the reader has some context as to why the subject matters. Earl Butz's policies succeeded in their goal of solving the food crisis and making food more affordable for everyone. The CAFOs are rife with animal cruelty and are a major source of water pollution (Pollan, 2006). Chemical fertilizer runoff has caused fish-killing algae blooms, hurting the livelihood of Gulf Coast fishermen. Agribusiness firms greatly benefit from HEIA as the providers of seeds, fertilizers, pesticides and farm machinery, but farmers are dissatisfied with the current system. Farmers must pay more for the fertilizers and pesticides as well as fuel, parts and mechanics for their machinery (Guenthner, 2016). Finally, the monoculture that HEIA makes feasible are highly vulnerable to drought and other vagaries of climate change.

My thesis is that farms have experienced a decline in mixed farming while at the same time becoming more dependent on external inputs. In other words, my goal is to provide evidence proving what I said up to this point is true. To this end, I use GIS mapping to display how farming practices - specifically acreage of select crops, number of horses, chemical pesticide and fertilizer use, and mechanization - have changed over time for Pierce County, Polk County and St. Croix, the three Wisconsin counties in the St. Croix watershed. My hypothesis is that the acreage of corn and soybeans, the use of chemical pesticide and fertilizer, and

mechanization will all have will have increased, while the number of horses and acreage of hay and oats will have decreased.

Research Methods

I began this project by interviewing Polk County farmer Dan Guenther over the phone. Dan Guenthner and Margaret Pennings had previously donated their time to give our class a tour of Common Harvest Farm. During our interview, we discussed what changes in farming practices he has observed, and he pointed to the decline in mixed farming and the disappearance of livestock that I discussed in the Introduction. He also referred me to the Department of Land Information and the Farm Services Agency in Polk County, who were also of great assistance during this project.

The maps of the three counties - Polk, Pierce and St. Croix - were created using data from the Census of Agriculture for the years 1974 and 2012. I chose 1974 for comparison because that census was taken falls when the Secretary of Agriculture was Earl Butz, whose tenure catalyzed the transition towards our current system of high external input agriculture. 2012 was the year of the most recent agricultural census; choosing data from the 2012 census rather than an earlier year gives me the largest time frame to analyze (The Census of Agriculture is managed by the USDAs National Agricultural Statistics Service and is taken every five years). I chose the Census of Agriculture as a data source because Osh Andersen, whose article this paper is modeled after, did the same. I chose to collect data on Pierce and St. Croix Counties in addition to Polk County due to data limitations. I tried to find data at the level of the census tracts for Polk County but was unable to do. Polk County's County Executive Director at the Farm Services Agency confirmed that there is no publically-available data at a smaller scale than county level

due to privacy concerns. Since I could not go further than the county level, I decided to again follow Andersen's lead and research Polk, Pierce and St. Croix Counties.

I collected nine variables to build eight maps. The variables are as follows: corn cuiltivation (measured in acres), soybean cultivation (acres), hay cultivation (acres), oat cultivation (acres), number of horses, pesticide use (total acres applied with pesticide), fertilizer use (total acres applied), estimated market value of machinery (measured in unites of thousand dollars), and total harvested cropland (acres). Generally, I build each map by taking the subtracting the 1974 data from the 2012 data and then dividing those difference by the 1974 value for each variable. For example, the acreage of corn in Polk County was 61,649 in 1974 and increased to 73,022 by 2012. To subtract 61,649 from 73,022 gives 11,373, which represents the increase in corn acreage over the time scale. Dividing the difference by the 1974 gives 0.18, so there was an 18% increase in the number of acres under corn cultivation. This process was used for all nine variables except for the estimated market value of machinery and the total harvested cropland. I used those variables to represent mechanization by dividing the estimated market value of machinery for each year by the total harvested cropland value for the same (dollar value of machinery per acre). I then took the difference of the 1974 and 2012 ratios and divided it by the 1974 ratio.

I used Microsoft Excel to analyze the census data and then joined it to an operational table in ArcMap 10.3.1. I used ESRI shapefiles to provide background data for the maps.

Findings

The findings are organized by individual maps, which are found in the map index at the end of this document.

Map 1 - Corn Cultivation

The acreage of corn in Polk County grew by more than 11,373 acres from 61649 in 1974 to 73,022 in 2012, an increase of 18%. The acreage of corn in Pierce County grew by more than 13,911 acres from 66753 in 1974 to 80,664 in 2012, an increase of 21%. The acreage of corn in St. Croix County grew by more than 12,548 acres from 81682 in 1974 to 94,230 in 2012, an increase of 15%.

Map 2 - Soybean Cultivation

The acreage of soybeans in Polk County grew by 21,443 acres from 3,368 in 1974 to 24,811 in 2012, an increase of 637%. The acreage of soybeans in Pierce County grew by 26,028 acres from 5,284 in 1974 to 31,312 in 2012, an increase of 393%. The acreage of soybeans in St. Croix County grew by 32,216 acres from 7,982 in 1974 to 40,198 in 2012, an increase of 404%.

Map 3- Hay Cultivation

The acreage of hay in Polk County fell by 47,406 acres from 85,823 in 1974 to 38,417 in 2012, a decrease of 55%. The acreage of hay in Pierce County fell by 27,883 acres from 63,675 in 1974 to 35,792 in 2012, a decrease of 44%. The acreage of hay in St. Croix County fell by 49,824 acres from 87,847 in 1974 to 38,023 in 2012, a decrease of 57%.

Map 4 - Oats Cultivation

The acreage of oats in Polk County fell by-20,246 acres from 21,676 in 1974 to 1,430 in 2012, a decrease of 93%. The acreage of oats in Pierce County fell by 24,334 acres from 28,081 in 1974 to 3,747 in 2012, a decrease of 90%. The acreage of oats in St. Croix County fell by 29,455 acres from 32,720 in 1974 to 3,265 in 2012, a decrease of 87%.

Map 5- Horses on Farms

The number of horses in Polk County grew by 613 from 1,236 in 1974 to 1,849 in 2012, an increase of 50%. The number of horses in Pierce County grew by 1,120 from 863 in 1974 to 1,983 in 2012, an increase of 130%. The number of horses in St. Croix County grew by 1,625 from 1,133 in 1974 to 2,758 in 2012, an increase of 143%.

Map 6 - Pesticide Application

The number of acres treated with pesticide in Polk County grew by 74,848 acres from 54,178 in 1974 to 129,026 in 2012, an increase of 138%. The number of acres treated with pesticide in Pierce County grew by 80,980 acres from 73,811 in 1974 to 154,791 in 2012, an increase of 110%. The number of acres treated with pesticide in St. Croix County grew by 96,577 acres from 93,855 in 1974 to 190,432 in 2012, an increase of 103%.

Map 7 - Fertilizer Application

The number of acres treated with chemical fertilizer in Polk County grew by 27,259 acres from 84,226 in 1974 to 111,485 in 2012, an increase of 32%. The number of acres treated with chemical fertilizer in Pierce County grew by 40,356 acres from 84,009 in 1974 to 124,365 in 2012, an increase of 48%. The number of acres treated with chemical fertilizer in St. Croix County grew by 14,242 acres from 131,080 in 1974 to 145,322 in 2012, an increase of 11%.

Map 8 - Farm Mechanization

The ratio of the estimated value of machinery over the total harvested cropland in Polk County grew by 0.624 from 0.221 in 1974 to 0.846 in 2012, an increase of 228%. The ratio of the estimated value of machinery over the total harvested cropland in Pierce County grew by 0.872 from 0.198 in 1974 to 1.070 in 2012, an increase of 440%. The ratio of the estimated value

of machinery over the total harvested cropland in St. Croix County grew by 0.726 from 0.190 in 1974 to 0.916 in 2012, an increase of 382%.

Analysis

My hypothesis with regard to the cultivation of corn, soybeans, hay and oats; the usage of pesticide and fertilizer; and the increase in mechanization of farms were all correct. My hypothesis that the number of horses would decrease is incorrect. For all counties, the increase in soybean acreage, of pesticide acreage, and mechanization has more than doubled.

Discussion

The increase in the horse population does not initially seem to match the overall trend toward high external input agriculture. However, it may be that there is simply are horse farms in each county which raise them for non-agricultural use. The dramatic increase in money spent on farm machinery per acre of land suggest that machinery, not horses, are the primary tool of farmers. Dan Guenther stated that draft animals such as horses were largely replaced by machinery as early as the 1940s (Guenthner, 2016). I posit that horses are being no longer being used to provide motive power, instead having been replaced by machinery, and are no longer found on most farms. Therefore my thesis, which states that we have moved from mixed farming towards HEIA, still stands. Frustratingly, I was unable to test this because the Census of Agriculture data does not go further than the county level.

Conclusion

Farms in the Polk, Pierce and St. Croix counties have in 2012 more corn-and-soybean monocultures dependent upon chemical fertilizers, pesticides, and expensive farm machinery

than it did in 1974. It is certain that farms in that area has moved towards a strategy of high external input agriculture.

What is to be done? High external input agriculture is here to stay, and we certainly should not return to the horse-drawn plow, but we as a country can support farmers that rely less on monoculture or external inputs. One method, proposed by Bill Moseley, is reform the current farm subsidies so that farmers who grow their own fodder receive direct payments (Moseley, 2012). We should also encourage small farmers to raise livestock for meat. This can be accomplished mandating that the FDA create a new category for small producers so that small farmers would not be required to meet standards designed for large meat processing plants. These policies would help return animals to our farms and return fertility to our soils.

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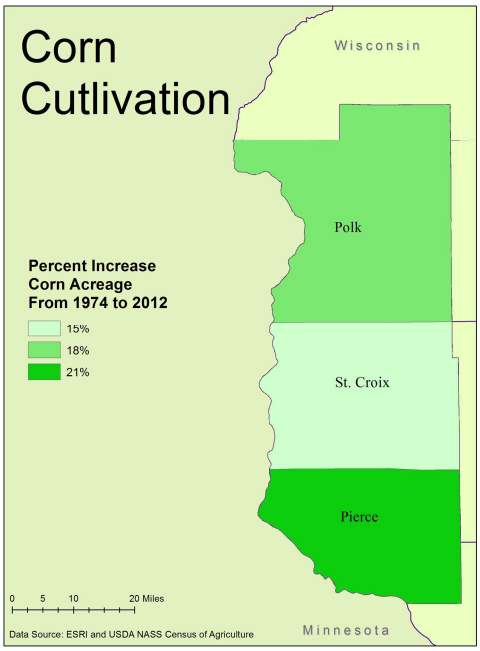
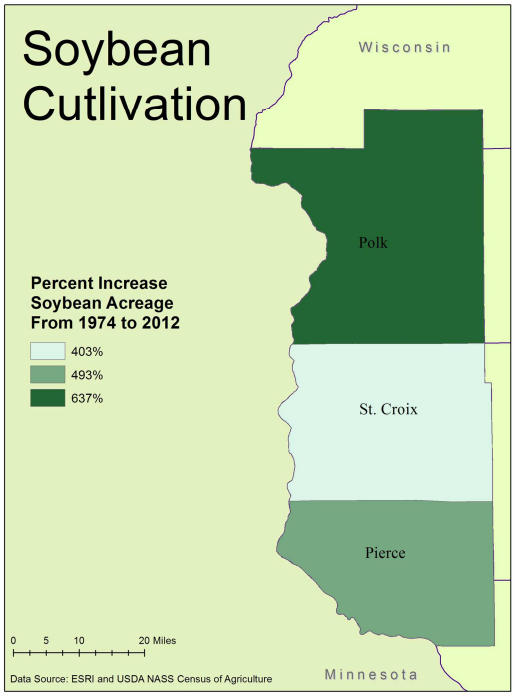
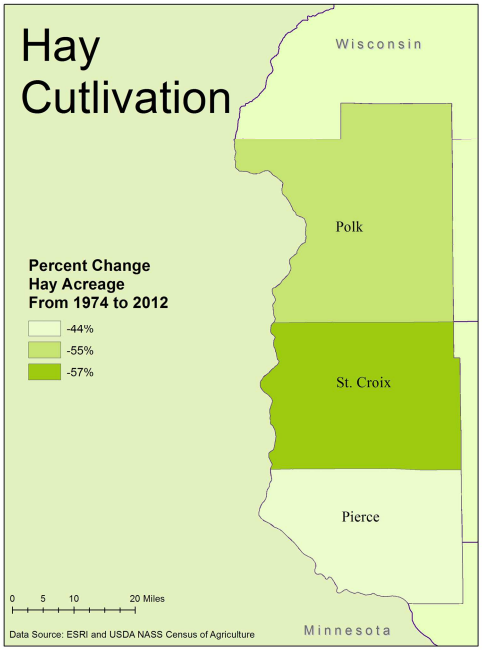
Map 1


Corn
Cutlivation
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Increase
Corn Acreage
From 1974 to 2012
15%
18%
21%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

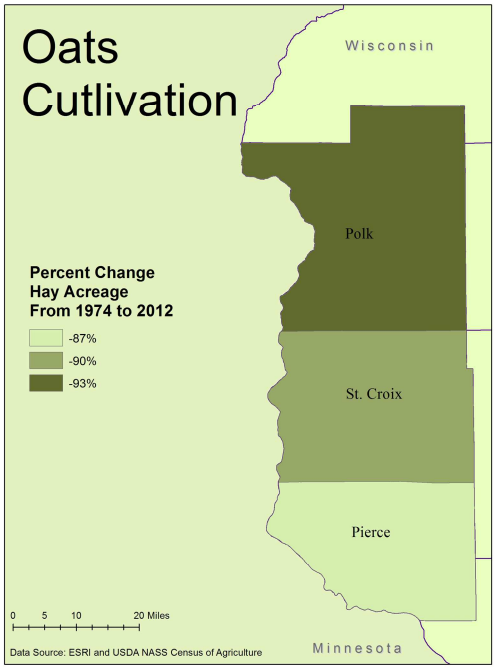
Map 2


Soybean
Cutlivation
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Increase
Soybean Acreage
From 1974 to 2012
403%
493%
637%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

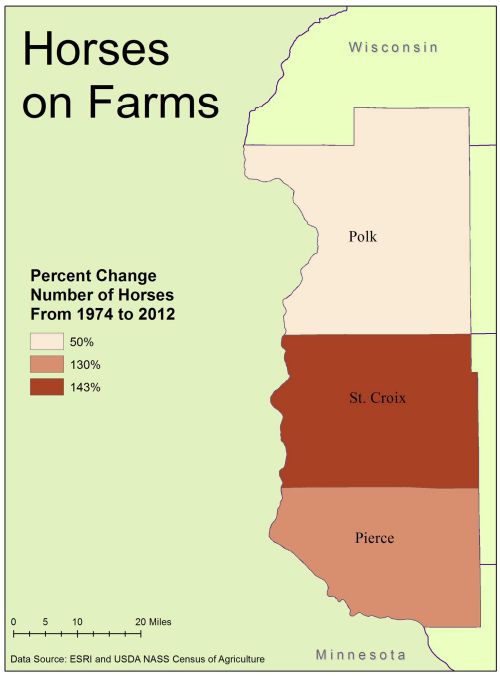
Map 3


Hay
Cutlivation
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Hay Acreage
From 1974 to 2012
-44%
-55%
-57%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

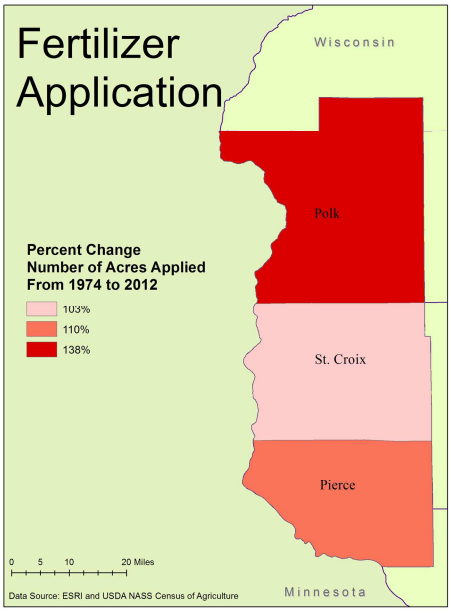
Map 4


Oats
Cutlivation
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Hay Acreage
From 1974 to 2012
-87%
-90%
-93%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

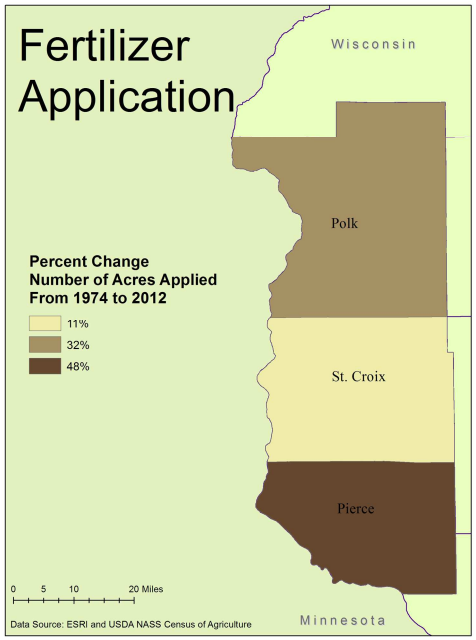
Map 5


Horses
on Farms
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Number of Horses
From 1974 to 2012
50%
130%
143%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

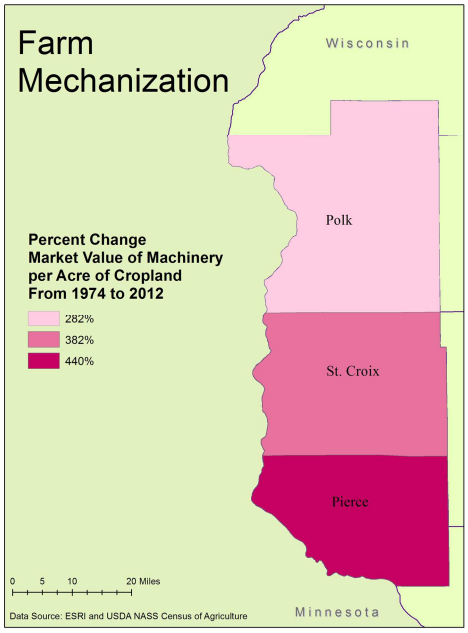
Map 6


Fertilizer
Application
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Number of Acres Applied
From 1974 to 2012
103%
110%
138%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

Map 7


Fertilizer Application
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Number of Acres Applied
From 1974 to 2012
11%
32%
48%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

Map 8


Farm Mechanization
Wisconsin
Polk
St. Croix
Pierce
Minnesota
Percent Change
Market Value of Machinery
per Acre of Cropland
From 1974 to 2012
282%
382%
440%
0 5 10 20 Miles
Data Source: ESRI and USDA NASS Census of Agriculture

Examining the Spatial Distributions and Relationships of 'Organic' Agriculture across Polk County and Wisconsin: A GIS-based approach

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GEOG 232: People, Agriculture, and the Environment
Professor Bill Moseley
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Examining the Spatial Distribution and Relationships of the 'Organic' Agricultural Sector across Polk County and Wisconsin: A GIS-based approach

Introduction

Polk County lies along the northwestern edge of Wisconsin in the St. Croix River Valley, bordering Minnesota to its left in the St. Croix River. The county's landscape and economy has been geared primarily towards agriculture, complemented with a small niche for outdoor recreation and leisure activities. Historically, the area's landscape has been subject to a great amount of human manipulation (Andersen, Crow, Lietz, and Stearns 1996). Native Indian tribes—mainly the Sioux and Ojibway—practiced extensive but controlled burning, creating a patchy distribution of grasslands and woodlands for their hunting activities. The influx of European-American immigrants into the area during the late 1830s altered the general use and approach of the land by taking advantage of the extensive woodland cover present. A dominant logging industry quickly emerged, attracting more people to the area. Agriculture simultaneously grew alongside, and farms transitioned from subsistence to commercial practices as early as the 1850s and 1860s. The numbers of farms and acreage increased in the 1870s, and by 1900 half of Polk County was farmland. Reports concerning soil erosion problems emerged as early as 1928 (Andersen et al. 1996).

To this day, the detrimental consequences of commercial agriculture to the integrity of the land are an ongoing concern for farms. Intensive monocultures dominate the agricultural landscape, causing problems such as soil erosion from mechanical tilling practices or chemical runoff from crop fields into rivers. Dan and Margaret Guenther, owners and operators of Common Harvest Farm in Osceola, Wisconsin, in the St. Croix River Valley, do face these

problems because they have chosen not to partake in those intensive practices. As a community supported agriculture (CSA) operation, this farm is different from the majority of farm operations in the county and state. While not officially certified through the commonly known USDA organic label, Dan's emphasis on the biological understanding of his own land, especially his soil, is an approach that has greatly preserved the integrity of his land and proved productive. Considering this, I thought it would be worthwhile to examine the general distribution of farms operating under similar ideals as Dan and Margaret's business—both at county and state scales. Additionally, I wondered how feasible it would be for more agricultural operations to adopt organic practices and still remain productive and profitable. To visualize and enhance my answers, I used a geographic information system (GIS) to explore my questions. I wanted to know how the spatial distribution of suitable farmland could influence the potential for and establishment of organic producers and handlers. I particularly considered site suitability, cropland cover, and the dairy industry in approaching my question.

Background

It is important to highlight the significance of a GIS analysis, what I mean by 'organic' agriculture, and the role and influence of the U.S. Department of Agriculture (USDA) has on the landscape in Wisconsin. Understanding these elements in the context of this topic is useful to grasping the meaning of the spatial relationships found in the maps I made.

GIS

The purpose of a GIS-based approach for this analysis was to provide a visual portrayal of the agricultural elements of Polk County and Wisconsin. This involves arranging layers of data to produce a map of the spatial relationships that exist between variables of choice.

Ultimately, this approach helps strengthen arguments that are useful to understanding Polk County and Wisconsin's current situation in regards to 'sustainable' agriculture.

Organic agriculture and the USDA

What has become a ubiquitous and sought-for label in the food industry, U.S. Department of Agriculture (USDA) organic certification is, according to the agency itself, a "leading global standard" of agricultural food production that aims to preserve the integrity of ecosystems and natural resources (USDA 2015). With increasing awareness of chemical inputs and environmental degradation from conventional farming among consumers, there is a growing demand and market for 'organic' products that, theoretically, are produced under healthier and ecologically sound standards. The National Organic Program (NOP) plays a major role in the transition into and certification process for 'organic' production. They also hold a large regulatory oversight for farms to adhere to the USDA's standards.

I have chosen to use the USDA's 'organic' agriculture standards and certification as an indicator for the general efforts of producers and handlers to improve the integrity of the land they use, as well as an indicator of a productive and profitable site without the use of conventional practices. Under these standards, crop and livestock practice must: use biological and mechanical processes that promote cycling resources on the farm; not use unapproved synthetic fertilizers or antibiotics in their crops and livestock, respectively; manage soil fertility through tillage, crop rotation, cover crops, and animal-derived or crop waste; and livestock must be fed 100 percent organic feed (National Organic Program 2002). After visiting and learning about Common Harvest Farm, it was evident that their practices emphasized careful use of their land and resources. This demonstrates that certification is not necessary; either way, Dan and Margaret choose to practice good land stewardship, and their transparency as a CSA farm does

not require a government-based certification to validate the careful practices they have done from the beginning.

At the state level, Wisconsin's involvement in the USDA's organic program is significant, as seen in the state's organic agriculture status report for 2015 (Carusi et al. 2015). Wisconsin ranks second in the nation for the number of organic farms as of 2012; the number of certified farms has grown from 712, in 2005, to 1217 in 2013, which is a 41 percent increase. Other noteworthy 'organic' rankings include: being first in the number of dairy farms and second in oilseed and grain farms (Carusi et al 2015). From these figures, it is obvious that the market for organic products will not shrink. Rather, the demand for 'organic' products can make these agricultural practices more lucrative for producers to adopt and implement on their land. Wisconsin's potential for organic agriculture is not lacking. Utilizing a GIS analysis, we can examine the distribution of elements that make these sustainable practices feasible.

Methods

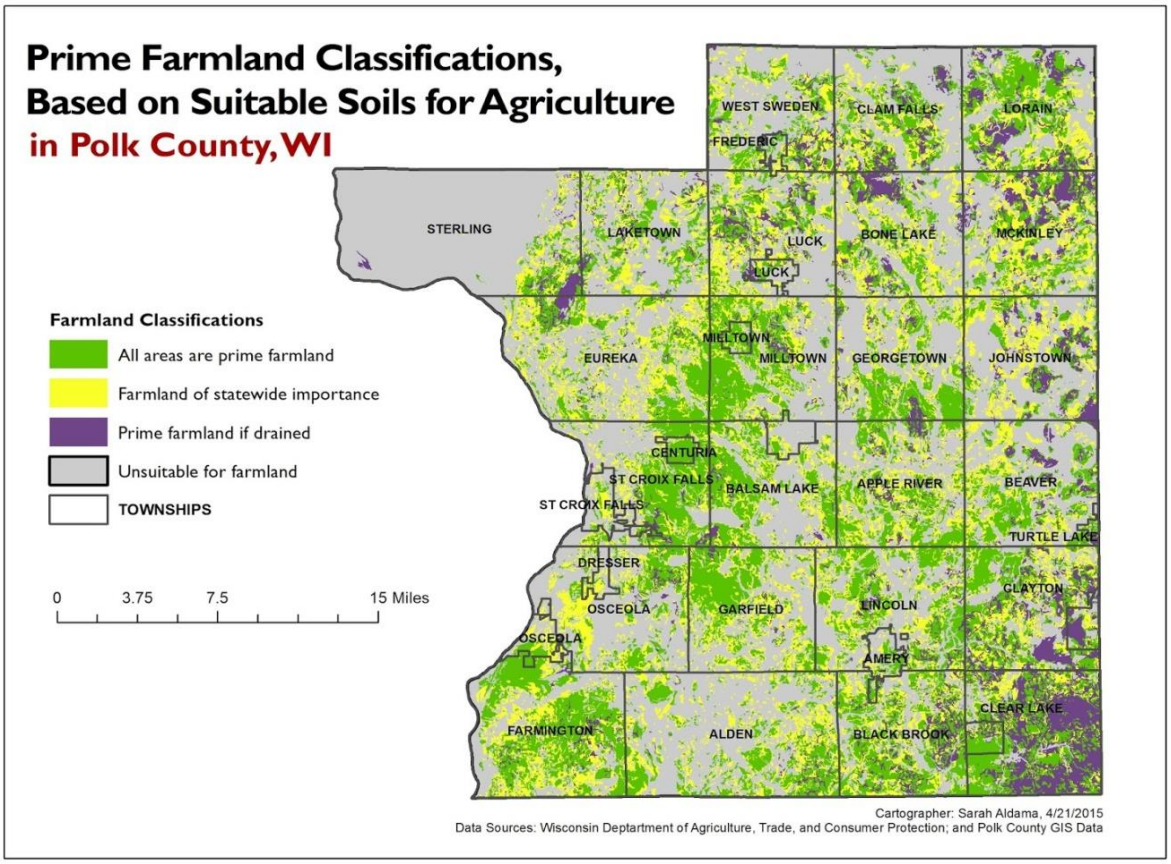
By utilizing a geographic information system program called ArcGIS, I constructed several maps to try to address the questions I had about Polk County and Wisconsin. The process essentially consisted of gathering data from publically accessible online databases, and then layering combinations of variables of choice to show how they're spatially distributed.

There were three main sources from which my spatial data was collected. The USDA's National Resource Conservation Service provided land-use, land-cover, and county boundary data. With the help of Dan, I was able to find Polk County GIS data, which provided several boundary and water body data specific to the county. Initially, finding this particular data was a concern, but Polk County ended up having its own GIS data portal publically accessible. The other main source was the Wisconsin Department of Agriculture, Trade, and Consumer

Protection (ATCP). This source had a variety of thematic spatial data related to my chosen topic. I chose to use 'Prime Farmland' coverage (2014), Certified Organic Business (2015) and Farm (2015) distributions, and the distribution of all types of dairy producers (2016). All the GIS data used for my mapmaking consisted of physical features; there was no human data such as demographics involved in my particular analysis.

The process of locating and downloading spatial data involved navigating the internet using keywords of a desired topic with "GIS data" at the end. For the type I wanted, the U.S. government's geospatial data was abundant, free, and easy to download and transfer into the ArcGIS program for mapping. The collection of spatial information and assembly of maps was time-consuming, but the end products do provide a clear visualization of the distributions in relation to my questions at both the county and state level.

Maps, Results, and Discussion



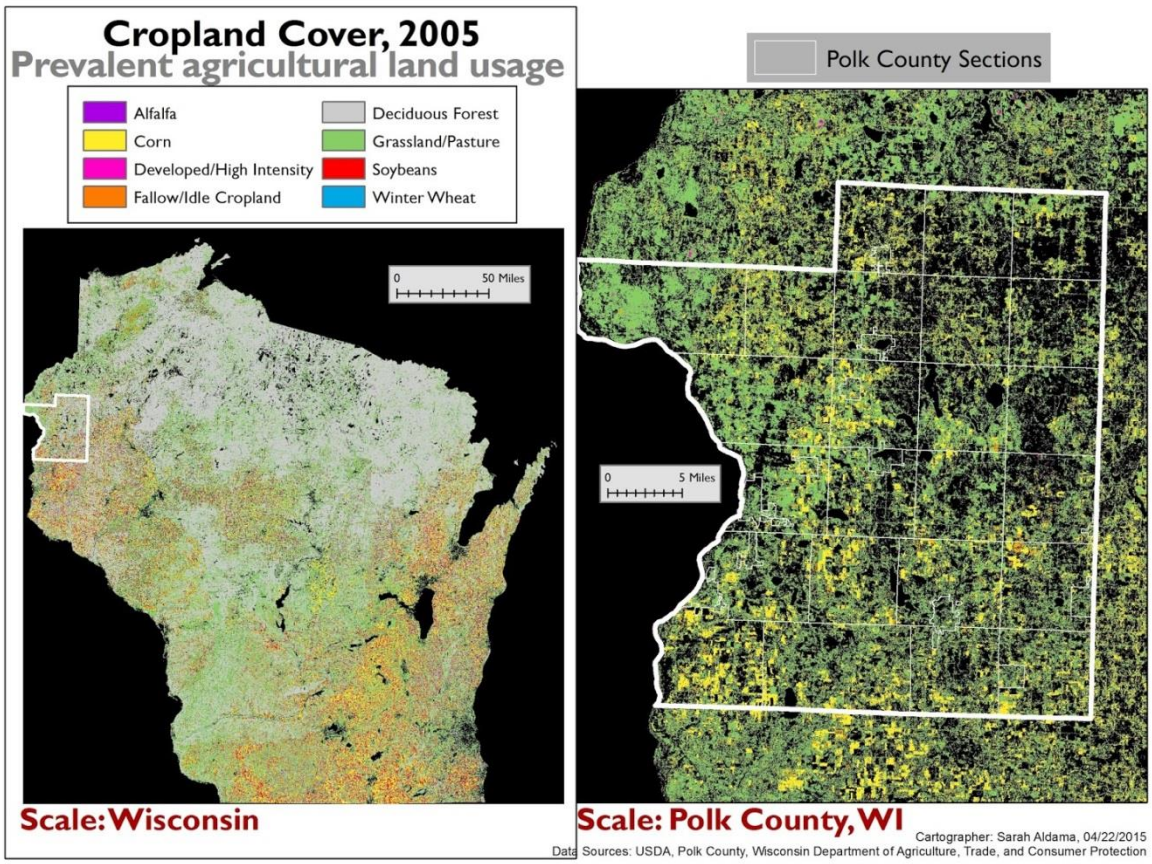
Map 1. *Prime Farmland Classifications, Based on Suitable Soils for Agriculture in Polk County, WI.*

The purpose of this map was to examine site suitability of Polk county agriculture. This map shows the distribution of prime farmlands at the county's scale. The definition of 'prime farmland' is based on particular soil qualities that make the land suitable for farming. The USDA defines this land to have the best combination of physical and chemical characteristics for production utilizing minimal inputs of fertilizers, fuel, labor, and pesticides, without eroding the

soil excessively. 'Farmland of statewide importance' is land devoted to the production of commodity crops that the state government deems important to their economy.

There are three categories symbolizing current or potential site suitability for farming: green, yellow, and purple. Of these three, green covers the greatest amount of area, followed by yellow, and some purple. The distribution of prime farmland seen on this map shows that, in general, Polk County has a generous amount of suitable land for what *could* be organic practices. If the soil is well-suited for minimum chemical and mechanical inputs, the adoption of organic practices could hypothetically be feasible while maintaining a profitable operation. As a farmer, investing in the USDA's organic certification is only sound if your land is likely to be productive without the use of synthetic chemical inputs and GMO's.

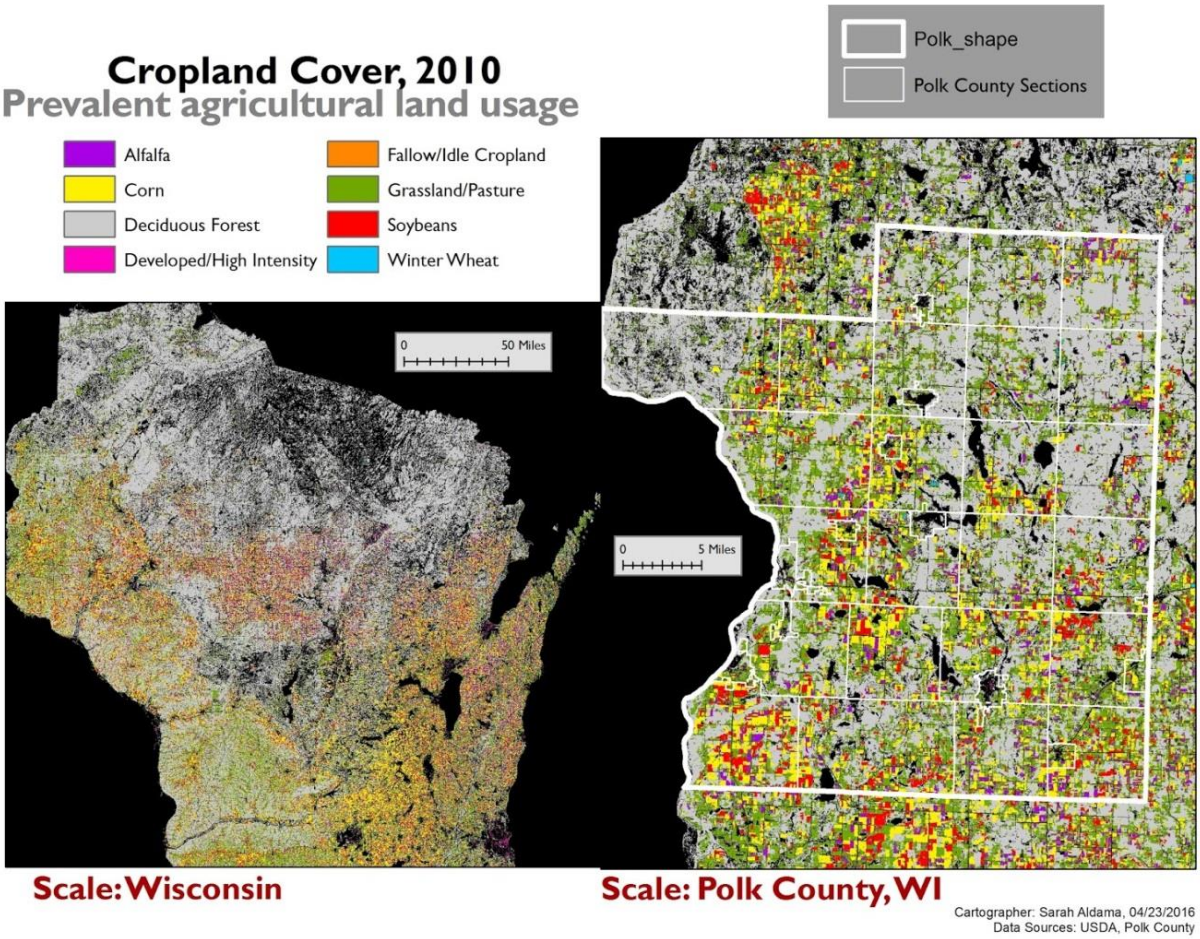
Common Harvest Farm is located in the township of Farmington. A majority of this area is either green or yellow, indicating the potential for agricultural productivity using organic practices. Dan and Margaret have already taken advantage of this fact.



Map 2a. *Cropland Cover 2005: Prevalent agricultural land usage.*

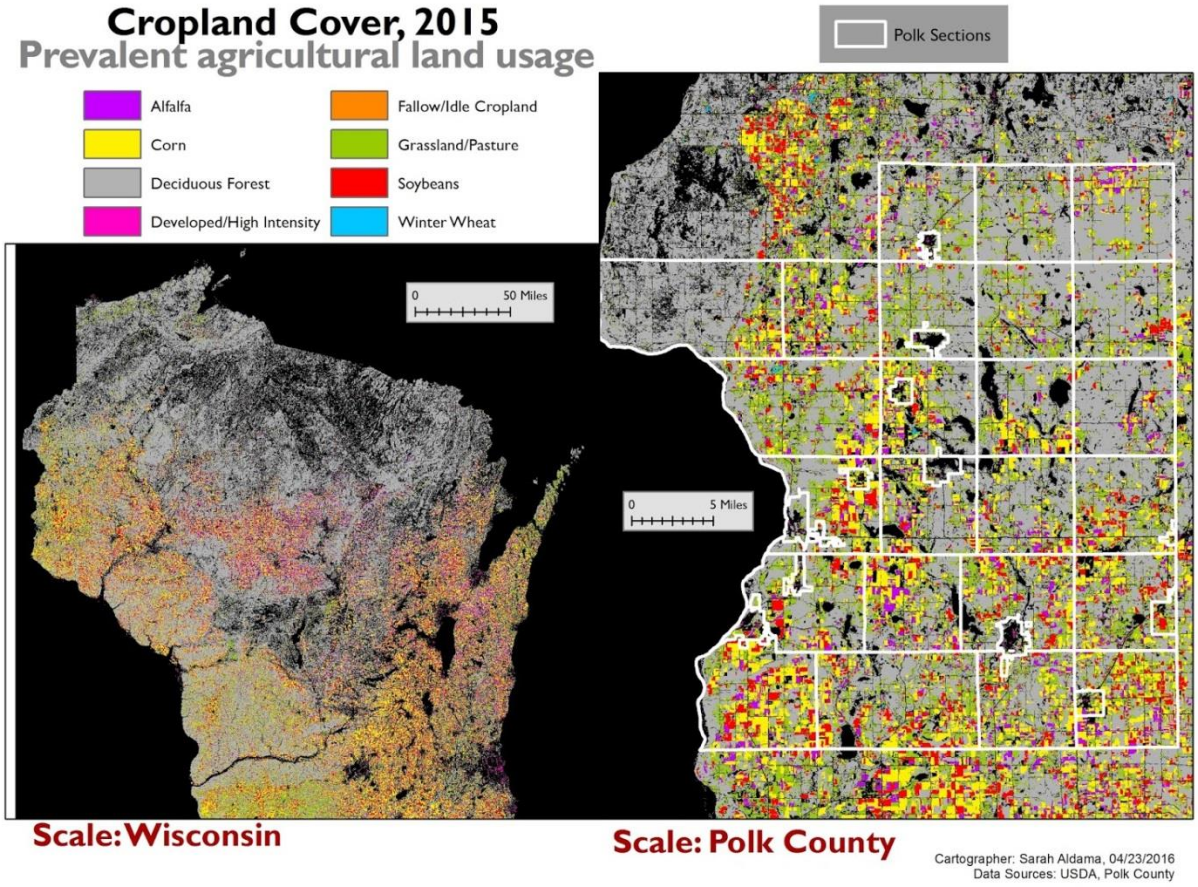
The purpose of the next three maps was to examine cropland cover across a fifteen-year period—at the state and county levels—for 2005, 2010, and 2015. The USDA defines "cropland" as areas used for the cultivation of crops for harvest, which comprises of : close-grown crops, row crops, pastureland, and hayland (USDA 2013). Cropland type demonstrates the types of land-use that have been prioritized over time, and it provides a visualization to help speculate what kinds of agriculture has been practiced over time. General trends include a vast cover of corn production, as seen in the yellow. This crop requires high inputs of pesticides, which can only be accomplished through conventional practices, where high productivity and profits are the main priority. According to the Wisconsin Land Use Report in 2010, pesticide application

amounted to 6.5 million pounds, roughly six times used for soybeans. Additionally, the report claims, increasing demands in the biofuel markets like ethanol are forcing farmers to expand corn production into lands that are uncultivated (Haines et al. 2010).Thus, the large amount of yellow seen across these three maps demonstrates the dominance of corn and conventional agriculture that sustains its production. Pastureland (in green) greatly dominated the landscape as well. Haines et al. also reported that livestock production takes up about 7.5 million acres of land-use in the state, comprising roughly half of all farmland--with 4.8 million of those acres devoted to dairy production (2010). While this is not a promising trend for the potential adoption of organic agriculture, there are other cropland uses that could more easily make these desirable transitions.



Map 2b. *Cropland Cover 2010: Prevalent agricultural land usage.*

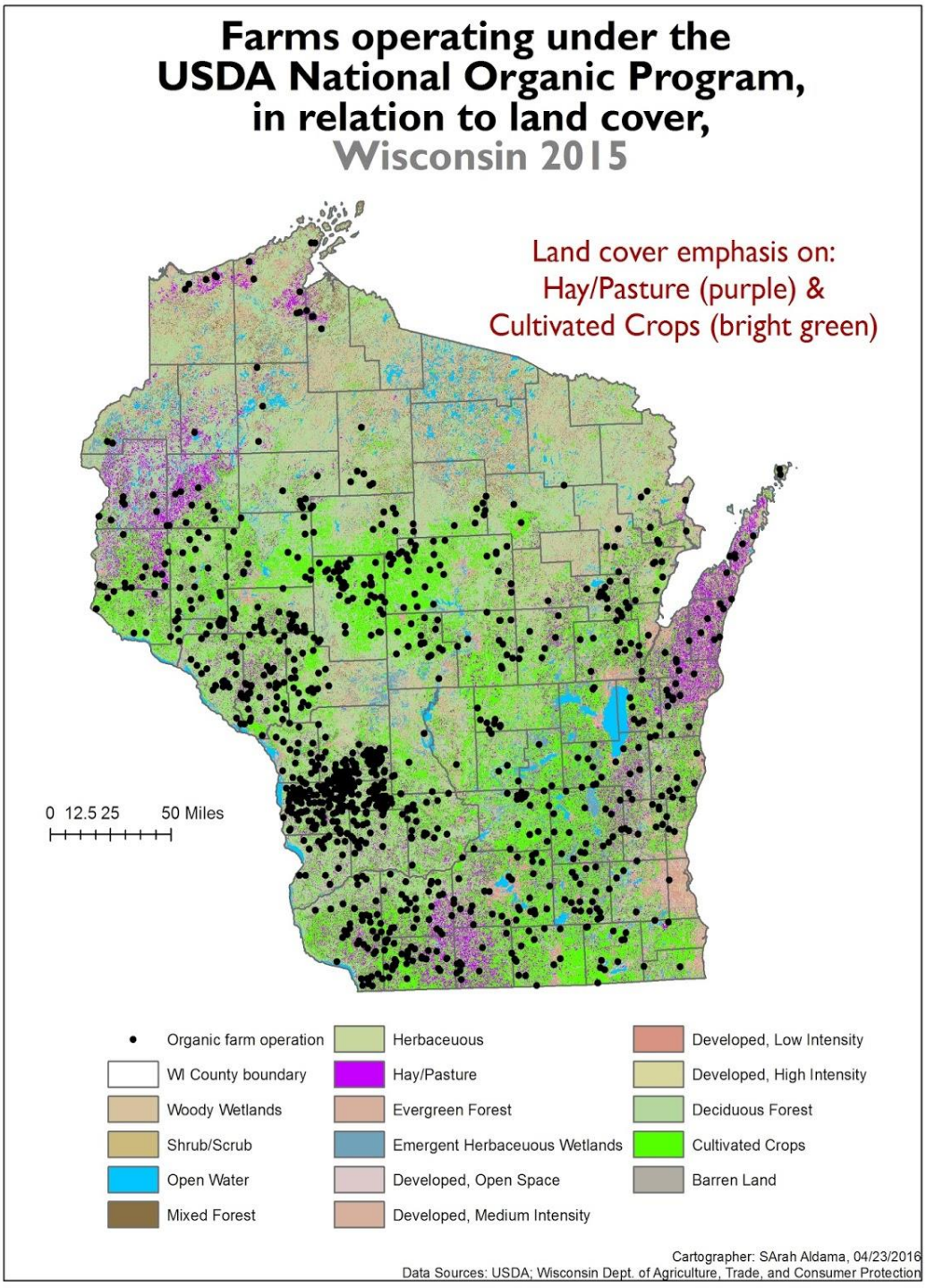
The purpose of this map was to examine any possible changes in cropland use that may have arisen within a five year period. A clearly visible change observed was the emergence of abundant soybean production in Polk County, seen in red. At both the county and state level, corn production dominates, particularly along the entire west, eastern and lower central areas of Wisconsin. This demonstrates a continuing prevalence and increase in commodity crops in Polk County and Wisconsin. While it is only a five-year change we are observing from Map2a, these small changes are worth highlighting.



Map 2c. *Cropland Cover 2015: Prevalent agricultural land usage.*

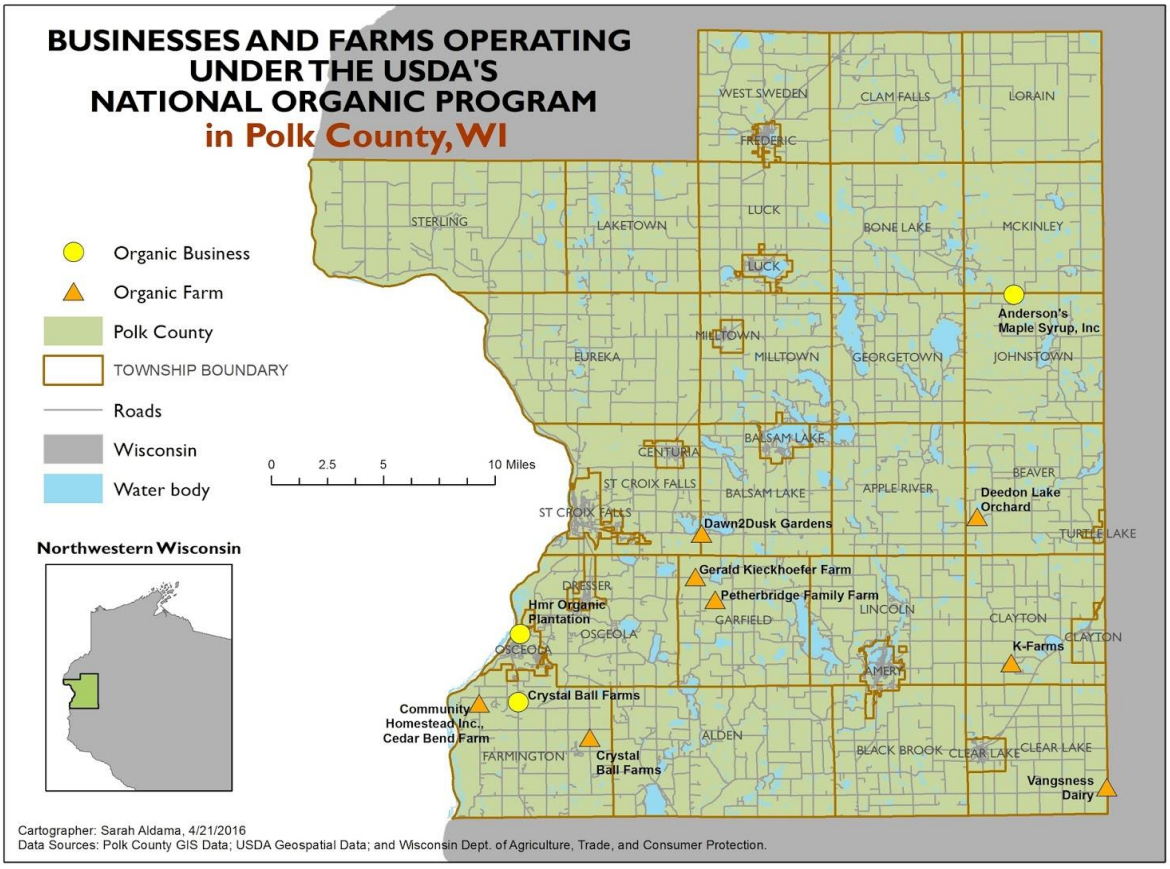
The purpose of this map was to examine changes in cropland use that arose within an additional five-year period from Map2b, or over a ten-year period when compared to the Map2a. Notable changes include the appearance of alfalfa production in Polk county, symbolized in purple. On the state scale, there is an increase in pink color in the mid-central, and north-central area of the state, indicating high intensity development. This appears in the area where, in 2005 and 2010, was mainly deciduous forest, symbolized by gray. Overall, corn and soybeans dominate, along with pastureland, by 2015. This indicates a generally strong presence of

commodity crop production, most of which is likely conventional farming. Unfortunately, there was no data available to distinguish the farm management intensity associated with the cropland types.



Map 3. *Farms operating under the USDA's National Organic Program, in relation to land cover, in Wisconsin*

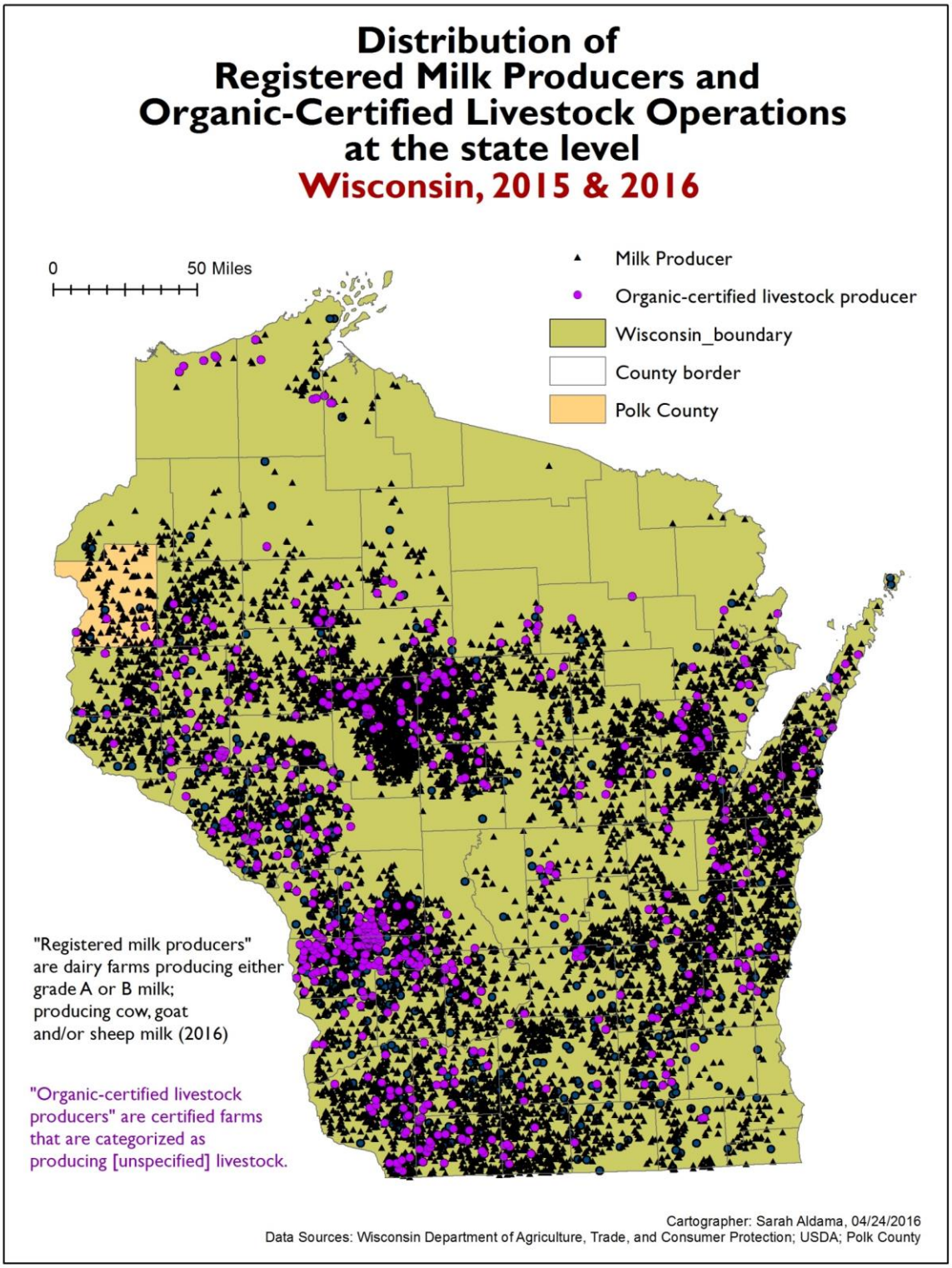
The purpose of this map was to examine the spatial distribution of organic-based operations—both producers and handlers—at the state level. After considering the site suitability and land-use patterns, I move on to next consider the presence of operations that have undergone certification and adopted organic practices. This map provides a general idea of the establishment of these operations in relation to the type of land use—most which lie within crop (bright green) or pasture (purple) land-use. Overall, these farms and businesses are settled in agriculturally productive areas. While this is no surprise, it strengthens the argument that organic practices need to be situated on suitable land in order to continue being productive and profitable, and make it feasible to support the special costs and effort required from organic agriculture. Additionally, there is a dense cluster of black dots in the southwestern area. According to the Wisconsin Land Use Report, this is the state's "hub of organic production," largely due to establishment of the largest farmer cooperative in the nation—the Coulee Region Organic Producer Pools (Haines et al. 2010). This map shows a relatively healthy distribution and abundance of organic operations across the state.



Map 4. *Businesses and Farms operating under the USDA's National Organic Program, in Polk County, WI.*

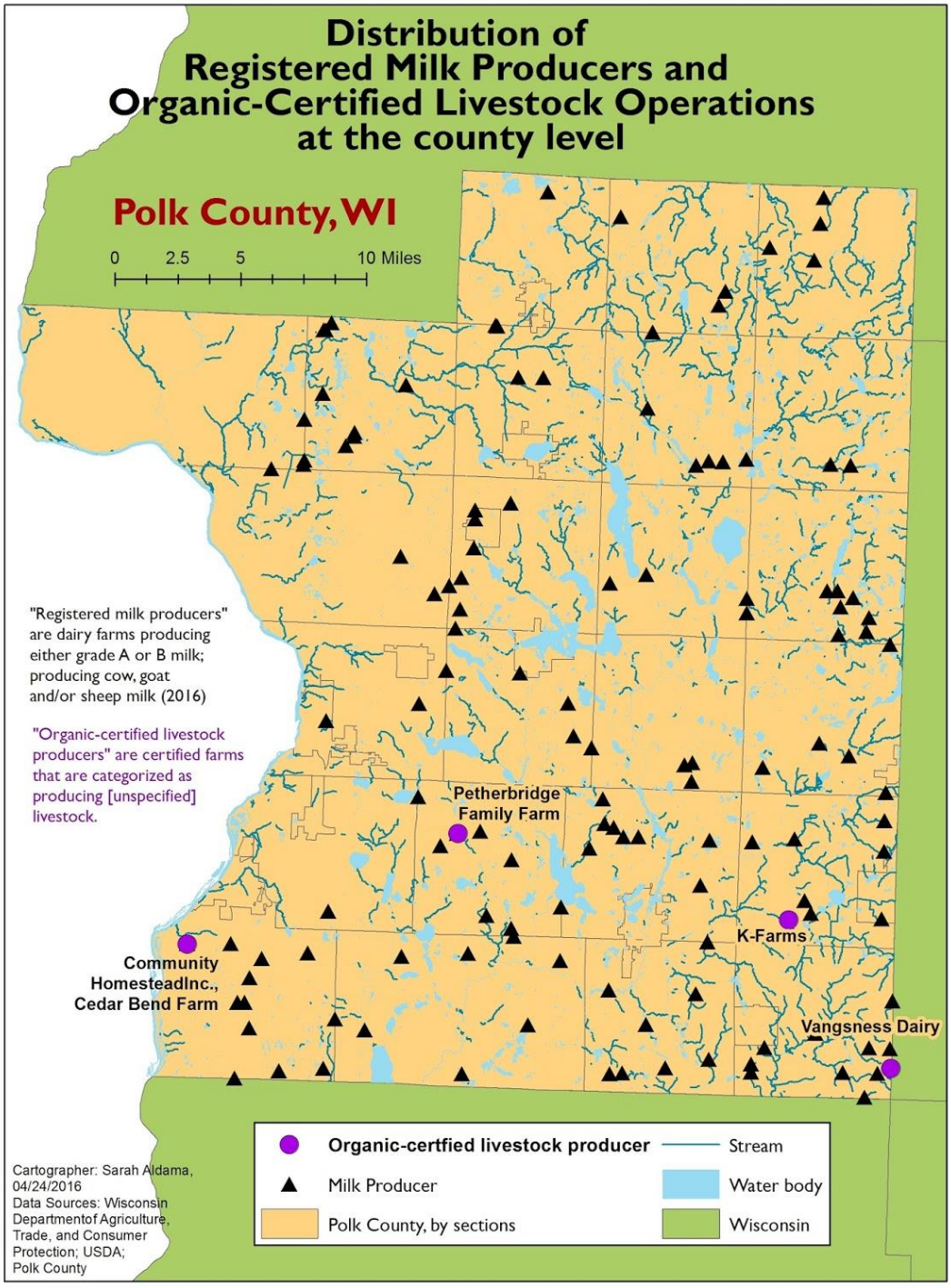
The purpose of this map was to see examine the prevalence of organic operations Polk County, by zooming in from Map 3. The general trend observed is a relatively small presence of organic-certified operations across the county, compared with state scale (Map 3). The majority of certified farms (orange triangles) and businesses (white circles) are situated in the lower half of the county. The township of Farmington is where Dan and Margaret's farm is located, but it is not listed in this data. It is important to recognize the establishment of businesses and farms like Common Harvest Farm, who also partake in sustainable practices, regardless of not having the

USDA's certification. While they may not show up in these maps, it is critical to highlight their contribution to this market.



Map 5. *Distribution of Registered Milk Producers (2015) and Organic-Certified Livestock Operations (2016) at the state level.*

The purpose of this map was to examine the present establishment and distribution of livestock operations, particularly the dairy industry at the state scale. Milk producers (black triangles) are densely established across a large proportion of the state, covering everything but the upper area of the state with blackness. While the data for milk producers did not distinguish between organic and conventional operations, I will assume the proportion of organic operations to be larger than the national average. After all, Wisconsin is number one in the nation for farms with milk cows and other livestock. It produced 10 percent of the nation's organic milk in 2014, and its revenue from cow milk accounted for 55 percent of the state's organic sales in 2014 (Haines et al. 2010). In addition to dairy producers, I layered the distribution of organic-certified livestock producers (purple circles). While it was not possible to fully isolate dairy operations from this data, I will infer that a large proportion of these are dairy operations. This assumption is based off from how the purple dots fall within the same areas where dairy producers are found. The significance of these spatial patterns is the visibly dominant presence of the dairy industry, and how the momentum of this abundance could potentially 'fuel' an increase in the adoption organic-based practices across the dairy industry in the future.



Map 6. *Distribution of Registered Milk Producers (2015) and Organic-Certified Livestock Operations (2016) at the county level.*

The purpose of this map is to supplement the state-scale map by examining the same thematic patterns at the Polk county level. This shows a relatively low presence of organic-certified livestock operations, but a fair abundance of likely conventional dairy producers. This makes sense: as seen in the cropland cover maps (Map 3a, 3b, 3c), crops are the predominant land-use for Polk County.

Conclusion

Taking a visual approach in examining the distribution patterns of agriculture was possible through the use of GIS analysis. My choice to focus on the prevalence of organic agriculture at both the county and state scales is based on the growing demand and popularity in organic products in recent years. This analysis required the collection of data relevant to this topic, deciding what variables to examine together, and making educated assumptions as to what the spatial relationships tell about the particular areas being examined.

First, I mapped the abundance and distribution of suitable land that would, in theory, make the adoption of defined 'organic' practices feasible—productive and profitable—for farmers and businesses. It was evident that Polk County's landscape was well suited for agriculture, supporting what Dan told us during our visit. He particularly emphasized his focus on soil quality and care, which proved a key factor in crop productivity on his own farm. This can be translated into the map, which suggests that areas of prime farmland can theoretically make sustainable agriculture a feasible endeavor if pursued on those areas. However, it must be noted that over 800,000 acres of prime farmland have been lost to urban and residential development already, according to Haines et al.'s analysis of land use trends (2010).

I then mapped cropland cover between 2005 and 2015. Corn and soybeans—two major commodity crops—dominated the arena, along with pastureland. This indicates the established prevalence of large scale, resource-intensive agriculture. In terms of the organically geared operations I was focusing on, knowing the current distribution of the cropland across the county and state provided some context into the past and current agricultural landscape.

The next maps examined the distributions and spatial relationships between organic-certified businesses and farms. Overall, Wisconsin's attitude towards organic certification seems positive and especially strong in the dairy sector. Considering the state's strong standing in organic dairy production, this industry has the potential to 'pave the way' for the adoption of more sustainable farming management across all agricultural sectors. One major limitation to my data is that it does not account for the small, sustainably-oriented farm operations like Common Harvest Farm, who intentionally preserve the integrity of their land in all their agricultural practices. This is the downside of using the USDA organic certification operations proxy variables, but doing so provided the most complete set of data that would show general trends I wanted to examine.

With a growing market for organic products and an increasing awareness among consumers, it is useful to examine the current landscape suitability and distributions, along with the established organic operations that are already these demands. Ultimately, more producers and handlers would be more willing to adopt more sustainable, 'organic' practices if the land held biological, chemical, and physical potential to be productive and profitable for the them. The purpose of this GIS-based approach in examining general agriculturally-oriented trends was to provide Dan and Margaret with an insight to the 'organic' culture that currently exists in their county, as well as their state. I hope this analysis contributes to not only a visually pleasing

experience of spatial relationships across the land, but also an appreciation for Wisconsin's strong standing as an economically productive 'organic' agricultural market.

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Patterns of Increase in Farm Size

Maya Swope

May 2016

Introduction

Over the course of the last 100 years, American agriculture has seen drastic changes. The farming system went from one that was based on small farms with relatively local food networks to a mega-industry on the national and international scales. The system has seen drastic increases in technologies, important policy changes, shifts in attitudes about agriculture, changes in land use, and many more changes since the turn of the twentieth century. These factors all have affected our economy and our food supply, as well as our human communities. While it is essential to recognize that all of these factors are intricately connected, it is useful to focus one's analysis in order to gain a more nuanced view. This paper will focus on changes in farm size: both the reasons for it and the consequential effects. The paper will focus on the example of farming in Polk County, Wisconsin, as well as analyzing trends on the state and national level. American agriculture has seen an overall trend of farm consolidation over the last one hundred years, and these changes have occurred because of economic, social, political, and environmental factors that have affected farming.

Research Methods

This research was informed by a variety of very distinct sources. Information from an initial tour of Common Harvest Farm in Polk County, completed by my classmates, provided a valuable orientation on the subject and on the location. I gathered the majority of my GIS data from the Polk County GIS Website, which provides very

specific information on agricultural land use and land ownership on the parcel level. I downloaded the data to a spreadsheet and used Microsoft Excel to combine properties and determine how much land each farmer or business owned. I obtained other useful GIS data from the USDA Geospatial Gateway website, as well as from the US Census Bureau American FactFinder online portal. Both were instrumental in providing information on the county and census tract level.

Using this data and ESRI's ArcGIS software, I created maps to analyze patterns in farming in Polk County. GIS is particularly useful in this instance because it allows one to visualize patterns in a spatial manner, so as to better interpret patterns. The software also allows for more complex analytics of data.

Finally, I conducted a review of the literature that has been written on the topic of changes in farm size and on Wisconsin agriculture in more general terms. I used this information to extrapolate conclusions about trends in agriculture on the national scale, as well as to interpolate trends and information specific to Polk County.

Findings, analysis and discussion

The United States has seen an overall trend of farm consolidation over the last century. Between 1935 and 1974, the overall number of farms decreased from 7 million to just 2.3 million. During the same time period, the average farm size in the country grew from 155 acres to 440 acres, a 183 percent increase. Still, the amount of land that is in use for agricultural production has remained relatively constant. Similar trends have continued since the 1970s (Baltensberger, 1987).

The state of Wisconsin has seen similar trends. As early as 1848, the year that the state was founded, two thirds of residents lived on a farm. The average farm size was

100 acres, and there were just 20,00 farms in the state. Initially, farming increased in popularity, and in the year 1935, there were nearly 200,000 farms in Wisconsin. However, since that time, average farm size has been increasing as the number of distinct farms goes down. In the early 1990s, average farm size in Wisconsin reached a height of 222 acres, and at that time only 2.6 percent of the state's population lived on a farm (Center, 2010). Polk county, in the western portion of the state follows the trends as well. According to Dan Guenther, a farmer in Polk County, the area has seen patterns in which fewer and fewer of the farmers own more and more of the land. Currently, Polk County is a heavily agricultural area, with corn and soybeans grown as the most prominent crops. Dairies are also a prominent part of the Polk County landscape, and feedlots of many different sizes occur in the county.

One of the most important reasons for the changes observed has been the changes in economic systems associated with farming. In the years before World War II, many of the costs of production on a farm were fixed. They could not be cut, and so a rise in output that caused a decline in market prices of many crops had a significant impact on farmers. These farmers, then, were forced to make a choice to either increase the size of their farms or to intensify their production techniques, if the farmers wanted to maintain an adequate income. Many farmers chose to expand the amount of land that they were farming, which allowed them to "spread[] the fixed costs of machinery over more units of output" (Baltensberger, 1987, pg 257). Thus, they were able to maintain an adequate income in the face of rising agricultural outputs.

One of the primary factors that led to this change was the mechanization of farm technologies. An important impact of new technologies was that improvements in

tractors meant that less labor was needed on the farms. A farmer with hired labor did not need as much help they previously had, which added to an already-existing exodus from farming over the course of the last one hundred years. The improved technology also allowed a single farmer to farm more land than ever before, because new machinery made it more efficient to farm larger and larger areas. Other types of more modern technology also played an important role in the pressures that changed farm size. Pesticides and fertilisers mean that farmers can intensify their production, leading to more crops per acre. Genetically modified crops, too, have a similar effect. Thus, farmers who use synthetic pesticides and fertilizers or GMOs tend to face less pressure to expand their farm acreage to the same extent as those who do not. Changes in technology in other sectors of the economy are also incredibly relevant to trends of increases in farm size. Strengthening of the manufacturing sector meant that many rural farmers left to work at factories nearer to cities. These manufacturing jobs tended to pay more than farming, which drew many people away from the farming business (Baltensberger, 1987).

Another important economic factor that affected farm expansion was the fact that programs for farm capital and credit are generally easier to access for large farms. The Farm Credit Association, for example, tends to benefit larger farms, and many other programs favor larger operations as well. One reason for this unequal benefit is that “tax benefits accrue disproportionately to large farms through investment credit, differential taxation of capital gains, and cash-basis accounting” (Baltensberger, 1987, p 257). In Wisconsin for example, the total government payment to farmers reaches about $196

billion. Two thirds of this was given to farms that had at least 260 acres, much more than the average farm size, and to farms that had market values of over $100,000.

Though economics have an important effect on farm systems, they are not the only category of factors that influence farm size. Culture, for example, plays a very important role. According to famed essayist and environmental activist Wendell Berry, "a healthy farm culture can be based only upon familiarity and can grow only among a people soundly established upon the land; it nourishes and safeguards a human intelligence of the earth that no amount of technology can satisfactorily replace" (Berry, 1977). Berry argues that we lack a healthy farming culture, which both is caused in part by farm conglomeration and leads to more increase in farm size and big agriculture businesses. The idea of "get big or get out" that has long dominated farming is a dangerous one, Berry believes, especially because it is paired with an increased dependence on machines and increased debt for farmers. Berry writes that the idea "forces a profound revolution in the farmer's mind: once his investment in land and machines is large enough, he must forsake the values of husbandry and assume those of finance and technology" (Berry, 1977). This is a factor in the devastation of farm culture, because it breaks apart the moral codes that people used to tend to the land and the sentimental and historic connections that tied them to farming. Thus, economic and other pressures can more easily push farmers out of the profession, or keep the children of farmers from joining. These cultural factors have added to the overall trends of increases in farm size and decreases in the number of farmers.

Political factors are also integral to the trend of farm consolidation. Perhaps the single most important piece of farm legislation in the United States is the Farm

Bill. Originally, the Farm Bill was created in 1933 as part of President Franklin Roosevelt's New Deal package. Since then, it has been updated about every five years. The bill deals with factors as complex and varied and as food stamps, trade policy, rural development, conservation, and agricultural research. However, one of the most widely contested parts of the Bill are its sections on agricultural subsidies. These subsidies assist farmers with managing risk that occurs because of fluctuations in weather and in market prices, among other factors. The subsidy system is organized in a way such that it unevenly benefits farmers who grow major commodity crops, such as corn, soybeans, wheat, cotton, and rice. Most of the subsidies end up going to "the largest and most financially secure farm operations," (EWG's, 2016) rather than to family farms. This means that the most important and influential farm legislation in the United States supports the continuation of this trend of farm consolidation and increasing farm size.

It is clear that farming has experienced a trend of farm consolidation and increasing farm size over the last one hundred years. This is due, in large part, to a combination of economic, cultural, and political factors. More recent trends involving hobby farming and in other small-scale practices have also increased in popularity, especially in Polk County. In some cases this has actually led to a decrease in average farm size. However, this trend pales in comparison to the greater progression of consolidation of farms.

It is also important to look ahead to understand how these changes will affect farming. Since economic factors and pressures are, of course, central to trends in farming, understanding how the trends will affect the economic situation of farmers is

essential. Using Polk County as an example for analysis, Figure 1 shows the average farm size by census tract in the county. The average size per census tract ranges from 60 acres to 80 acres, though individual farms in the county range in size from less than one acre to over 1,386 acres. Figure 2 shows the mean household income in Polk County by census tract. This ranges from $47,223 to $73,182.

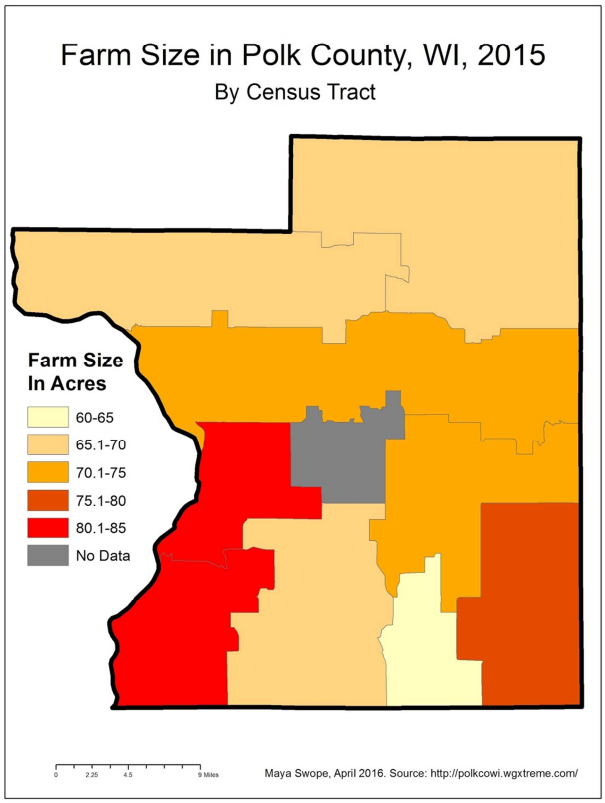

Figure 1: Farm size in Polk

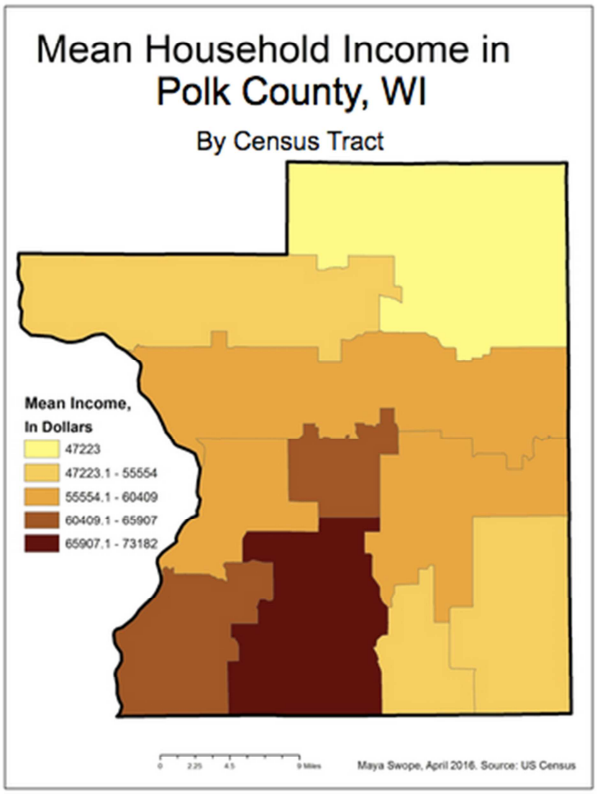

Figure 2: Mean Household Income in Polk County

A side-by-side comparison of the maps shows that there seems to be a general trend in which areas with larger average farm size actually have a higher mean income. A possible conclusion from this information could be that larger farms tend to earn money, especially more money per person. However, there is not enough data nor a

clear enough pattern to conclusively state that to be the case. It is also important to recognize that there may be a large amount of variation in income within a single census tract. Thus, a census tract with a high median household income may harbor an income gap between richer farmers or agribusinesses and poorer family farmers. These discrepancies might not necessarily show up in the patterns symbolized on the map.

A negative implication of farm consolidation is that it allows fewer people, often large companies, to hold the power of the agricultural system. This makes it very difficult for family farmers and for rural communities to maintain their livelihoods; large agribusinesses have the power to make huge decisions about agriculture that have important effects on these groups (Berry, 1977).

Larger farms also have different environmental effects than smaller farms. In general, the existence of large farms often corresponds to the use of more industrial techniques such as intensification and use of more synthetic pesticides and fertilizers. These techniques can pollute the surrounding environment to dangerous levels. Additionally, farmers working on a smaller scale tend to be more frugal with their resources, because they have to take into account different means of risk analysis. This tends to result in better conservation practices on the part of small-scale farmers (Baltensberger, 1987).

Conclusions

It is clear that the United States has seen a trend of increasing farm size over the past one hundred years. The state of Wisconsin and Polk County specifically have followed these trends. Increasing farm size is a complex phenomenon that is affected by many different factors, but economics, culture, and politics of the American farming

system play an especially important role. Looking forward, increased farm size does not seem to be a healthy trend for American agriculture, because it can lead to a consolidation of power into the hands of a few and to negative environmental consequences.

In order to create and maintain a healthy farming system that is beneficial for many people, from the farmers in Polk County to the consumers in other parts of Wisconsin and other parts of the country, the United States must make changes. First, we must re-evaluate monetary incentives and tax policies to level the playing field and allow small-scale farmers to reap the same economic benefits from policies as large farmers do. Second, it is important to think about farm culture and about the discourses that surround our food and agricultural systems. We must raise new generations that care about where their food comes from, and must help farmers have the support they need to to create diversified and healthy farms that support these ideals. Finally, we must re-evaluate the Farm Bill to allow for more small-scale diversified agriculture, and to subsidize farmers and crops in a way that works more fairly for all farmers, not just large agribusinesses. Feeding a national population, and increasingly, a global population, is no small task. In order to be up to this, it is essential that the American agricultural system is diversified, healthy, and supports many different kinds of farmers in doing the important work that they do.

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Chapter 3: How might CSA farms in the region anticipate and cope with climate change?

The Findings of Research Group 3 (Matt Kolasny, Katie Lund, Brian Fox, Eva Larsen & Elizabeth Stutts)

Elizabeth Stutts
Geog 232: People, Agriculture, and the Environment

Adapting to Climate Change in the Upper Midwest: Current Practices and Potential Modifications

Introduction:

In Wisconsin, general predictions for climate change indicate that the region will be experiencing warmer average temperatures (Vimont, 2016) and increased winter precipitation, paired with decreased summer precipitation (Center for Land Use Education, 2009). These changes have the potential to impact the livelihoods of farmers and the agricultural health of the region if not properly prepared for. Given the potential for shifts in weather patterns, beginning to prepare for changes now is necessary in order to preserve the environmental, agricultural, and economic wellbeing of regions such as Polk County, WI, where agriculture is a vital part of the economy. Fortunately, implementing practices that adapt for projected climate changes may not be an insurmountable task, particularly if practices already in place in the region can be expanded to prepare for these projected changes.

In order to consider how farmers in general and Community-Supported Agriculture farms in specific can adapt to climate change, this paper first examines the practices in Polk County that already serve as climate change adaptions. Given the general projected changes in climate in Wisconsin, current practices within Polk County of growing winter cover crops and use of no-till farming within the region may be able to contribute to water retention in the region, to mitigate the challenges of highly variable precipitation and storm events. Then, it examines further methods of preparing for climate change. Expansion of the practices mentioned above, in conjunction with implementation of other farming practices such as contour farming and drip

irrigation would allow for increased water conservation within the region. Furthermore, encouraging the growth and proper maintenance of wetlands within the region would contribute dramatically to healthy water practices within these regions. Finally, changing crop varieties to ones that are better prepared for warm temperatures would prevent crop failures as temperatures shift toward warmer averages. Some of these solutions are difficult to apply to large-scale conventional agriculture, but community-supported agriculture farms are uniquely and positively suited to lead the way with adaptions to climate change, and promote the environmental health of the regions in which they operate.

Methods:

A proper analysis of methods already in place within Polk County requires a visit to the region in question. For this purpose, a brief tour of farms within the region of Osceola, Wisconsin, served as an introduction to the variety of primarily agricultural and dairy farms within the region. Information about Common Harvest Farms, and the agricultural practices in the region of Polk County, were provided by Dan Guenther during this tour, and his lecture preceding it. Additional information on projected climate changes and adaptation methods were collected from the Wisconsin Initiative on Climate Change Impacts (WICCA), including a collection of lectures on the impacts of climate change in Wisconsin, and potential general adaptation strategies. Finally, references were sourced from the scientific literature about the impacts of particular farming practices on water retention and soil quality. This paper is one of five addressing the ways in which Community Supported Agriculture (CSA) farms can adapt to climate change. The other papers in the series discuss the projected changes in climate, Agriculture’s contributions to climate change, the economic impacts of climate change on

agriculture within the region, and the specific advantages of the CSA model in dealing with climate change.

Findings:

The ability to actively adapt to climate change relies on knowing what is predicted to happen. In the case of Wisconsin, predictions for climate change indicate generally increasing temperature and average increases in precipitation (Vimont 2016), though increased seasonal variation is predicted, and water availability may become questionable at times. Seasonality of rainfall is not entirely problematic, as groundwater and well use is not as fraught in this region as it is within reservoirs such as the Ogallala Aquifer, which feeds much of the agriculture in the Great Plains (Opie, 1993). That said, intensive groundwater use can still contribute to depletion of the aquifer and a lowering of the water table. Non-sustainable groundwater use would therefore contribute to a problem of water scarcity and retention in the region. Groundwater recharge is a process that can be highly variable, and take timescales of decades in some regions (Castro & Goblet, 2005). However, when paired with responsible water use in the present, implementing techniques to encourage aquifer recharge could prevent future water crises. With this background in mind, it is possible to examine the practices of farmers within Polk County, WI, with regards to their current effectiveness at trapping and conserving water.

Specific practices already contribute to water retention within farm fields, as a byproduct of other soil conservation practices. No-till farming and use of winter cover crops such as winter rye, oats, or hairy vetch are scattered throughout the region (D. Guenther, Personal Communication, April 9, 2016). Much of the use of cover crops and no-till farming is to prevent soil erosion (Hartwig & Hoffman, 1975), by keeping ground cover in place during the winter

when current farming convention in the United States would call for tilling and adding fertilizer in the fall, and leaving the field bare throughout the winter.

Another practice within the Midwest related to soil drainage is adding tiling. Tiling is added to the ground beneath fields to encourage runoff in situations where water might otherwise remain in the ground or pool. This practice therefore actively discourages water retention in the soil, and is a large contributor to high volumes of agricultural runoff within the Midwest (McPhee & Coffin, 2010). However, because of the sandy and easily-drained soils of Polk County, tiling is not a common practice in this area (Guenther, Personal Communication April 9, 2016).

Some practices that are occasionally implemented in the region, such as low-till farming, also serve to reduce loss of soil moisture. For example, even if no-till methods are not viable, particularly in conjunction with debris-heavy cover crops, low-till methods that limit soil overturning and loss of soil water to the atmosphere would help. Implementing low-disturbance technologies such as the Australian chisel plow/Yeomans plow (Seybold et al., 2002) would allow for soil tillage without overturning the soil profile, which prevents water loss and maintains soil health.

Furthermore, some practices that are rarely if at all, used in the region would encourage water retention and penetration into the groundwater reservoir if they were implemented. In addition to expanding those practices already in place, methods such as contour farming, wetland preservation, and drip irrigation would contribute massively to the ability of the region to maintain water reservoirs.

Unlike other regions of the Midwest, where relatively flat ground is normal, Polk County contains some relatively marginal land. Small hummocks and swales, and hills, are common. Despite their less than ideal nature, however, many of these steep hilly areas are still farmed regularly, and tilled (Guenther, Personal Communication, April 9 2016). Because of the demands of farming machinery and row crops such as soy and corn, these contours in the landscape are not always taken into effect in tilling and creating rows. Not allowing for those contours encourages runoff from these hills and soil erosion (Mercado et al., 2011). Encouraging farming that creates rows perpendicular to the slope of the hill would prevent soil erosion via runoff. In situations where contour farming is not possible, encouraging that land to be retired from farming use might be the more viable option.

A key reservoir for water in this region is in wetlands. With the growth of agriculture, particularly soybean and corn farming in the region, wetlands were often destroyed or marginalized in order to make room for more acreage (McCauley, 2005). However, wetlands and seasonal (vernal) pools are key for holding water and allowing it to penetrate the ground, rather than exit fields as runoff and move directly into nearby rivers such as the St. Croix River. Encouraging maintenance of wetlands over expanding farmland acreage would allow for increased water retention capacity across the county. For that purpose, the Wisconsin DNR has suggested a plan of restoration and management (Hagen, 2008).

Another practice that would prevent water loss and reduce the demands of irrigation on the regional aquifer is drip irrigation. Conventional pivot irrigation is known to be inefficient because it sprays water above the root of the plants onto their leaves (Wood et al., 2007), which allows for a large amount of water to be lost to evaporation. Drip irrigation, by comparison, relies on running pipelines along the base of the plants to deposit water directly into the soil

where the plant is growing (Hinnell et al., 2010), which prevents water loss. Implementing drip irrigation within the region would allow for improved water management. However, drip irrigation, because it requires piping on the ground, does not often work well with use of heavy farming machinery, and may find limited use among large-scale farmers unless a solution for that problem is found.

Many plans for water conservation in preparation for increased precipitation variety rely on region-wide practices in order to be fully effective, but individual farmers can also prepare for temperature changes by choosing different crops during the growing season. For grain, corn, and soy farmers, with large-scale seed distributors and key cash crops, that task may be easier. Researchers have developed varieties of wheat, corn, and rice that continue to produce, and may even thrive, with heat stress (CITATION HERE). Specific research may not be applied as easily to other crops, but changing plant varieties to breeds known for better heat tolerance is something some farmers are already doing (CITATION HERE) and would allow farms to anticipate climate change in a way that would not hurt their crop yields.

Analysis:

As a whole, Polk County is only patchily prepared for the changes climate change will bring. Although some practices to encourage soil and groundwater preservation are in place in the form of cover cropping and low- and no-till planting, these practices are implemented at the discretion of the individual farmer and are far from universal. There exist some methods within the county that encourage both soil stewardship and water retention, they need only be expanded. Mandates or incentives on the government's part to encourage widespread use of these conservation practices would go a long way in preparing Polk County for the changes it faces.

Furthermore, introducing land and water conservation practices in the form of strong wetland protections and minimizing unnecessary water use would encourage farmers not to over-water their fields and would also help to address the problems of fertilizer runoff and overall soil erosion in the region. Retiring land unsuitable for farming would have similar effects, of preventing soil loss and creating buffer environments to allow water to be held within the region.

Conclusions:

The benefits of these practices are not just in their ability to promote water retention. Specifically, they also are commonly used to prevent soil erosion and soil degradation. In a region with sandy, shallow soils such as Polk County, implementing practices that encourage water retention would not only allow for adaptation for climate change, but they would encourage the region's long-term agricultural health as a whole, and the environmental health of the entire region. Promoting practices of sensible land and aquifer stewardship would also incentivize farmers to manage their lands in ways that are sensitive to the coming changes in climate, and would benefit the long-term health of the region, both environmentally and economically.

CSA farms are in a unique position compared to large-scale conventional agriculture. Specifically, CSA farms are not limited to soy or corn crops. Instead, their task is to supply their supporters with a variety of crops, particularly vegetables. Because of this model, CSA farmers have much more freedom to rotate their crops to reflect changing climate in general. More importantly for the preservational methods discussed here, however, small-scale CSA farms, with their wide variety of crops, are less likely to use heavy machinery on the field once tillage and planting are complete, which allows for the implementation of practices such as drip

agriculture. Furthermore, CSA farms, with their direct connection to the consumers of their products, can actively market on their environmentally sustainable practices, and connect with a consumer base who are similarly concerned by climate change, and are willing to support agricultural practices and land stewardship that are environmentally sustainable in a changing climate.

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Effects of Climate Change on Yields and Costs of Agricultural Production

Introduction

It is not surprising that in this point in time the observable effects of climate change are well underway. Climate change is a force of nature that can no longer be stopped, but one whose consequences must be carefully mitigated in the near future. Though much of the discourse surrounding this topic focuses on the clear changes this phenomenon will have on the environment, it is also important to pay attention to the changes this will impose on people, especially regarding their livelihoods.

Farming is one such business whose practices must be open to adapting to changing circumstances in order to remain successful. This raises the critical question of how will farms anticipate and cope with climate change? There are numerous factors to consider when attempting to answer this question, one of which is the economic effects that climate change will have at the individual, local, and state level. In the face of changing weather conditions due to climate change, one of the biggest concerns for farmers worldwide is the effect these new conditions will have on their yield. This especially holds true for farmers in Wisconsin, a state whose economy relies on agricultural production, which generates approximately $60 billion in economic activity and employs over 350,000 people, which comprises about 10% of the total state workforce (Deller, 2009). Thus, not only are people around the country reliant on Wisconsin farms for their products, but the state and its people are reliant on production for

revenue and livelihood. In this paper will explore economic impacts brought about by climate change, with a particular focus in Midwestern agriculture, especially in alternative agriculture practices like Community Supported Agriculture (CSA) farms.

Methods

I aimed to more thoroughly research the way in which local and state economies will be impacted by climate change. To do this successfully, I first had to read academic papers which would give me an understanding of what kinds of weather changes would be taking place in the Midwestern region. This would give me a contextual framework for examining future economic issues in agriculture. I was particularly interested in addressing these economic changes among Community Supported Agriculture and other alternative agriculture farms. This entailed visiting Common Harvest, a CSA farm in Wisconsin. Here, I gathered information on how CSAs generally function, and how CSA farmers make a profit with this alternative way of producing and selling food.

Investigating this issue of economic effects of climate change also required reading of a numerous academic articles. To understand this issue in Wisconsin, specifically, I consulted research done by the Department of Agriculture and Applied Economics at University of Wisconsin-Madison. Additionally, I read primary materials to get the individual perspective of farmers who are already experiencing some of the issues in their farming and their livelihood.

Findings

Climate change is already negatively impacting agricultural production globally and locally, as impacts on agriculture threaten its pivotal role in rural livelihoods and development. Economic changes will be a result of changing crop yields, which can be impacted by new,

extreme, varying temperatures and precipitation as well as increasing carbon dioxide levels. In the coming years, it is possible that farmers will experience both positive and negative economic impacts. It is important to note that experienced effect of climate change will not be homogenous across all geographic regions or crops of the Midwest or of Wisconsin. Changes in temperature and precipitation will shift agricultural patterns and affect crop yields, with gains in certain crops offset by losses in others.

Wisconsin exhibits significant gradients in growing period length, growing degree days, rainfall, and other climatic conditions, and its diverse array of crops vary greatly in their high temperature resistance (Kucharik, 2008). For example, corn is strongly heat sensitive crop with increased and decreased yields both within the range of likely possibilities, with a 1 in 20 possibility of corn yield experiencing declines. This is important to know as the Midwest is responsible for 65% of the US production of corn and soybeans (Gordon, 2015). Wheat, on the other hand, is more resistant to heat and to major yield declines as a result of rising temperatures, and may be one such crop which experiences increased yields as a result of climate change, recapitulating the notion that the effects of climate change will have varying effects on crop yields, depending on the resilience of the species and the ability of farms to adapt to these changes.

Though it is difficult to associate climate change effects with any sort of positive connotation, research done by the Agricultural Working Group indicates that climate change in the Upper Midwest region may actually lead to higher production and higher yields. Conditions like longer frost-free periods, lower daily maximum temperatures in the summer, and more summer precipitation may actually be beneficial to plants. Potentially, some crop yields would increase due mainly to reduced plant stress from lower daily maximum summer temperatures,

mores summer precipitation, more soil moisture, and more diffuse light (due to cloudiness) (Wisconsin Initiative on Climate Change Impacts, 2011). This is especially applicable for Upper Midwest states like Minnesota, which is predicted to experience a 17% increase in soybean yields by 2040-2059 (Gordon, 2015). In Wisconsin, increases in total summer precipitation could potentially boost corn and soybean yields by 5-10% (Kucharik, 2008).

Additionally, Wisconsin Agricultural Working Group and an economic risk assessment done by the Risky Business Project found that an increase in Carbon Dioxide in the atmosphere may boost photosynthesis, promoting plant production and producing higher seasonal crop yields (WICCI, 2011). This increased crop yield would thus have a positive effect on individual farmer income as their farm would be more productive, and creating more revenue (Gordon, 2015)

Perhaps more predictably, however, is the fact that climate change will also bring with it adverse weather conditions which will not only have negative economic effects by lowering yields, but also by costing farmers a significant amount in rebuilding and remediating these negative impacts. Personal accounts from farmers in Wisconsin have revealed how expensive dealing with extreme weather conditions has been in the recent past and will be in the future. Kucharik found that for each additional degree °C of future warming during summer months, corn and soybean yields could potentially decrease by 13% and 16%, respectively (Kucharik, 2008). Extreme variations in weather like droughts and excessive summer heat and intense rain events and flooding will wreak havoc across various aspects of the agricultural sector. These effects will reach both large monoculture farms, small CSA farms, vegetable farms, dairy/livestock farms, orchards, infrastructure, disease, and labor costs, among other things.

The overall humidity and temperatures increase will have a stressful effect on crop plants, yet will provide a wider range of habitat for invasive weeds and disease-causing pests and fungi

(Rosenzweig et al., 2001). Increased summer nighttime temperatures will cause lower yields due to plant stress, as will over-wintering of pests due to warmer winters at low temperatures (Walter, 2013). Temperature, precipitation, and CO2 increase may benefit invasive plant and insect species more than they will crops as these conditions will extend the geographic distribution of weeds northward in areas where they would not have thrived here before, exposing farms in northern latitudes to new or enhanced threats to productivity. Farmers will have to accommodate for costs related to low yields and higher management expenses (Walter, 2013). Currently the US spends $11 billion dollars on weed control in the form of herbicides such as glyphosate (RoundUp), and these costs are only estimated to rise with rising necessity for weed management (Gordon, 2015).

Changing weather patterns towards drought and extreme summer heat are expected to harm crop yields and increase remediation costs for farmers. For example, a Wisconsin drought in 2012 depressed crop yields and drove up the cost of grains, causing farmers to spend $800 million more on inputs like feed, seeds and pesticides than the previous year (U.S. Department of Agriculture, Agricultural Statistics Service, 2013). Farms with plants (this includes vegetables, fruits, and greenhouse/nursery plants) which can not cope with the heat will not only experience decreased plant quality and yield loss, but altogether crop loss in some instances. Farmers have reported sales drop as much as 25% because consumers were reluctant to buy because of reduced quality (Walter, 2013). Drought will also increase the costs of grow plants due to increased energy and water usage. Adapting to these extreme heat conditions may require implementing improved, and expensive, irrigation systems to reach expanded irrigated acreage (WICCI, 2011). Additionally, high temperatures will have a negative effect on labor productivity on farms and increase labor costs. When the temperature rises past comfort levels, labor productivity declines

in “high-risk” industries like agriculture which involves substantial outdoor work (Gordon, 2015).

Extreme heat will cause livestock farms to experience significant damage manifested not only in production loss but expensive remediation costs as well. A temperature increase of about 4-5 F above optimum levels will likely restrict the number of cows on pasture, not to mention will result in heat-related stress, productivity loss, and higher instances of miscarriages and mortality (Gordon, 2015). High temperatures will lead to a decrease in egg production by about 15-20% according to some estimates (Walter, 2013). Dairy farmers reported decreased milk production and reproduction during particularly extreme drought in Wisconsin in 2012 (Walter, 2013). Heat-related health issues will mean added costs for drug and vet bills as well. Another added expense for livestock farmers will be the price of buying feed, which has been reported to cost farms anywhere from $90,00 to $250,000 more during period of high heat. To compensate for high feed costs, farmers will have to raise prices of meat. Additionally, farmers have been trouble selling feed, which reportedly cost one Wisconsin farmer between $30,00-$40,00 because of an extremely dry summer in 2013 (Walter, 2013).

Instances and flooding and more intense precipitation events are also expected to become more common in this region as a result of climate change. On vegetable farms, farmers will have to account for delays in planting due to increased precipitation leading to water-logged soils and loss of soil productivity. Flooding not only washes away new plantings, but may also destroy entire crops as well. Additionally, increased moisture contributes to higher prevalence of crop disease (Rosenzweig et al., 2001). The costs of these damages will be in the form of the price of replanting lost crops as well as field repair and maintenance (Looker). Floods have cost farmers $300,000- $1,000,000 over last few years (Walter 2013). In Wisconsin, one farm reported losing

over $400,000 due to recent flooding events, while another reported heavy rains of 2007-2008 costing them up to a million dollars. On livestock farms, flooding often wreaks havoc on pasture and cause destruction to transportation infrastructure, reducing speed and efficiency of delivery to milk processing plants. In Wisconsin, heavy rains of 2013 cost approximately $61 million in assistance payments from the USDA to farmers, which is approximately $52 million more than it cost the year before (U.S. Department of Agriculture, Risk Management Agency, 2016).

Conclusion

One of the most important concepts to take away from these findings are that Wisconsin's commodity crops and weather conditions are diverse and variable. Generally speaking, this region will experience an overall rise in temperature and precipitation, with periodic intensified heat/drought and rain/flooding events. However, this does not mean that all farms will experience the effects of these changes equally. For some farms with more resilient crops, increasing temperatures have the potentially to be economically beneficial, while for others a changing climate will require severe adaptation in order to thrive.

One proposed adaptation is the adoption of the Community Supported Agriculture business model to adjust to changing conditions due to climate change in which members share in benefits as well as risk. One downside to this is that there have been cases where CSA partnerships have been ruined because changing weather conditions and subsequent fluctuations in yields and quality have put off some members who are not willing to take that financial risk. On this other hand, this could be a successful form of alternative agriculture for farmers to adopt because of the economic security provided by its members. This seems to be a promising model for coping with unpredictable conditions as pre-growing season payment financially supports the

farm for that season, providing farmers with more freedom and ability to adjust in order to prevent yield loss and excessive remediation costs.

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Alternative Agriculture:

The CSA Model & Climate Change

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Introduction

Although the most jarring effects of climate change to come will be observed along coastal and other more vulnerable areas, people in places like the upper Midwest – a region extremely critical to U.S. agricultural production – will not go unscathed by the environmental consequences an industrialized humanity has brought forth. Climate change and its many collateral effects are observable here at this very moment. This necessitates collective action to cope with a changing planet, one whose stasis we once thought our lifestyles could be made dependent upon. One of the key fields for which our priorities and practices must be reconsidered is that of agriculture.

Agriculture is one of the most principal ways through which people interact with their environment, making the cultivation of food one of man's most intimate relationships with the land around him. Maintaining adequate food supplies on a planet changing at unprecedented rates will certainly be one of the key challenges posed by climate change – adequate food production and efficient distribution will need to keep up. Worryingly, though, the industrialized forms of agriculture that many wealthy parts of the world have come to rely on are themselves large sources of the problem. Huge energy inputs are needed, including fossil fuels especially, in order to grow, process, and distribute commodities at a scale to feed entire populations of people. Will the daunting task of feeding this swelling population in the midst of changing climates require us to put more strain on our existing food systems, and thus our planet? Are there other agricultural options aside from the mainstream industrialized form for communities to consider and experiment with? Can people like urban residents, with little to no farming knowledge or practice themselves, become involved in making our food systems more clean and sustainable?

In this paper I will investigate these questions and more through a contextualized analysis of one alternative agriculture system that has already been implemented in the upper Midwest:

community supported agriculture (CSA). The format CSA brings to the table for tightening the bond between the grower and the eater is one I find quite exciting, affording greater possibilities with regard to anticipating, mitigating, and coping with climate change communally and inclusively. If CSA is all about creating a lasting partnership between farmers and their consumers, climate change may provide both a challenge and opportunity for this relationship to be strengthened moving forward.

Research Methods

Altering the ways in which we grow, eat, consume food, and ultimately live in response to the menacing trials of climate change will have to be a communal responsibility. In order to break from the industrialized and polluted status quo, farmers must take the initiative to practice effective environmental stewardship and consumers must broaden their curiosities as to where their food comes from, how it is grown, and what the consequences of their consumption might be. There is no science in finding community solutions to such challenges, but to see an effective example of how this might be done, we need look no further than Common Harvest farm and Dan and Margaret Guenther who operate their own CSA. Macalester's partnership with Common Harvest and the Guenthers has allowed me to gain experience, wisdom, and extra communication with people actively working to change the paradigmatic dialogues surrounding agriculture. After having spoken more with Dan on the phone regarding the choices people in the future will have to make in the face of climate change, I have been able to explore the advantages of CSA as a community model to combat such forces. By supplementing this along with other scientific and scholarly material compiled through internet research regarding CSAs and climate change in this region, I have been able to use this relationship to gain great insight as to some practical, small-scale solutions to complex, large-scale problems. To find out how

groups are working toward these goals, I had to dig deeper into the community and reach out to others – just as more people will have to do if they hope to adequately cope with the forces of a changing Earth.

Findings

As Dan puts it, "CSA is all about establishing actual relationships and the attempt at creating a lasting partnership between consumers and farmers" (D. Guenther, personal communication, April 20, 2016). Despite the fact that such partnerships are for the most part noticeably absent, and in fact most often not thought about at all in many places, the CSA model is itself rather simple. In this cooperative relationship, "individuals and families within a community buy memberships or shares in a farm in exchange for food produced on the farm," which typically includes a range of fruits, vegetables, herbs and other goods that might even encompass meat or dairy products (Greenwood & Leichenko, 2012). This model is based on connecting people across space so that they may see and begin to understand the impact they might have upon places they might not otherwise consider themselves a part of. To explore the ways in which CSA offers a helpful model in anticipating and coping with climate change, though, it will be important to understand the consequences of the relied upon conventional and industrial agricultural systems that have taken root.

Many western countries, including the U.S. and its upper Midwest region, utilize forms of agriculture that emphasize capital, chemical and mechanical inputs, and high yields. Such methodologies have come to be understood as industrialized agriculture. According to Lea (2005), farms of this type cultivate very large single-crop monocultures, typically featuring rotating corn and soybean fields, which depend on "synthetic fertilisers, pesticides and herbicides...to promote growth and control pests and weeds." The widespread use of synthetic

chemicals opens the door to serious localized environmental degradation, however large scale farms like this actively contribute to the process of global climate change as well. Lea goes on to note that "agriculture worldwide is responsible for 20% of annual carbon dioxide anthropogenic emissions and about 50%-75% of anthropogenic emissions of methane and nitrous oxide" (2005). Clearly, industrial agricultural production is extremely resource intensive, especially when attempting to mechanically operate on massive scales – there can be little hope for effective environmental stewardship when people are this far removed from the land.

Agriculture's effects on climate do not end once the food has been grown, though. Industrialized agriculture has contributed to extended commodity chains where vast amounts of energy are required to transport food across continents and oceans. Here we can see that conventional agriculture is clearly contributing to continued fossil fuel emissions, but how might climate change impact the staples of this system if we are to do nothing? As Capra points out, "the crops grown in the genetically homogeneous monocultures that are typical of chemical farming," most often corn and soybeans, "are not resilient to the climate extremes that are becoming more frequent and more violent" (2015).

Although crops like corn, the staple commodity of industrial agriculture, are rather cheap and exceedingly productive, climate change is showing us that this over-reliance on corn may become particularly dangerous. Moseley (2012) writes, "this limited diversity of crops restricts our diets, degrades our soils and increases our vulnerability to droughts." Industry leaders and governments, though, have overlooked these side effects in their efforts to pursue cheap food policy, including the federal farm subsidy program. When governments subsidize corn production to the point where alternatives can only be more expensive, farmers will not have a difficult time choosing what to grow. Interestingly, "40 percent of the corn crop is now devoted

to" the development of corn-based ethanol (Moseley, 2012), highlighting the fact that special industrial interests are as involved in this process as are those concerned with bringing food to people's plates.

The magnificent array of processed foods corn may be transformed into, many of which we are familiar seeing line the shelves of our favorite grocery stores, further emphasize the market value of this crop. Although the monocultural fields from which corn originates may not be all that impressive or diverse, the colorful and well-advertised products we are ultimately exposed to disguise both the uniformity and environmental costs lying just below the surface. According to Dan Guenther, this cheap food policy and design is very intentional. "Industrial food systems make huge sacrifices for low prices which pacify consumers, providing an illusion of choice" (D. Guenther, personal communication, April 20, 2016). The beneficiaries of industrial agriculture obfuscate these hidden realities by design because they are able to benefit from public confusion and, even more so, public ignorance. Here is where Dan's emphasis on education is especially important. Many consumers, if provided with more information on where and how their food is produced and handled, might end up making decisions that are healthier not only for themselves and their families but for their communities and, ultimately, their planet. The CSA model is so effective as an alternative to the industrial paradigm because it operates on a system governed by values, relationships, localism, and transparency. Aligning these values, particularly environmental ones, with economic activity will be a critical step in fending off the effects of climate change that have the potential to cause the most harm to our livelihoods and continued existence.

In practice, the CSA model is able to directly alleviate some of the major ways in which agriculture contributes to climate change and further provides a community with a jumping point

for finding new solutions. Most obviously, food systems and networks are becoming once again more localized. When consumers are able to meet and interact with the people growing their food, as often takes place at Common Harvest, as well as even participate in the process directly, whether through initial financial contributions or taking an active interest in the farm's labor practices, they will surely be able to know more about where their food comes from and what sort of impact it is making on the Earth. This local partnership also cuts down on "food miles" in the process of distribution – when the producer and consumer are closer to one another, not as much energy needs to be expended in getting the product from point A to point B. The small-scale farms that feature mixed varieties of crops characteristic to CSAs prove environmentally superior to the massive industrial fields of corn and soybeans as well. As Lea notes, "a narrow range of genetic variability drastically increases the risk of plant disease and pest infestation" (2005), meaning a renewed consumer demand for a diverse range of harvested products may enrich the local ecosystem and further decrease a farmer's need to apply harmful chemicals to catalyze growth. With a greater emphasis placed on variety in this model and others like it that may be implemented in communities across the country, we may begin to reduce the dependency on staple crops like corn. This will make our food systems, and ultimately our communities, less vulnerable and more resilient to the hostile effects of climate change which will only become more apparent across the world moving forward, including in the upper Midwest of the United States.

Aside from the immediate environmental benefits, specifically within the context of agriculture, we have already observed the CSA model offer, this framework and other strategies like it which seek to connect community members across space through relationship building and education provide an excellent template to combatting climate change more broadly.

Reinvolving everyday people in the processes of agriculture and food security allows for direct opportunities in environmental education and the opening of important dialogues which will only become more critical in the face of climate change. It is imperative that people begin considering and prioritizing the environmental implications of their actions and choices – transforming the ways in which we think about and cultivate our food is a perfect place to start.

Conclusion

Many communities, especially in western societies like the U.S., have become dangerously dependent on the many eases and comforts industrial agriculture provides. Significant sacrifices have been made that allow this food system to perpetuate, including labor, communal connection to land and sense of place, and both individual as well as environmental health. The effects of climate change may not be as immediately visible in the upper Midwest as they are elsewhere around the globe, however the time has come to act if we hope to adapt effectively, as humans have done many times before. Transforming the ways in which we think about and grow food, an environmental interaction that is imperative to civilization as we know it, may serve as an excellent place for local communities to join the fight and the CSA model may be one of the many tactics we will most benefit from in this battle. Not only does the CSA provide a well viable alternative to the industrialized, polluted status quo we see today through its many positive environmental contributions, it further has the potential to rebuild a personal connection to food that has largely faded over the years. Perhaps more significant than that, a necessary element of the CSA is that it reconnects people to the other people growing their food. I believe that this humanist element can be very powerful in helping individuals realize that the war against climate change will have to be one that we wage together. The continued emphasis on local, grassroots community solutions like those CSAs help provide in response to larger,

more complex problems like climate change will be essential if humans hope to rediscover harmony with the environment here on Earth.

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Katie Lund
People, Agriculture and the Environment
Alternative Agriculture Paper

Confronting Climate Change in Upper Midwest: What Can We Expect?

Introduction:

While the most visible effects of climate change such as sea level rise in Pacific Islands, drought in California, and the melting ice caps seem like far off phenomenon for many Midwesterners, these same climatic forces will bring changes right at home. In the Midwest, the climate is predicted to experience substantial changes most significantly in the areas of temperature and precipitation. While many people are concerned about predicted changes in climate, this concern is especially pertinent for farmers in the Upper Midwest. Agriculture in the Upper Midwest is a very large and important industry with the land in the region representing one of the most intensely farmed areas in the world, with ⅔ of the land designated as farmland (Hatfield, J., 2012). The region is critical for the United States economy in terms of food production and production of exports such as grain and meat. The Upper Midwest also accounts for 65 percent of national corn and soybean production, with these two crops being the biggest crops for midwestern farmers (U.S. National Climate Assessment). The size and importance of the agricultural industry in the Upper Midwest necessitates consideration of how climate change will impact agricultural production. However, in order to predict how agriculture will be affected it is necessary discern what physical changes can be expected in the region in the future. In this paper I will examine the current research available on predicted climatic changes in the Upper Midwest region and use this information to focus in on what these changes mean for agriculture. I will show that the largest predicted shifts in temperature and precipitation patterns will affect

agriculture in terms of the growing season, crop yields, soil health, water quality, and crop management.

Research Methods:

In order to learn more about how climate change will directly impact the Upper Midwest region I utilized federal sources such as the Environmental Protection Agency and the National Climate Assessment, which gave me an idea of how much of the research being done is consolidated and reported. Additionally, I consulted scholarly articles from various universities around the Midwest as well as reports from midwestern institutions currently researching and working on climate change issues. In order to get a more holistic idea of climate change and the Upper Midwest I also consulted sources that gave information on how the shifting climate will impact other sectors of the economy and the environment in the region.

Rising Temperatures:

Findings

Our world leaders have decided, in convention halls around the world, that in order to avoid disastrous consequences of climate change we must limit warming to two degrees Celsius. While the variable and diverse climatic conditions of the Midwest, especially the Upper Midwest, make it more difficult for us to perceive changes in temperature, the region is and has been experiencing rises in temperature in the past one hundred years. Between 1900 and 2010, the average Midwest air temperature has increased by 1.5 degrees Fahrenheit with the rate of warming increasing twice as quickly between 1950 and 2010 and three times as quickly between 1980 and 2010 (U.S. National Climate Assessment). [See Figure 1] These trends are expected to continue with the increased concentrations of greenhouse gases in the atmosphere. In the scenario of continued growth in global emissions some estimates put projections for regional

average temperature increases at 4.9 degrees Fahrenheit by the middle of the century (2046-2065) (U.S. National Climate Assessment). Similarly, the amount of hottest days, days over 95 degrees, and the length of frost-free seasons are also predicted to rise.

Analysis

Shifts in temperature in the Upper Midwest will affect agriculture in both positive and negative ways. Firstly, the increase in temperature will lengthen the growing season, which can be seen as a positive outcome of increased levels of carbon dioxide concentration in our atmosphere because farmers could increase their yields. The growing season has already been increasing, with a two-week increase since 1950 being observed and this trend is expected to continue more rapidly with the effects of climate change (U.S. National Climate Assessment). While the longer growing season is often thought to be a possible advantageous aspect of climate change in midwestern agriculture, the real effects are different on a crop-by-crop basis. In general, rising temperatures that are associated with a longer growing season are predicted to have a predominantly negative impact on the yields of corn and soybean. [See Figure 2] This decline can be attributed to the fact that the increased temperatures that will accompany a longer growing season will put stress on crops, which will counteract the positive effect of a longer growing season. This multifaceted analysis illustrates how the effects of climate change will be dynamic and complicated and our predictions to how we will be affected must take account of these nuances.

As previously noted, the predicted rising temperatures in the Midwest will affect the growing potential of the region's two main staples: corn and soybeans. Each of these crops has a specific temperature range with a lower and upper limit in order to maximize the growth of the plant (Hatfield, J., 2012). Different groups have done research into how significant temperature

shifts would affect these crops in the Midwest. Lobell et al. (2011) observed that already occurred temperature changes (1980-2008) have reduced crop productivity in corn and wheat by 3.8 percent and 5.5 percent respectively (Hatfield, J., 2012). Furthermore, Kucharik and Serbin (2008) also found that rising temperature has and would continue to significantly negatively impact yields in Wisconsin specifically (Hatfield, J., 2012). Also important to note is the impact of rising nighttime temperatures, which have been increasing more rapidly than daytime temperatures (Tackle 2011), and will impact plant growth and yield even more significantly. The thermal environment during the endosperm cell division phase is critical and temperature differences of 5 degrees Celsius during this time reduced the subsequent kernel growth rate and the final kernel size (Hatfield, J., 2012). This scientific data points to a negative impact on agriculture in the Upper Midwest directly related to the increasing temperatures.

Shifts in temperatures also have consequences for other agricultural processes such as photosynthesis. In a controlled study of sweet corn, observations were taken at different temperatures of photosynthetic rates and from these observations it was concluded that the photosynthetic rate of sweet corn declined for each 1 degree Celsius increase in temperature above 30 degrees Celsius (Hatfield, J., 2012). Researchers expect that corn grain plants would show a response along similar lines. In soybean plants it was found that elevated temperatures have the ability to reduce pollen production by up to 34 percent (Salem et al. 2007). The projected negative impact of temperatures on the productivity of crops is in contrast to claims that increased atmospheric concentrations of carbon dioxide will increase plant photosynthesis and biomass accumulation. Field research points to the conclusion that the proposed “fertilization” effect of carbon dioxide on increasing crop yields has been overestimated (U.S. National Climate Assessment). As a result, the overall impact of rising carbon dioxide levels

coupled with rising temperatures is predicted to have a stronger negative impact on the agriculture sector in the Midwest.

Throughout the Midwest, rising temperatures will have negative impacts on agricultural productivity and necessitate the adoption of mitigation strategies among farmers. Given the predicted negative impacts on the two most important crops in midwestern agriculture, corn and soybeans, I recommend moving away from the monocultures that characterize this region as a strategy to mitigate the effects of climate change. Diversifying the crops that are grown in this region will help it become more resilient to the effects of climate change because risk will be spread out across different crops. Managing and coping with increased risk associated with climatic shifts due to climate change will be one of the most important strategies that farmers can use to mitigate higher temperatures.

Precipitation:

Findings:

Around the country, climate change is predicted to shift the total average precipitation and precipitation patterns. Average annual precipitation has increased during the past century and is predicted to continue to increase, with much of the increase being driven by more frequent intense rain events (U.S. National Climate Assessment). However, changes in the amount of total precipitation will not be as drastic as the changes in the patterns of precipitation including the intensity of the precipitation and the seasonal timing. Intense rain events are expected to continue to rise, especially in the Midwest region, with most of these events taking place in the spring season. While there is much more uncertainty predicting the increases in precipitation than there is for temperatures, average precipitation totals are also expected to impact the different seasons in different ways. While the average precipitation is expected to decrease in the summer months,

precipitation in the spring is expected to increase dramatically. [See Figure 3] This shift in the seasonal timing of precipitation will impact labor and crop management practices for famers (Hatfield, J., 2012). In general, the shifts in precipitation expected in the Midwest region are complex and adapting to them will also require complex solutions.

Analysis

While there is uncertainty about the future changes in precipitation there is a consensus that intense precipitation events are on the rise, which has clear impacts on crop productivity. Excessive precipitation in the early stages of the growing season adversely affects crop productivity because waterlogged soil conditions during early plant growth promotes the development of shallower root systems, which are more susceptible to disease, nutrient deficiencies and drought stress later in the season (Rogovska, Cruse 2011). In terms of crop damage and loss, much of it occurs when flooding happens in the early stages of growth, meaning that early spring increases in precipitation, especially intense precipitation, could be detrimental. Furthermore, the health of the soils may be comprised by shifts in precipitation. Extreme weather events contribute to the erosion of topsoil, already a prominent concern in agriculture, with some estimates stating that the erosive force of precipitation will increase by up to 58 percent (Rogovska, Cruse 2011). Similarly, the rates of soil erosion are expected to increase exponentially as precipitation increases. In areas of agriculture where the soils are already marginal, soil erosion due to intense rain events and flooding in the spring season could be significant.

The shift in precipitation patterns towards more spring precipitation will also have negative impacts on labor practices. The shifts in precipitation will affect field preparation time in the spring and will force farmers to delay their planting, resulting in shorter growing seasons

and decreased productivity. The workable days in April through mid-May has seen a decrease in Iowa specifically from 22.65 days (1976-1994) to 19.12 days (1995-2010), which means that there is a major change in the days available for spring work including planting and preparation. The decrease in days available for work adversely affects farmers' ability to optimize crop production because the growing season is shortened.

Increases in precipitation also bring worries about water quality, especially around agricultural land, which provokes discussion on the type and amount of fertilizers that are being used. Firstly, the changes in precipitation and temperature are expected to both reduce the efficacy of herbicides as well as making weeds more difficult to control. This convergence of effects is especially worrisome when considering the effect of increased use of chemical inorganic fertilizers that may be used to combat this problem. Increased intensity of spring precipitation has the potential to increase surface runoff and will transport sediment as well as other nutrients and perhaps increased amounts of fertilizers into nearby water bodies, with pollution expected to rise as a result (Hatfield, J., 2012). Increased pollution in bodies of water negatively impacts wildlife and human health alike. Furthermore, nitrate loss is also expected to rise with increased precipitation, which would decrease the health of the soils (Rogovska, Cruse 2011). [See Figure 4] In summary, increased precipitation will result in larger amounts of run-off, which will negatively impact both human, water, and soil health.

Conclusions:

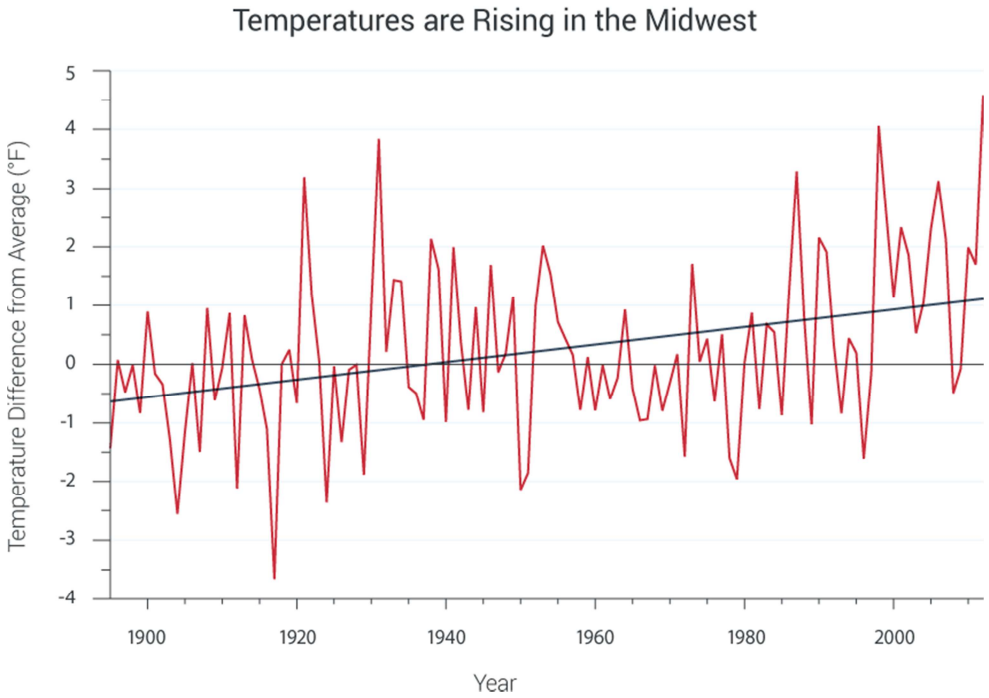
In the United States and especially in the Upper Midwest region, climate change is a phenomenon that seems to be happening elsewhere. Rising sea levels, extreme weather events, and other environmental changes are impacting other regions throughout the world but the effects of climate change in the Midwest are much more subtle. These subtle changes can make

it difficult to focus attention and research on climate issues in the region. However, it is clear that there is a lack of sufficient research being done especially pertaining to climate change impacts on midwestern agriculture. There is uncertainty about the true impacts of rising temperatures on crop yields, how changes in precipitation will affect crops and overall water quality, and a host of other concerns in regard to agriculture and the changing climate. It is clear that a main priority needs to be expanding research and funding into these areas to better understand what we will be dealing with in the midwestern region.

Despite a lack of a comprehensive and sufficient body of research in to climate change impacts in midwestern agriculture, it is clear that climate change is a force that can be felt in this region. Agriculture will be affected in ways that we can predict and in ways that we don't yet understand. Farmers and agricultural industries alike must unite to take on these challenges together. The most pressing issues that need to be addressed today are soil conservation and crop management especially pertaining to fertilizer runoff. Increasing the health of the soil and soil conservation practices in general will be a crucial step that we can take currently to help prepare for climate impacts in the future while also boosting the health of our current agricultural system. With increased precipitation and therefore increased runoff the chemicals used to manage crops will also need to be revised in order to preserve human and environmental health into the future. While I believe that these two areas should receive priority in terms of what practices we should implement now, there is also a need to continue to seek to understand our changing climate in terms of Midwestern agriculture in order to further develop adaptation and mitigation strategies.

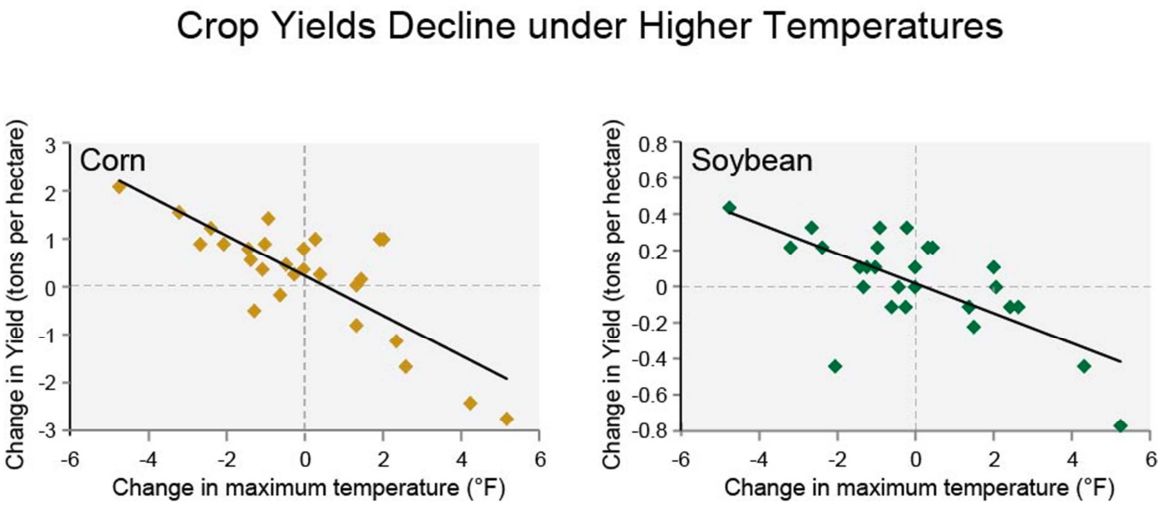
Appendix

Figure 1



Source: http://nca2014.globalchange.gov/report/regions/midwest

Figure 2



Source: http://nca2014.globalchange.gov/report/regions/midwest

Figure 3

Source: http://nca2014.globalchange.gov/report/our-changing-climate/precipitation-change

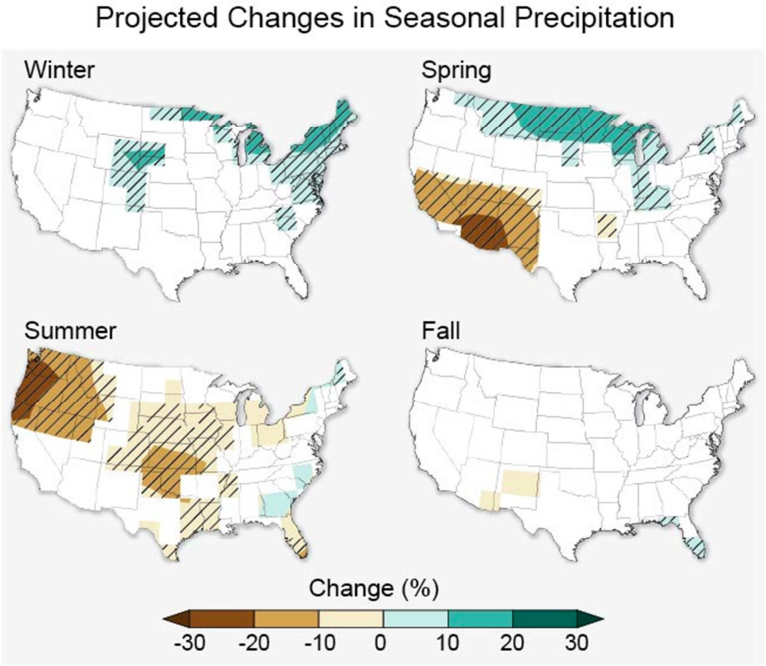
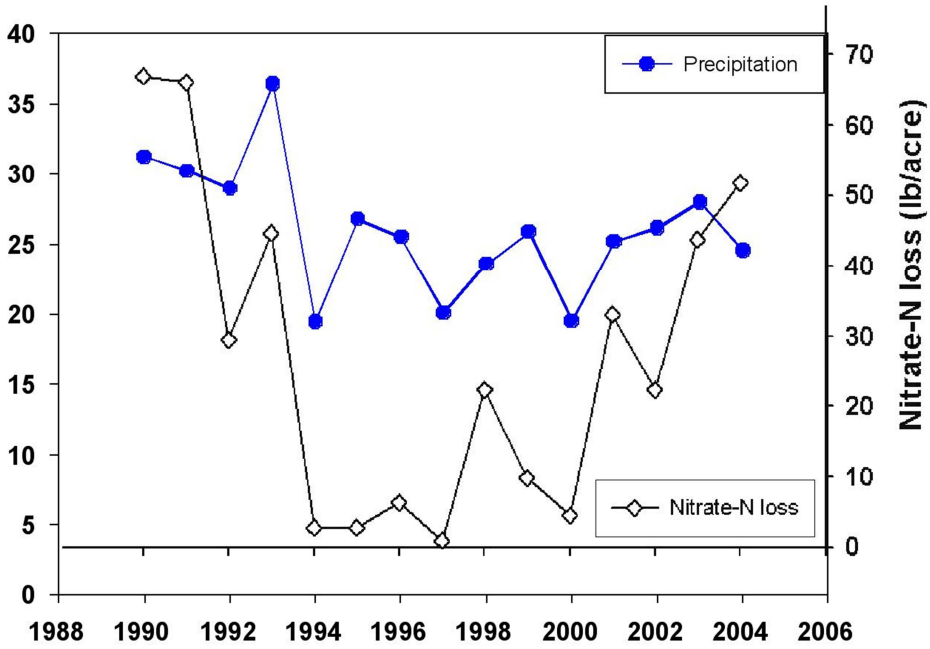


Figure 4

Source: http://www.agmrc.org/renewable-energy/climate-change-and-agriculture/climate-change-consequences-for-agriculture-in-iowa/



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People, Agriculture, and the Environment

CSA Farms and Climate Change: Sustainability of Current Practices

Introduction

Among the multitude of human practices that currently contribute to climate change, agriculture is one that is indispensible to humanity. Humans need to eat, and crop cultivation naturally produces greenhouse gases that contribute to climate change. Therefore, agriculture must adapt and change, and humans must search for new solutions to mitigate agriculture's climate change contributions or offset the contributions using more practices that remove excess greenhouse gases.

Many groups already lead the charge in altering agricultural practices to suit our rapidly changing world. Often times a multitude of different but interrelated forces drive these adaptations, not just climate change. Community supported agriculture as a movement has already made several changes to the traditional agricultural model. The CSA system promotes sustainable practices in order to reduce waste and promote a closeness with agriculture overall. These does mean making the system of distribution as efficient as possible, including increasing crop diversity and managing an efficient delivery system. As with any agricultural system however, there are still outputs and practices that further contribute to climate change. The first step to solving any problem is to address what issues we are facing currently and how they can be rectified. The question then is what current practices contribute to climate change, and which practices do not. This paper will examine current practices in conventional agriculture that contribute to climate change and greenhouse gas emissions, and contrast these with practices currently implemented by Common Harvest Farm, as a case study, to recommend practices to mitigate climate change impacts.

Methods

In answering my subquestion there are a few issues. Overall the CSA farms and similar movements already pride themselves on sustainable practices and adaptations to reduce environmental impact. Most CSA farmers have already identified and reduced the impact of the most common unsustainable agricultural practices. Dan and Margaret of Common Harvest Farm have already put in place many practices to make their farm more ecologically sound and reduce any impact and contributions towards climate change. Therefore, Common Harvest farm will be used as a case study in order to examine agricultural adaptations that can be made in other agricultural areas.

On the other hand, analyzing other unsustainable practices can serve to only increase the amount of knowledge about climate change contributions. Therefore my research methods involved a wider look at agriculture and how current activities contribute to climate change. By casting a wide net I hoped to discover as much about agriculture's contributions to climate change, and in doing so apply the lessons learned elsewhere to CSA farms in Wisconsin. This may seem to be tangential from the main question, but I believe that agricultural lessons can be taken from many locations as long as the lessons learned are taken in context and used to promote appropriate practices for given contexts and areas. For much of my research I looked various online databases such as AGRICOLA and GEOBASE in addition to US Government sources such as the USDA and the EPA. I did also try to incorporate the many lessons and massive amount of knowledge shared by Dan and Margaret, as there is not much existing literature on the climate change contributions of CSA farms.

Findings

Agriculture affects and contributes to climate change most directly in release of greenhouse gases. Greenhouse gases are often the culprit in most climate conversations and

agriculture is no different. According to the EPA, agriculture contributes around 9% of the United States' total greenhouse gas emissions. Within the agricultural sector, the vast majority of greenhouse gases come from agricultural soil management while enteric fermentation and manure management also play a considerable role in greenhouse gas contributions. The major greenhouse gases considered in this report are CO_2, CH_4 and N_2O (Hockstad & Weitz, 2016).

The gases from enteric fermentation come from the digestive systems of farm animals such as cattle and to a lesser degree horses. Cattle and other ruminants produce methane as part of their digestive process in their rumens while animals like horses produce methane in their large intestines. These animals account for a large amount of methane released. Factors, such as quality of feed and activity level, can affect how much methane the animals produce, but on the whole the sheer number of these animals is the major factor in determining the greenhouse emissions (Hockstad & Weitz, 2016). The US consumes massive amounts of beef and milk that require cattle, so the total amount of greenhouse gases emitted from farm animals is directly tied to consumption.

Manure naturally produces both nitrous oxide and methane, and how farmers handle the manure plays a large role in the quantity of greenhouse gases produced. When manure and moisture mix such as in liquid lagoons or holding pools, more methane is produced as opposed to when the manure is deposited on lands or pasture. The manure produces nitrous oxide naturally as part of the nitrogen cycle of the soil, and more nitrogen is produced when the manure is deposited on pasture. Currently most farmers deposit their manure onto fields or pasture rather than use liquid systems, but liquid systems have grown in popularity among dairy farmers (Hockstad & Weitz, 2016). These liquid systems require less physical work and effort to distribute the manure, so the driving force behind adoption of these practices with a greater impact is convenience.

Soil management produces the vast majority of greenhouse gases in agriculture, a whopping 79%. Soils emit nitrous oxide from various sources, including the application of fertilizer and manure and drainage of organic soils. Both grasslands and croplands directly produce nitrous oxide, and the croplands of the Midwest produce especially large amounts due to the large amounts of fertilizer needed in intense corn production. Runoff from croplands into surface water and leaching into groundwater also contribute to indirect nitrous oxide emissions. Much of these emissions are directly linked to agriculture itself, but many human alterations such as use of inorganic fertilizers have greatly increased emissions (Hockstad & Weitz, 2016).

There are other factors that contribute to greenhouse gas emissions in agriculture. Breakdown of organic matter in soils also contributes carbon dioxide as well as tillage and working of the soil. If we take production of beef cattle as an example, as the Agri-food of Canada did, agro-chemicals, harvesting equipment, and the heating and power of farm buildings all contribute carbon dioxide while manure, production of fodder and grain, and the cattle themselves all produce nitrous oxide and methane (Desjardins et al., n.d.).

Another source of greenhouse gases that should be considered is the result of land use or change of land use. While most agricultural activities produce predominantly methane and nitrous oxide, changing land use produces carbon dioxide. Deforestation is a large source of carbon dioxide, and forests are often cleared to make space for croplands, especially conventional monocultures. Harvest and management of croplands also play a large role in releasing carbon dioxide into the atmosphere, in the form of tillage and breaking of the ground that allows carbon stored in the soil's organic matter to escape (Center for Land Use, 2009).

Additionally, agriculture can have other harmful effects that do not directly contribute to climate change, but their effects can also be environmentally devastating especially in conjunction with the effects of climate change. Most of the negative effects come from the

propagation of nitrogen and phosphorous caused by agriculture. Humans introduce large amounts of these elements through fertilizer, and when these elements remain in wastes, they often end up in water sources including rivers and coastal seas and oceans. Excess amounts of phosphorous and nitrogen in water can devastate the biodiversity of these areas by encouraging blooms of algae that can drain oxygen from the waters and eliminate large populations of fish and other organisms. Runoff of pesticides can cause similar harm, and in areas with intensive agriculture like the Midwest, fertilizers and pesticides are used rampantly (Tilman, 2001). This damage to water supply is devastating to agriculture, and as current predictions show less rainfall in the Midwest in the future, current water supplies should be protected vociferously (Center for Land Use, 2009). These factors may not directly contribute to climate change like greenhouse gases, but the devastating results will damage the environment and continue harmful changes to the environment hand in hand with climate change.

Clearly agriculture will unavoidably produce greenhouse gases. The mere act of raising livestock such as cattle and planting, growing and harvesting crops will produce greenhouse gases. Some current agricultural practices do produce additional greenhouse gases, such as excessive use of fertilizers, and farmers can avoid these practices. Given the harmful effects of fertilizer runoff, the less fertilizer used, the healthier the environment could be. This is not a revolutionary claim. Many have already embraced this sentiment, if the growth and popularity of organic farming is any indication. Many organic farmers have also adapted many of their practices to minimize the amount of greenhouse gases emitted from their farms. The growth of organic farming has motivated many to search for solutions to the large amount of greenhouse gases contributed to the atmosphere by agriculture. By examining practices in these areas, new solutions that can be applied to agriculture as a whole can be found. Common Harvest Farm is a organic CSA farm, and Dan and Margaret have already done much to adapt to a less

environmentally impactful agricultural system. Common Harvest Farm will serve as a case study to examine practices that can be adopted by the conventional agriculture sphere to limit greenhouse gas contributions.

During the field trip to the farm, Dan's tours illuminated many facts about both his farms and the surrounding farms to show many of their actions actively contribute to climate change. Dairy farms dominate that area of Wisconsin, and dairy cattle contribute an extremely large amount of methane. The mere presence of cattle increases a farms greenhouse gas content. Many of those dairy farms surround Dan's farm, and Dan made a point of mentioning their liquid manure management and the fact that their manure does not stay on their farm. These conditions allow the manure to produce additional greenhouse gases. Many dairy farms are choosing these types of systems, and that does not bode well for climate change prevention. Also, Dan pointed out how many of the farms that surround his leave their fields totally uncovered during the winter, and this can only encourage carbon and nitrogen to leave the soil, which not only decreases soil health but contributes to climate change. Most of Dan's neighbors also aggressively till the soil and that process can lead to even more carbon and nitrogen escape from the soil (D. Guenthner, personal communication, April 9, 2016).

Dan's small farm, on the other hand, has already implemented advantageous adaptations that reduce the farms greenhouse gas emissions. First of all, Dan has a small farm. The larger the farms, the more greenhouse gas emissions produced, so Dan already contributes inherently less greenhouse gases. Also, Dan does not raise cows or have any livestock on the farm. Dan does not have to account for the large methane output of livestock, nor does he have to manage the emissions from the resulting manure (D. Guenthner, personal communication, April 9, 2016).

Dan's cultivation practices already also reduce greenhouse gas emissions a great deal. Dan uses cover crops on his fields when he has not planted his crops. While the life cycle of

these crops does emit a certain amount of nitrous oxide, the beneficial effects on soil health as well as the reduction of nitrogen and carbon loss from the soil overall reduces Dan's impact. Dan also uses different tilling practices from his neighbors. Dan uses an Australian chisel plow, which reduces the total artificial turnover and disruption of the soil. This reduces the amount of carbon and nitrogen released from the soil, and reduces the total greenhouse gas emissions of the farm. Dan also spoke highly of one of his neighbors who uses no-till farming practices, which further reduce emissions from the soil. Dan also preserves a small riparian area near his farm, that allows a wetland environment to persist. By not clearing these areas of their trees and other organisms, Dan is preventing a large release of carbon dioxide from land clearing (D. Guenthner, personal communication, April 9, 2016).

Dan's status as an organic farmer also affects his greenhouse gas output. Dan does not use the same chemical pesticides and fertilizers that other conventional farms use. Dan instead tries to maximize his efforts using organic fertilizers. Runoff or leeching from Dan's fields then do not contribute excess nitrogen and phosphorous that devastates water quality and biodiversity. Dan's use of organic fertilizer also means not using a liquid manure system, but rather spreading the manure across his fields, thus reducing the amount of methane produced by the manure (D. Guenthner, personal communication, April 9, 2016).

Beyond Dan's farming techniques, he also has adopted other practices that further reduce his greenhouse gas impact. Dan's farm uses solar panels to power the farm, and these solar panels often produce all the electricity the farm needs. By drawing less power from the existing power grid and energy production system, Dan has reduced the amount of greenhouse gas emissions involved on his farm. Dan also has two tractors. One is a more conventional fuel powered tractor, but Dan also uses and maintains a tractor that is solely battery powered.

Emissions from farming equipment contribute heavily to climate change, and Dan has even reduced that impact (D. Guenthner, personal communication, April 9, 2016).

Conclusion

Overall, Dan's organic CSA farm has already adapted and reduced total emissions greatly. Organic farming inherently reduces the environmental impact by not using chemical fertilizers. Dan's small farming techniques focusing on soil stewardship and lack of cattle presence also hugely reduce the amount of greenhouse gas emissions from the farm. Overall, the CSA movement, due to a lessened focus on production outputs and a greater emphasis on connection to the land and health of the land, has already poised itself in a position such that its greenhouse gas emissions are largely reduced. Many of the greatest contributors to climate change in agriculture have already been addressed. There are still greenhouse gas emissions from agriculture and from farms, but agricultural production will always produce some, the key is to mitigate that production through other means. Nevertheless the CSA farms already have jump start on reducing contributions to further climate change.

Moving forward, I think many CSA and organic farming sourced solutions can be implemented in more conventional agricultural circles. First and foremost, the amount of pesticides used in agriculture can clearly be reduced. By encouraging a wider acceptance of solutions such as polycropping and other measures to naturally reduce pests, the amount of nitrogen and phosphorous released can be reduced. Also, by promoting agroforestry, as Dan has done by preserving a section of wetlands near his property, more trees can be preserved that can mitigate the emissions of agriculture that cannot be eliminated. Agroforestry can help partially offset emissions of cattle production, if we are to continue with the massive amount of cattle that are grown. Ideally, the overall cattle population should be reduced to reduce the methane released, but consumption patterns are unlikely to change.

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Chapter 4: How might CSA farms in the region anticipate and cope with climate change?

The Findings of Research Group 4 (Ella Bushnell, Karin Davey, Marin Stefani, Alia Benedict & Ayoub Belemlih)

Adapting to Wisconsin Climate Change: A CSA Approach

Alia Benedict, Spring 2016
Alternative Agriculture Paper
People, Agriculture, and the Environment
Professor Bill Moseley

Dan and Margaret Guenthner take a lot of pride in their Wisconsin countryside farm. And rightly so— in 1989, Common Harvest Farm was one of the first major CSA farms in the Midwest, bravely pioneering the now widespread and trendy Community Supported Agriculture movement. The 40 acre farm, of which only 18 acres is actually tillable, sits on a mixture of woods, vernal ponds, and farmland. The Guenthners grow just over 40 different vegetables and herbs, and also partner with other small farmers to supply customers with a modest fruit share in the summer if fruit production is sparse. While it's small for a farm in the traditional sense, Common Harvest packs a lot of punch. Dan and Margaret supply dozens of customers with weekly or bimonthly boxes of fruits and vegetables— a service that requires work, dedication, and cooperation of both the farmer and the land in order for the farm to thrive— all while keeping up with customer demand. However, no matter how hard Dan and Margaret work to keep the farm running smoothly, the land— and the weather— does not always cooperate.

In recent years, southwest Wisconsin has experienced increasingly drastic changes in weather, from periods of heavy rain to long-lasting spans of drought, as well as shorter, milder winters with increased amounts of mid-winter thaws. In 2012, Wisconsin displayed record-breaking March temperatures more characteristic of late summer months ("Wisconsin Land Use Megatrends," 2009). Cold-snaps in April were followed by heat-waves in June, which, with a 104ºF day in a three-day streak of over 100º period, devastated Wisconsin agriculture. While these extreme changes in weather and temperature are indeed large problems in themselves, they're most likely byproducts of a much larger, more expansive issue: climate change. Climate change arguably makes up some of the biggest challenges for farmers like Dan and Margaret.

Weather fluctuations greatly impact the logistics of crop planting, resulting in an inconsistency in production that could put profit and customer satisfaction at risk. Additionally, CSAs don't rely on the pesticides and expensive technologies that major farms do to mitigate the effects of climate change; instead, small farmers must find other ways to ensure the health of their soil, the health of their farm, and the happiness of their customers.

CSA farms in the southwestern region of Wisconsin can anticipate and quell heavy rains, droughts, and milder winters by adapting to a variety of practices— including increasing organic matter in the soil to buffer extremes in temperature, developing an irrigation system that maintains a steady and reliable source of water while also preventing flooding in the wet months, and also by planting earlier, planting alternative crops, and establishing partnerships with other organic farmers to ensure crop backup during the vicious freeze and thaw cycles of spring. If implemented, these practices would help to alleviate, and help take advantage of, the undesired and costly effects of temperature and weather fluctuations on small-scale operated Wisconsin agriculture.

Research Methods

Data in this paper was collected from a variety of educated sources, but most of my information is a mixture of fact and opinion, both professional and personal. General information regarding the operations and goals of Common Harvest Farm— as well as the impact that climate change has on the CSA level— was collected from interviews with Dan and Margaret during tour class visit to Osceola. I also used online articles, mostly from Wisconsin universities, to narrow down general climate change issues into the three largest problems that weather

fluctuation creates, as well as possible mitigation techniques broad enough to reduce the affects of climate change. Additional online research articles from agricultural based science journals were used as well, which are found in the analysis section of this paper.

Problem: Soil Easily Susceptible to Extreme Temperature Changes

Dan Guenthner loves soil, so it's natural that he would insist in its importance when combatting climate change. But while we might laugh over Dan's soil obsession, we also have to remember that Dan is right: soil is an important agricultural actor because it sustains all life on this Earth. Soil composition determines the health of the crops that grow in it, and thus it determines the health and success of a farm. However, as a result of extreme temperature and precipitation fluctuation and recent human activity, soils are quickly losing the organic matter needed for crops to thrive. In recent years, Wisconsin soils have lost one-half to two-thirds of their organic matter (Lal, 2004). Carbon once found in organic, rich soils is now found in the atmosphere—carbon levels have increased 31% in 250 years. Additionally, climate change increases abiotic stresses, resulting in decreases in soil biota and other soil processes necessary for crop vitality. According to the Wisconsin Department of Natural Resources, recent overworking of rural Wisconsin land, which exacerbates the decrease of carbon/organic matter in soil, has led to the quick spreading of weak and degraded farming areas (Woehler, 1987). Degraded soils are easily susceptible to droughts and flooding, so unexpected changes in weather — such as 5 inches of rain in one night, which is common now with climate change— can wipe out a field in no time.

Solution: Increase Soil Organic Matter

Increasing soil organic matter is key to buffering extreme changes in weather, which farmers can achieve in several ways. First, farmers could plant nitrogenous cover crops. Cover crops with fibrous, fine root systems stimulate soil aggregation, while crops with taproots stimulate water infiltration (Rowehl, 2016). Similarly, research has found that the addition of cover crops, supplemented with a general rotation of other plants, increases nutrients in the soil and also prevents nutrient loss (Rangarajan, 2012). Numerous crop roots and residues improve soil fertility through the stimulation of microbial communities in the soil, increasing water infiltration, aeration, root growth, and nutrient accessibility. Farmers can also adapt to a no-tillage system. While tillage is indeed beneficial for preparing the soil for planting, successful no-till farmers can emphasize the advantages of leaving the soil unworked— tilling burns up organic matter that might have taken years to build up, and it eradicates fungi and other microbial activity that's necessary for the increasing of organic matter (Meisner et al, 2013). Instead, farmers could add organic matter inputs, such as chicken, pig, and cow manure, for an additional fertility boost. An ideal system for boosting the organic matter buffer would entail the planting of nitrogenous cover crops amongst a rotated crop field, a limited tillage approach, and the consistent application of manure. These practices would strengthen and revitalize soil, leaving it less susceptible to the degradation of extreme weather.

Problem: Sporadic Periods of Rain and Drought

In late fall of 2007, Wisconsin experienced some of the most vicious flash floods in years. A series of intense thunderstorms dropped 8 to 18 inches of rain in 6 hours, while in the

southeastern region of the state, 14 inches of rain fell over the course of one day ("Wisconsin Land Use Megatrends," 2009). These storms caused over $110 million in damage, but similar flooding the next year caused $765 million in damage, making it the most expensive natural disaster in Wisconsin history. However, according to the Center for Land Use Education at the University of Wisconsin, these heavy rains are expected to be few and far-between during the summer months, when rain is crucial for crop growth. Wisconsin summers are expected to follow a parched pattern of the past; in 1995, the Midwest experienced consistent temperatures of over 100º with high humidity in the summer season and infrequent, sporadic rain periods. Today, that trend continues. Wisconsin is projected to see extreme heat waves and more frequent droughts— which means farmers will endure long periods of hot, dry weather, punctuated by occasional heavy thunderstorms.

The effects of too much precipitation or too little precipitation can greatly alter both the health of the crop and the production level of the farmer. Periods too hot keep plants from developing adequately, and other forms of irrigation— whether it be by hose or by dripper— is often too expensive and work-intensive to maintain. On the other hand, excessive wet periods, which are becoming more common with milder, heavy melting winters, lead to soil moisture that stunts plant growth, depletes oxygen, and fosters root rot and other diseases (Ransom, 2014). To prevent crops from getting pummeled with harmful periods of dryness and wetness, farmers must be able to mollify each period to the best of their ability, and use that period to their advantage when tending to their crops.

Solution: Develop a Reliable & Consistent Irrigation System

A variety of methods could be imposed to combat contrasts in temperature and precipitation level. First, to keep crops from getting waterlogged during wet periods, farmers can plant specific ground covers such as buckwheat, cowpea, millet, and soybean that are hardier and are more tolerant of flooded conditions. Plants with thicker, fleshier root systems would and soak up and store excess moisture while also providing root channels so taproots can find deeper water sources in times of drought. These roots also withhold water from draining the soil completely of nutrients, which highly benefits other plants in the field ("Weather Tolerant Gardens," 2016). However, cover crops can't soak up 100% of the rainwater. During wet seasons, field flooding can be mollified using this cover crop method, but farmers can also use excess water to their advantage. This can be done by participating in rainwater harvesting practices, which is a much cheaper and effective method to collect, store, and redistribute water throughout wet and dry seasons. A water harvesting system, which is usually composed of an above or below ground storage tank that collects rainwater through a series of pipes or roof gutters, could hold large amounts of rainwater to be used for irrigation in times of drought ("Rainwater Harvesting," 2015). Using this closed system of water collection and redistribution is highly cost effective and efficient, as it saves on utility bills while avoiding the depletion of nearby water sources. Rainwater harvesting practices can be coupled with the construction of ridges of soil along the contours of fields— this method can hold back rainwater runoff when infiltration is needed, while also channeling water down furrows for targeting specific crops. Utilizing a closed water system and designing crop fields to maximize water conservation is environmentally friendly, cheap, easy, and effective when dealing with sporadic periods of rain and drought. By combining the planting of hardy, drought resistant cover crops, and developing a

reliable rainwater harvesting system, both wet and dry periods can be efficiently alleviated, and farmers can use these usually undesirable effects of climate change to their advantage.

Problem: Spring Frost/Thaw Cycles Dangerous for Early Crop Development

Each spring, farmers jump at the bit to get planting. In the winter, water in the ground freezes, resulting in rigid soil with inaccessible nutrients. When the ground thaws during warmer temperatures, that ice melts— loosening and warming the soil to release nutrients and prepare for the planting season ahead ("All About Frozen Ground," 2014). However, spring isn't known for being the most consistent season— especially in the Midwest region, where warm weather is often punctuated by overnight frosts. Now, the spring season has grown even more fickle. Environmental scientists have recorded earlier thawing seasons induced by global warming, advancing almost one day a year since 1988 ("Spring Thaw/Freeze Effects," 2008), which is advantageous for increased production due to the extended growing season, but also detrimental when looking at the side effect of extended freeze/thaw cycles that are on the increase with early springs.

Repeated freezes and thaws are hard on plants. Extreme heat can slow growth and promote moisture loss while extreme cold is detrimental to seed germination and nutrient availability, resulting in reduced production. Temperature fluctuations not only inhibit growth by sending mixed signals to crops, but unexpected cold snaps can take newly developed buds off guard. Farmers fret about early springs due to the dangers of early bud break; in warmer temperatures, fruit crops like grapes and apples develop shoots during the first signs of warm

weather, leaving them vulnerable to the imminent frost threats of spring. If a frost hits, these young, undeveloped shoots die— leaving the farmer with scarce, if any, production.

Solution: Planting Earlier/Alternatively, & Establishing Partnerships

While these thaw and freeze cycles are out of farmers' control, Lianhong Gu, a Research and Development Staff Scientist for Oak Ridge National Laboratory in Oak Ridge, Tennessee, insists that farmers can work against these harsh cycles by planting earlier and planting alternative crops. Gu suggested that hearty native species, rather than newly introduced, cultivated species, fare much better when subject to extreme temperatures— and that variation is key ("Spring Thaw/Freeze Effects," 2008). Planting hardier crops earlier gets a head start on important growth, so when frost hits during early spring, the plant would be developed and strong enough to withstand drops in temperature. And variation is indeed key— a (2012) book by Oerke et al. insisted that intra-field variation is integral for keeping crop conditions in check. Spatial variation, as well as crop rotation, protects crops from diseases while increasing nutrients in the soil; this increases the vitality of the crops, protecting them from the harms of the freeze-thaw cycle. Adding more plant mass in a field, as well as leaving extra buds on the tree or vine instead of pruning, offers extra protection during cold snaps. Farmers could also institute other protective measures by planting crops in closed, unexposed areas where the ground absorbs more heat.

These measures, while simple, are practical and small scale enough that they can be implemented at a CSA level. However, should crops fail to last throughout the frosts of the spring, another backup option could be utilized— farmers could establish partnerships with other

small, organic growers to promote options such as fruit, dairy, and meat shares that can reliably produce the goods that customers want. For example, if a Wisconsin apple crop gets hit by frost, farmers can reach out to fellow apple growers that had a more successful season— whether it be in Wisconsin, Michigan, or Washington— to help deliver fresh, organic fruit. Dan and Margaret have done just that by expanding their small, local Wisconsin network to reach a more national demographic. They work with friend and former CSA farmer Everett Meyer through an organic fruit shipping company that delivers fresh, in season fruit to Common Harvest Farm— so Dan and Margaret are ensured certain crops despite the threat of weather mishaps and crop failures. This transnational fruit delivery system is a practice that, while going against traditional, local CSA practices, is becoming more necessary in order to maintain a sustainable food culture.

Conclusion & Policy Recommendations

Ultimately, the affects of climate change are out of our hands, unless we partake in more sustainable practices. Everyone— not just the farmers that produce our food— should be adjusting to more environmentally friendly practices, but in the meantime all we can do is attempt to mitigate its affects. Small farmers should utilize a mixed method of simple yet efficient practices to mitigate extreme changes in weather. Increasing rain levels can be combatted with the planting of cover crops and the establishment of a water-harvesting system, which can store water for expected drought periods. Organic matter in the soil can be increased to create a buffer for extreme changes in weather. Finally, farmers should plant earlier in the season and plant alternative crops to strengthen production, as well as establish partnerships with other small farmers to ensure an import of produce that customers want.

However, it's easy for papers like this to be all talk, no walk. I drew up my information from distinguished universities and environmentalist journals and proposed mitigation techniques based off of these professional opinions, yet in the end my suggestions are just words on a page. In order to successfully cope with and adapt to climate change, people have to get their hands dirty. We should indeed design mitigation techniques based off of these academic and scientific findings, but ultimately the truth lies in the crop fields. The solutions that I suggested are small in scale and conducive to the CSA model, so farmers should have no issue in boosting their climate change mitigation practices. However, it shouldn't solely be up to the farmer to pay attention to climate change. Support needs to come from the federal and state governments to promote the importance of local agriculture— so it can transform from a movement into a lasting practice. While change lies in the farmers and the consumers themselves, the government can help to provide subsidies that support small CSA requests for technology such as solar panels or water harvesting. More importantly, the government can begin promoting the importance of local agriculture instead of backing large monocultures.

But CSAs are doing well on their own. Supporting local agriculture is a step in the right direction of a sustainable food culture, and while Dan and Margaret have been smart enough to practice this since the 1980s, it's the next decades that will prove to be most integral in solidifying the CSA movement. Work will need to be done to continue to develop the movement while adapting to climate change.

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Climate Change in Minnesota and Wisconsin:
The Effects on Agriculture

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Agriculture in Minnesota is highly dependent on climate so as climate change continues to progress at its rapid pace, farms will need to plan ahead for changes in temperature and precipitation. The Midwest will be greatly affected by the physical changes that occur because of changing climate and unless some mitigation happens in the next decade, the crop losses, human health and economic impacts will be catastrophic. Climate change is generally thought of as a warming of the planet and the resulting effects on all parts of the planet but those effects are very different depending on the region: coastal areas are affected differently than inland areas, mountainous areas have different implications than flat lowland. This paper aims to address the reasons why earth's climate is changing as well as examine the effects that climate change will have on agriculture in the Midwestern United States, specifically Minnesota and Wisconsin. It will focus on changes that are specific to each season and the implications that those changes will have on agriculture. Similarly, it will analyze the different ways that it will affect community shared agriculture (CSA) programs and large industrial farms.

Methods:

Much of the prominent data and analysis of climate change has been done by the Intergovernmental Panel on Climate Change (IPCC). They have released multiple assessment reports, which contain three working groups, or sections of the entire report. Working group

one focuses on the physical science and processes of climate change such as the release of greenhouse gasses and aerosols into the atmosphere as well as changes in air, land and ocean temperatures, sea level changes, chemical cycles, paleoclimate approaches to analyzing climate change and satellite data (IPCC). The information in this working group was the most helpful in addressing climate change in Minnesota and Wisconsin. The other two working groups are very important to the issue of climate change as a whole but are not included in the research for this topic. Working group two addresses the socioeconomic and environmental vulnerability that is perpetuated by climate change and working group three has mitigation solutions on how to prevent further greenhouse emissions in all sectors of development.

Along with the IPCC, the Union of Concerned Scientist has a lot of valuable information about the effects of climate change in the United States. They break up their analysis by region because climate change is not uniform in all parts of the country. They work in partnership with many other organizations and universities, ensuring reliability of their data and analysis.

The feelings and sentiments about farming in the Midwest during the initial effects of climate change were collected from Common Harvest Farm in Wisconsin, owned and operated by Dan Guenther and Margaret Pennings.

Findings and Analysis

Our planet has natural climate cycles depending on our distance from the sun, albedo (the reflectivity of the earth), and amount of greenhouse gasses in the atmosphere, but natural processes did not drive the warming that has occurred in the last century. In the last 800,000 years, the earth's atmosphere has cycled between periods of warm and periods of cold with atmospheric levels of carbon dioxide, a gas that traps heat in our atmosphere, never reaching

levels higher than about 300 parts per million (National Academy of Science, Engineering and Medicine, 2012). During periods of ice age, this concentration can fall to 180 parts per million because it is stored in oceans, land and ice. Today, we are producing levels of carbon dioxide that are more than the amount that the biosphere and oceans can absorb, resulting in extremely high atmospheric carbon dioxide levels. Recent studies have measured carbon dioxide levels approaching 400 parts per million as well as increased concentrations of other greenhouse gasses such as methane (The National Academies of Science, Engineering and Medicine, 2012).

Anthropogenic induced greenhouse gasses such as chlorofluorocarbons and hydrofluorocarbons have all increased due to burning fossil fuels. These greenhouse gases insulate the atmosphere and do not allow heat from solar radiation to escape back into space. This is the main reason why climate change is occurring and will have a plethora of effects on other earth processes that have significant impacts on human livelihoods, especially agriculture.

Because the Midwestern US is not close to the ocean coast, people do not have to worry about rising sea levels and the resulting damage from that symptom of climate change but it is a host for other serious effects of climate change. Water generally stabilizes the climate, which is why coastal areas have more stable temperatures throughout the year. The Midwest feels the full force of all four seasons but because of warming temperatures, winter will be shorter, spring will have more precipitation and summer will be hotter. The growing season of many crops will be extended by about six weeks, which seems beneficial but actually causes an entirely new set of problems that inhibit high crop yields such as pest problems and intensified precipitation events.

The trend predicted by the Intergovernmental Panel on Climate Change (IPCC) for winter in Minnesota is an increased average temperature and generally shorter time period. This seems to be a good thing on a surface level because some plants can survive warmer winters and farmers can start planting crops sooner but cold winters are important in the Midwest for keeping pests in check. When the winter season becomes warmer it allows for northward migration of pests and an intensified problem during the growing season. With an already high rate of pesticide usage on large farms, this environmentally detrimental practice will only increase in upcoming years unless some sort of climate change mitigation strategies appear. Farmers will need to make the decision of whether or not risk their crop to the increased probability that it will be eaten by pests or plant earlier to have a longer growing season. This is one of the areas of climate change that could be beneficial for agriculture, especially if farmers used integrated pest management strategies rather than relying on chemical pesticides.

As mentioned previously, when the growing season begins, it will be warm enough to start early in the year but spring is predicted to not only have larger populations of pests but also have much higher precipitation levels as well as more intense precipitation events. Large rainstorms are predicted to increase from about one per spring, to around three in southern Minnesota (UCS, 2009). This has the potential to wash away newly planted seeds and cause a decline in crop production before the plant even had a chance to grow. In Dan Guenther's lecture, he articulated that now, seventy percent of rain is absorbable by plants but in the upcoming years that percentage will be reduced to about thirty percent (Guenther, 2016). Rain events could actually push the growing season further into the year if farmers think that the

heavy precipitation could ruin their crop. Looking back to 2009 when the Red River flooded, there was more than $5 billion in damage to farms, homes and businesses in the area (Dunbar, 2015). This was one of the worst floods before Hurricane Katrina and is now predicted to be a yearly event. If nothing is done to prepare for this kind of damage then an unthinkable amount of money will be lost and farms will no longer produce the yields that they do today.

After the floods of spring, a scorching hot summer will ensue; causing major droughts that will lead to large-scale crop failure. Three-day periods with temperatures that rise above 95 degrees Fahrenheit generally happen once every ten years and seven day periods with temperatures consistently rising about 95 degrees happen every 30 years and are basically guaranteed to wipe out the corn crop (UCS, 2009). These short and long droughts are predicted to occur every other year if nothing is done to halt fossil fuel emissions. In a heat wave in 1988, the US lost $40 billion, mainly due to crop losses (Hayhoe et al., 2009). The projected average summer temperature is going to be as hot as it was in 1988 with additional heat waves. Of course these projections are not completely accurate but there will definitely be higher temperatures in the summer that will induce crop failure and ultimately put much more pressure on water resources. There will be approximately fifteen percent less rainfall, so farms that primarily rely on precipitation to water their fields will either suffer extreme crop losses or start irrigating (Hayhoe et al., 2009).

Conclusions

Farmers will need to come up with adaptive solutions to the problems that they are facing due to climate change. Their main concern is maintaining their current yield so that people can continue to be fed and they can continue to get paid. In the summers, water will

become increasingly scarce and their crops will unless farmers save some of the rain that will surely fall in spring. Spring will also come with increased precipitation that will need to be mitigated whether through terracing fields or early flood prevention. They will also have to find creative ways to reduce pests so that they don't rely on chemical pesticides that cause damage to local terrestrial and aquatic ecosystems. Because pests generally target one crop, farmers might need to diversify their crops in order to maintain their yields. The changing growing season will also change the type of plants that farmers grow because the new climate will also be more suited for a different set of crops. Ultimately, there will be a lot of problems that farmers can solve through their own innovative system but others will need government intervention especially if there are multi year large-scale crop failures.

The word "farmer" applies to small CSA or organic farms as well as large industrialized farms so it is important to analyze all types of farms. Each farmer will experience and deal with the effects of climate change differently, which brings up the question: who will suffer more from the effects of climate change, smaller CSA farmers or large scale industrial famers? A shift in the agricultural system in the United States is emerging slowly, and climate change may be the spark that finally forces us to act on the flaws of our system. Smaller farms and organic farms will share the brunt of climate change impacts but will most likely be able to adapt better. Because they generally grow a variety of crops, if one plant is washed out by a flood of dies in a drought or is eaten by pests, they will still have other plants to rely on for both food and income. Similarly, it will be less expensive for them to change their practices because they are smaller and do not have as much pressure put on them to produce as much as their fields will allow. One way that they would most likely suffer more is by pests eating their crops.

Without pesticides, entire crops could be wiped out by a pest that was not killed in the winter or migrated to a farm where this pest was not normally found. These farms will obviously have to go through big changes to manage and mitigate the effects of climate change but they have more freedom to change or alter their practices to cope with the challenges that they might face.

On the other hand, big agriculture generally only grows one crop, which can be highly mechanized and manipulated to maximize yields. Through chemical fertilizers and pesticides, farmers cultivate specific growing conditions but are restricted to only that crop. If their crop fails due to drought, flood or pests then there is nothing else for them to fall back on besides reserves that they would only potentially have from the previous year. If they continued to grow their crops using the same practices that they do now they are almost guaranteed to have multi year crop failures that would completely put them out of business. If the temperature changes as dramatically as it is predicted, crops like corn, one of the staple crops of the Midwest, will not be able to withstand the heat and during the heat waves of summer will perish. Because industrial agriculture plays such a large part in climate change they are actually harming themselves by carrying on without changing their practices and a shift to smaller, local or regional agriculture might become the only viable alternative. Climate change could ultimately be the push that our agricultural system needs to become more sustainable.

There are many things that both federal and state governments can do to foster this change to more sustainable practices. Today, there are already subsidy programs in place for farmers growing cash crops like corn and wheat, but that system is becoming outdated as farmers are paying more attention to their soil stewardship and the impact that they have on

the land and the climate. If there is going to be a new and productive policy it should attempt to change the system of agriculture from one of mono cropping and maximizing yields to one that promotes sustainable practices. It should allow farmers to transition to a system of poly cropping and weaning themselves off of chemical fertilizers and pesticides either through subsidies or government funded education courses. Money should be set-aside for smaller CSA and organic farms as well. Smaller local farms do not transport their crops as far as and thus have smaller carbon dioxide emissions so if the government paid these farmers for selling their produce in a 100 mile radius that would incentivize other farmers to start selling local. This would dramatically reduce agriculture's contribution to climate change.

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Staying Organic:
An analysis of CSA farms' ability
to remain sustainable

Introduction

CSA farms today seem to have found a sustainable model to grow food, using harvesting technique that respect the environment. It pushes other farmers and consumers to harvest and consume organic, and is beneficial for the planet.

However, rapid climate changes might disrupt this balance. Droughts, floods, global warming, all are direct consequences of the fluctuations of the climate, and those hazards have a growing impact on food producers, and in particular on those types of farm. Nowadays, with the effects of climate change being felt all over the globe by food consumers and food producers alike, the question seems to have shifted from whether or not climate change is happening to what can one do about it. Establishing an organic farm, instead of a conventional one, is one way to deal with climate change, but the harsh consequences of the latter challenge that notion. In fact, will climate change affect CSA farms' ability to remain organic and sustainable over the long term?

I argue that indeed, CSA farm will be able, over the long term, to surmount the effects of climate change and maintain their organic enterprise. I will answer this question by analyzing the current organic techniques of farming and harvesting, as well as the general model of the CSA

farm, and their potential compatibility with several major consequences of climate change, including rise in temperature, droughts and floods. I will also be taking a closer look at the p

Research Method

To gather information and data for this analysis, I looked back at my notes from the visit of Dan's farm. During the group interview we conducted at the end of the day, he and his wife shared valuable information regarding the future of CSA farms in Wisconsin, as well as a few of the tools and techniques they had to face the effects of climate change. I also investigated the different resources Dan had linked up in his email, a very helpful one being a report with a numerous data on climate change in Wisconsin. Researching more about the CSA model of farming was also rewarding, and it gave me additional insight on the challenge of producing organic food and maintaining a viable economic input.

CSA Farms: A Viable Model?

Climate change has several consequences that could potentially impede CSA farms' ability to remain organic and keep their model alive.

The main consequence is a global increase in temperature. Over the coming decades, changes in temperature are expected to be increasingly damaging to farms around the world. More specifically, in the Midwestern part of the United States, the weather patterns are set to evolve more and more as time passes, resulting in warmer and drier climate. Those effects should be particularly prominent in Wisconsin and Minnesota, especially in the summer. The temperature, before the end of the century, will increase from 8 to 18 degrees (F) in the summer and 6 to 11 degrees in the winter. These intense perturbation, caused primarily by the systematic rejection of greenhouse gas worldwide, are a real challenge for farms to overcome. In fact,

increase in temperature have a direct impact on crop productivity. Research from the Rice Research Institute Farm have shown that during the future dry seasons, for each additional degree (C) in temperature, corn and soybean yield could see a decrease of 13% and 16% respectively. Such drastic changes thus present a major inconvenient for conventional farms, which most of the time specialize in large scale production of corn and soybeans, but shouldn't affect organic farming as much. Even though certain crops in organic plantations could eventually be affected by important global warming trends, research shows that a CSA farm is better prepared to face temperature increase than a conventional farm, because the former's organic focus doesn't encompass grains like corn and soybeans. However, one must take into account the fact that conventional farms, being bigger and more profiting than CSA farms, may thus have more resources to compensate for those higher risks of crop damaging. Still, when it comes to increase in temperature, CSA farms' crops are not as highly at risk. In addition, an increase in temperature, considering the geographical location of the Midwest, could create an extended growing season, and thus increase yields. Although those are more positive impacts of climate change, there are other effects of climate change and global warming that may disturb CSA farms' organic endeavor.

One of the other consequences of climate change and global warming is the increase in environmental hazards, particularly in floods and drought. Because most of the farming activities concentrate in the Midwest, rising sea levels are not that important a concern. However, floods are also caused by intense rainfall, which might disturb soil nutrient balance and damage crops. Wisconsin is thus rather prone to experience floods, like the ones of 2007 and 2008, which respectively cost $110 million and $765 million in damages. CSA farms, as a response to that, could compensate by increasing the amount of organic matter in the soil. That organic matter can

be compost or crop residue, something that organic farmers like Dan are already implementing. In addition to bringing nutrients like nitrogen to the plants, organic matter in the soil increases its permeability. In fact, organic matter helps form soil aggregates, which improves the structure and thus the ability for the soil to take up more water.

Drought, mainly caused by the rise in temperature in the dry season, could have an important impact on organic farming. Because CSA farms are not as resourceful as their conventional counterparts, they cannot compensate by producing more or on a larger surface. One way to bypass those restrictions would be to use fertilizers, but the latter, used to a great extent by conventional farms, damage the soil and pollutes rivers. There are other methods that CSA farms could use to avoid the effects of droughts that would not make them harm the environment of the soil. Conservation could be one way: saving good products would allow farmers to have something to sell when the drought comes. However, it conflicts with the very definition of a CSA farm, the latter being a farm that provides fresh product to its community. Some other ways, that I believe could be efficient, could be to collect rainwater and to redistribute it when it gets dry, or, like Dan does, to use a hothouse with a humid environment to have the plants ready to grow, even by dry weather.

CSA farms, over the long term, thus have at their disposal an array of solutions to help them maintain their organic model and cope with the effects of climate change. Considering those important fluctuations in weather, and to help CSA farms respond more adequately to their consequences, the farms will need several policies at the state or federal level. A set of policies could be focused on promoting crops that stand as an alternative to corn and soybeans. In fact, a lot of organic vegetable crops don’t suffer as much from climate change as corn does. In addition, at the smaller scale of CSA farms, the harvesting of these vegetable crops is generally

less harmful to the environment, as it doesn't require the heavy use of tractors and mechanized tools that damage the soil and pollute the atmosphere. Another useful policy would have to focus on better dealing with the hazards caused by climate change. A thorough set of policies could be implemented at the federal level to be both faster at responding to a drought or a flood, and more efficient at planning over the long term for potential reiterations of those hazards. These directives would help CSA farms, as well as conventional farms, to deal with the destructive effects of those hazards, and they would also promote long term solutions. One solution could be an evolution in our diet: instead of relying solely on corn, a crop that is often the most affected by hazards, we could switch to more organic foods and crops, something that a lot of CSA farm are already doing. However, implementing compelling policies over the long term at the state of federal level is hard, because CSA farms, and farms in general, all differ from each other. I think that, in order for CSA farm to maintain their organic model in the future, they will have to implement more specific solutions. The Common Harvest farm is a great example of a farm that carries out creative, often DIY solutions to environmental problems. Their custom hothouse, their use of solar panels or the way they use compost and organic matter are great examples of these solutions, and they will help the farm maintain its organic, sustainable focus over the long term.

Conclusion

From the evidence collected above, I do think that CSA farms, as built on an organic model, are viable. Because of their small size, they require less resources than big conventional farms to face the effects of climate change. Moreover, a lot of them, like Dan's farm, already implement creative solution to adapt to the changes in weather. The very model of the CSA farm is not in danger either, as many people in communities appreciate to receive fresh vegetables

rather than processed, ‘supermarket’ ones. Finally, the sense of community and growing interest that CSA farm develop is another reason why their model pertains, and will pertain despite harsher climatic condition.

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Name: Ayoub Belemlih
Course: GEOG 232
Assignment: Alternative Agriculture Paper - Final Draft

Main Question: How might CSA farms in the region anticipate and cope with climate change?

Sub-question: Which new technologies can help CSA farmers cope with climate change?

Introduction

In today's world, conventional agriculture has become more focused on yield to feed growing world populations. The intensive agricultural systems behind the production of the world's most famous crops (like corn, wheat, and rice) put pressure on the landscape, reduce soil fertility, and rely on machinery that consumes a lot of energy. On one hand, conventional agriculture can damage the environment through its unsustainable and yield-focused practices. On the other hand, conventional food production plays a significant role in supplying enough food to the market to keep it affordable and accessible in a variety of regions in the world.

Conventional agriculture is often represented by big agricultural companies that organize the production, packaging, transportation, and distribution of their crops and food products. With an emphasis on yield and incentive to generate profits, big agricultural companies rely on large farms that facilitate benefitting from large economies of scale. Given the size of the production system of a big agricultural company, the connection between food consumers and the farmers who produce it is sometimes lost. Another model of food production, organized and sustained by Community Supported Agriculture (CSA) farmers, aims to redefine the connection people have with the food they consume by improving their connection to the farmers who produce it.

CSA farmers usually operate smaller farms with an emphasis on providing healthy and fresh food to their customers. People can subscribe to a CSA farm by paying a subscription (or membership) fee and receive fresh produce from the farm weekly (in general) during the harvest

season (Source: Minnesota Grown Community Supported Agriculture (CSA) | Find a CSA.). CSA farmers tend to share information about their production practices and build better connections with CSA subscribers. In cases of challenging weather or natural disasters, CSA farmers are faced by cuts in their production or damages in their farms. A CSA subscription is centered around the trust between the farmer and the food consumer and therefore relies on the fact that consumers have to support farmers when they cannot deliver.

Research Methods

In order to understand the needs of CSA farmers, their production methods, and the challenges they face, we visited a CSA farm named Common Harvest Farm (CHF) and operated by Dan and Margaret. Dan and Margaret are very enthusiastic about the CSA system and tend to prioritize protecting the environment and preserving soil fertility in their farming practices. Dan mentioned that he has always wanted to be a farmer and pursued an education and career that allowed him to explore the science behind farming.

With respect to my research question, I focused on identifying the challenges Dan and Margaret could face in their farm if the impact of climate change on weather in Wisconsin worsens. Throughout our tour of the farm and our group discussions, I asked questions that related primarily to the technologies currently used in the farm and identified alternative or new technologies Dan and Margaret could implement to cope with climate change in the future.

Findings and Analysis

I. CSA farms' present and future needs

In the first part of our tour, Dan introduced us to the variety of farming practices their farm relies on to provide their subscribers with a variety of vegetables. He highlighted the importance of keeping the soil rich in nutrients and tracking moisture to develop the best

environment for a plant to grow. At different parts of the farm, we took soil samples and identified the main differences in soil for different parts of the farm. Based on our conversation with Dan, farmers should not use the same fertilizers and tillage techniques or plant the same crop for all the types of soil present in a farm. Different soils require different maintenance techniques and developing an understanding of the structure and needs of the soil can help farmers make better decisions. In general, given the variety of vegetables or fruits they need to include in the weekly boxes, CSA farmers have to keep track of the needs of the types of soil present in their farms and continuously monitor the changes in the soil structure of their farms.

Similar to all farms in today's world, the CHF also relies on machinery that requires energy to function. With respect to the size of their farm, Dan and Margaret do not own very heavy machinery (compared to conventional farmers who own large farms). Within the CHF, there is also a greenhouse that relies on energy to monitor temperature. Similar to the CHF, CSA farms need a reliable source of energy in general to operate the farming machinery, packaging machinery, greenhouses, etc. and can therefore be dependent on nonrenewable sources of energy.

With respect to the future effects of climate change, growing seasons might get longer in the future and the changes in the temperatures around the world can lead to stronger hurricanes and heat waves (Source: Effects on People and the Environment.). Farmers around the world need to be connected to share farming techniques and data and identify the future challenges of climate change. Throughout the tour, Dan highlighted some of the Australian innovations in agriculture. He also mentioned that Australian farmers are already affected by climate change and are switching their techniques to cope with the changes. Therefore, CSA farmers should consider implementing new technologies that improve their connection with

other farmers and analyze current data from countries like Australia to predict changes in landscape or weather in the future.

II. New technologies to anticipate and cope with climate change

A. Data Collection and Analysis

By 2050, the world population is estimated to reach around 9 billion which will put more pressure on the worldwide food production system (Source: Precision Farming And The Role Of Big Data., 2014). Precision agriculture, which relies on the use of real-time data (soil or air quality data for instance), will help farmers make better decisions and improve their short and long term planning (Source: Precision agriculture Using predictive weather analytics to feed future generations - IBM Research.). CSA farmers can take part in meeting the food needs of the world in 2050 and develop techniques in production and planning that rely on new technologies.

In order to keep track of the changes in the nutrients of the soil and its moisture, CSA farmers could invest in inter-connected sensors and computers that continuously store data about the soil and weather and track changes. By analyzing the day-to-day changes of the soil and building models that correlate between soil fertility and weather changes, CSA farms can improve their predictions of the changes in their farms with respect to climate change and therefore plan better for the future. In the cases of future droughts for instance, it would be helpful for CSA farmers to accurately predict the changes of moisture in their soils and therefore switch their cropping strategies and farming techniques appropriately. Another reason why CSA farmers should continuously collect and analyze data from their farms relates to feedback on the decisions they are making. Data reflects good decisions and can identify the efficient and more profitable switches that farmers have already implemented to their farm or the inefficiencies of any techniques they are using (Friedman, S., 2015). Lastly, agriculture is always attached to

changes in nature and CSA farmers can improve how they assess their risks when they have reliable information about the changes in their land over a long period of time (Friedman, S., 2015).

B. Building a network of CSA farmers and sharing data

In the previous section, data collection and analysis were highlighted as a powerful tool CSA farmers could implement to adopt precision farming and improve the productivity of their land. Building a network where CSA farmers share their data, tools, and tips is equally as important and can improve their overall productivity. On one hand, CSA farmers can reach a better understanding of the soil structure and the weather changes in their region when they compare their farm's data to other farms in the region (in this case it could be farms in Wisconsin, Minnesota, or the Midwest). On the other hand, by collection and organizing data that represents a whole region (Wisconsin for instance), CSA farmers could recommend policies to investors or the government for instance using reliable agricultural data and analysis. Lastly, a network of CSA farmers can develop a better community and support system and create an incentive for other farmers to join the CSA movement and spread its values across the United States.

C. Analyzing data to predict the impact of climate change

Learning from the experiences of Australian farmers facing the impacts of climate change can help farmers understand the future challenges they might face. Using data analysis and geographic information system software, CSA farmers can build visualizations that provide a clearer vision of the effects of climate change in various regions around the world. By tracking climate change in other regions in the world and the methods farmers are using to tackle it, CSA farmers can get a better idea of the possible tools (machinery, computer software, etc.) they

may need in the future. CSA farmers could also choose to collaborate with Geography students at Macalester who can help them build their maps and charts using their GIS skills.

D. Production of renewable energy

During the visit at CHF, I was surprised by the use of solar panels on the farm. During one of the discussions, Dan explained that those solar panels produce enough energy to meet the needs of the farm. He later mentioned that they sell energy to a company when their panels are producing more energy than needed, and buy it when their panels are not producing enough. Like Dan and Margaret, other CSA farmers should also become energy independent and produce renewable and clean energy on their farm. The production of solar energy can allow CSA farmers to add the “clean energy” label to their produce which can attract new customers (in this case subscribers to the farms).

Installing new panels to a farm and estimating the short and long term costs can be challenging for CSA farmers. To facilitate the process of estimating the energy production of solar panels and their cost in Minnesota, there is an app called “MN Solar Suitability Analysis App” on the University of Minnesota’s website. The app allows you to enter an address in Minnesota and, based in the location you indicate, gives you an idea of the quality of the site and an estimation of the cost of the system and its payback time (Source: MN Solar Suitability Analysis App.). To test the app, here is an example where the location of the site is the roof of the Leonard Center at Macalester College:

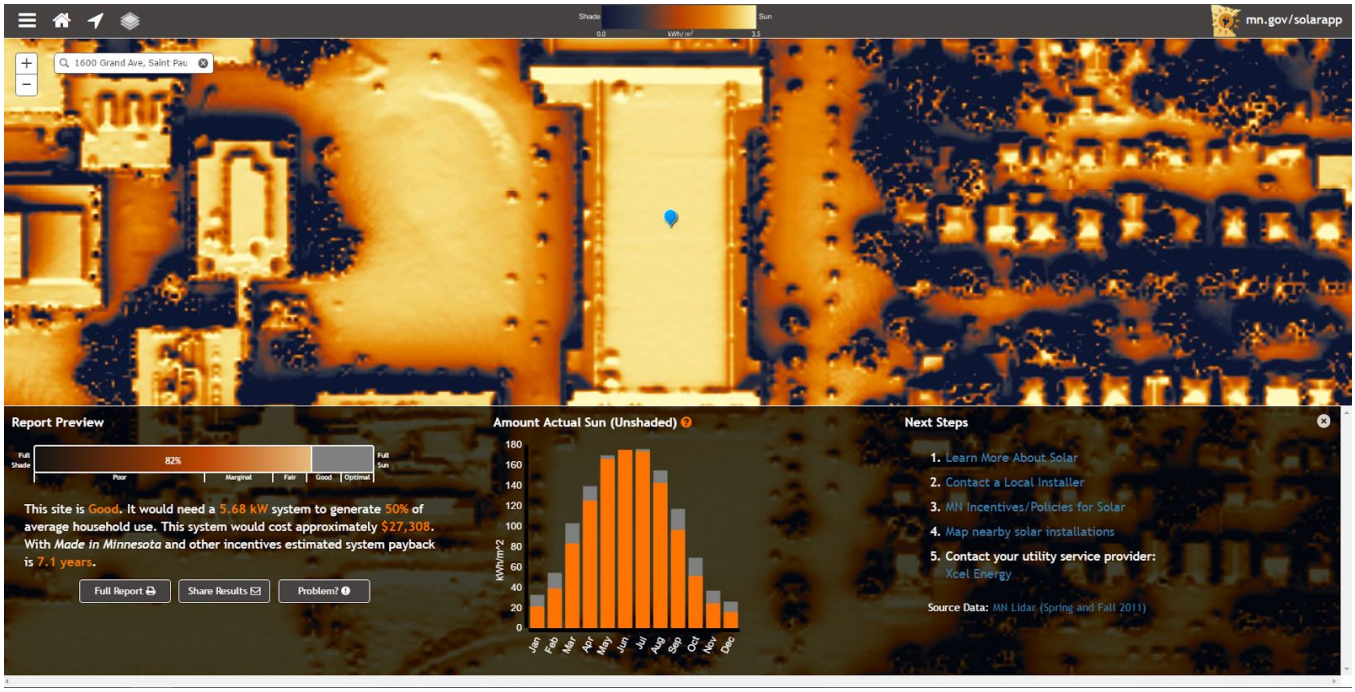

Figure 1: Results from the MN Solar Suitability Analysis App (Location: Leonard Center at Macalester College). (Source: MN Solar Suitability Analysis App.)

CSA farmers in Minnesota could use this app to estimate their costs, savings, and renewable energy production if they implement solar panels.

Conclusion

From the visit, I felt a connection with the land and developed a better understanding of soil structure and farming. Farmers who produce food to feed a growing human population have the responsibility of protecting farming lands and developing farming techniques that will also help the future generating meet its food needs. Climate change can change the way farmers produce food and customers make their food choices. CSA farmers promote a model where subscribers feel more connected to the farmers who produce their food and trust their farming techniques. Technologies that allow CSA farmers to collect and analyze data from their farms, communicate with other farmers, and produce renewable energy will help the movement improve its popularity and grow to have an important role in the food production system of the United States.

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Karin Davey
People, Agriculture, and the Environment
Alternative Agriculture Essay

The Influence of Agricultural Practices in St. Croix County on Climate Change Impacts

Question: How might CSA farms in the region anticipate and cope with climate change?
Sub-Question: How do the past and current conventional agricultural practices contribute to climate change and exacerbate its effects?

Climate change is one of the foremost environmental issues today. The changes that have, are, and will occur reach everybody in some way. The impact on food growth and how farmers will cope with the shifting climate is a major concern. However, agriculture itself is a factor in the onset of climate change, accounting for about a third of greenhouse gases (University of Wisconsin, 2009). Many changes in agricultural practices through history contribute to climate change, as well as some ongoing practices. This historic agricultural path and picture of the farming industry today can be seen in western Wisconsin, near the St. Croix River. The evolution of agriculture and many of the current conventional practices exacerbate the impacts of climate change on agriculture and contribute to the challenges farmers now face.

In this paper, I will outline some of the general land use changes that occurred as agriculture developed in the United States, as well as some history more specific to the area around Common Harvest Farm. Then I will discuss a few general trends in agricultural practices before evaluating the impacts of some of these methods both in general terms and applied more narrowly to the conventional farms neighboring Common Harvest. These are broad topics and thus only a few aspects of the agricultural history and impact can be addressed in a short paper.

Research Methods

Most of the information used in this paper was obtained through a tour of the Common Harvest Farm and surrounding farms outside Osceola, Wisconsin and interviews conducted with Dan and Margaret, the owners of Common Harvest Farm during a class trip. The data provided by Dan is supplemented with information from articles he suggested as well as readings from the class and outside research.

Land Use History

Changes in land use dating back to the first European settlers in the Midwest were the beginnings of an agricultural system in the United States that contributes to climate change. St. Croix County, as well as many other surrounding counties, experienced these land use changes and shows the broader waves of development that shape farms in the county today. The original prairie, savanna, and forest that covered the Midwest changed drastically with the coming of settlers. Logging became a major industry in the late 1800s as much of the softwood, then hardwood trees were cut down for timber. Practices of the logging industry were incredibly wasteful. Only select trees were chosen, and the "cutover areas" were burned, as was scrap materials that could have been used for constructive purposes. No trees were replanted to replace the forests that had been cut down. After most of the forests had been depleted, the economy became more agriculture based and forest were converted into agricultural land along with the prairies and savannas (Anderson et al, 1996). The mass conversion of forests and prairie to farmland over the decades released the carbon stored in the vegetation into the global carbon cycle; the burning of trees, such as what occurred frequently during the logging boom, releases carbon directly into the atmosphere, contributing to climate change. Additionally, both

forests and prairies are sinks of carbon, while farmland and its associated practices are sources of greenhouse gases (University of Wisconsin, 2009).

As the economy moved more towards agriculture, many of the wetlands in the area were drained to increase land available for farming. According to the Wisconsin Wetland Inventory Program, around 4.7 million acres of wetland have been lost since the 1830s (Anderson et al., 1996). Although early settlers considered wetlands unimportant and unproductive, wetlands play an important role in maintaining water quality, protect against floods, and absorb pollutants (Department of Environment, n.d.). Additionally, they store carbon instead of releasing it as carbon dioxide, and thus help mitigate global climate conditions (Environmental Protection Agency, n.d.). The draining of wetlands for farmland reduced the influence of wetlands' carbon sink and pollution fighting abilities. With increased fragmentation, small patches of forest or wetland are more susceptible to disruption from "external impacts from the general matrix" (Anderson et al, 2009), like runoff from surrounding agricultural land, and are thus even less effective in performing essential jobs, including carbon sequestration and water filtration.

Urbanization is another land use change that plays a role in climate change, as the concentration of people to a smaller area and building of infrastructure change the flow of energy, water, and materials on the landscape. Cities exude increased output of nutrients including phosphorus, nitrogen, and carbon, as well as drastically altering vegetation (Anderson et al, 2009). Both of these changes result in changes in the nutrient cycles. The impact of agriculture on the environment goes back to these initial land use changes and the mindset that the resources of the area were infinite.

Changes in Agriculture

More recent trends in agriculture in general, as well as specifically around Osceola, also contribute to the impacts of climate change. Most farms used to be small, family owned plots that provided food for the family to subsist on, and perhaps earn some money by selling off any extra crops. This image of the family farm looks very different from the typical farm today - a large commercial monoculture agribusiness. So how did farms go from a family subsistence to massive expanses that often don't provide food directly to the farmers? As industrialization took hold in the United States, technology was developed that made farming easier. Farms required less labor to run, and people began moving to urban areas to find jobs created by industrialization. With the discovery of the Haber-Bosch process in the early 1900s, nitrogen could artificially fixed and the production and use ammonia fertilizer increased drastically (Schmidhuber, n.d.). Another big shift came after World War II and the excess production of chemicals used in the war. Companies that had manufactured chemicals for the war effort found a market in the United States, both domestically and in commercial agriculture. The shift to fewer, larger farms, from polyculture to monoculture, and to larger amounts of inputs (pesticides and fertilizers) into farming has lead to an agricultural system that plays a part in the challenges that occur.

The practices of conventional farming have a hand in the changes that are making agriculture exploitative and destructive. The shift to a monoculture - based agriculture system occurred in conjunction with the mechanization of farming. Agriculture now is very energy intensive and is big consumer of fossil fuels. Not only does it take a great deal of energy to run the machines on farms and to transport crops, the pesticides and fertilizers that modern agriculture are so dependent on are also major stocks of fossil fuels. The increase of inputs into agriculture has also had a big impact on nutrient cycles. What

had previously been locked away floods into the nutrient cycles through leaching and erosion to quickly for natural processes to handle. This has changed ecosystems and thus those who rely on the processes of the earth.

On the tour of the land around Dan and Margaret's farm outside of Osceola, Wisconsin, Dan talked about the history of the area. According to him, what are now individual farmhouses in the middle of fields used to be “villages” of families surrounded by their farms. As people moved away to the cities, the farms were consolidated and now about 10 families own 90 percent of the farmland. Small 40-cow dairies grew to 400-cow dairies (Guenthner, & Pennings, 2016). Smaller family farms often participated in polyculture, growing many different types of crops in order to feed themselves. In addition, many families had animals on their farms, whose manure provided the fertilizer for crops. By putting the manure of the animals back into the earth to grow more food, these farms had a more closed system than farms today. Modern farms in the area tend to be either dairy farms or single crop farms, which has led to a more open system with higher inputs and thus greater waste. The large dairy farms that now dominate the area have little use for the mountains of manure they produce, so they pump liquid manure to other farms up a mile and half away. Liquid manure releases more methane than unadulterated manure, contributing more to the already significant greenhouse gas emissions of agriculture (Guenthner, & Pennings, 2016).

Conventional Agricultural Practices and Their Impacts

Beyond the effects on the climate from land use change and greenhouse gas emissions, the global agricultural system has many unsustainable practices that exacerbate the impacts humans and the environment feel from climate change. One of the major

impacts is the usage of water. Humans use 50 percent of the earth's fresh water, and agriculture accounts for 70 percent of that usage. 2,800 cubic kilometers of water are used to grow crops every year, often in places not ideally suited to producing food due to lack of naturally occurring water sources (Foley, 2010). For example, lettuce farmed in the middle of the desert in Arizona gets irrigated by water from the Colorado River. Using water in this way drastically reduces the water level of the river, and in some cases rivers dry up completely – the Colorado River does not reach the ocean anymore (Foley, 2010). Overuse of water for agricultural purposes is not limited to the United States. The Aral Sea in Kazakhstan and Uzbekistan dried up as well, and is now almost completely desert. This evaporation occurred because the Soviet government diverted the two major rivers that fed the Aral Sea in order irrigate desert areas for producing cotton. Not only are these examples of changes in the water levels, but human actions, such as the intense and sometimes inappropriate use of water for agriculture, change the surrounding environment as well. Weather patterns around the Aral Sea have changed, endemic fish species have gone extinct, and of course the entire ecosystem changed dramatically, from a body of water to desert (Foley, 2016). Human induced stress and alterations to the environment are a major part of the impacts felt by ecosystems and humans.

Agriculture plays a big role in climate change as a major emitter of greenhouse gases. A study form the University of Minnesota found agriculture to be the biggest single contributor of greenhouses. Altogether the carbon from burning rainforests, nitrous oxide from over-fertilization, methane from cattle and rice production, and other agricultural sources, agriculture accounts for 30 percent of greenhouse gases from human activity (Foley, 2010). According the World Research Institute, agriculture, not counting land use

change or t he production of chemicals used on agricultural lands, is responsible for 13.5 percent of the world's greenhouse gas emissions (University of Wisconsin, 2009). Obviously, the current farming practices and system in which agriculture operates contribute to climate change.

As mentioned above, conventional farming has high external inputs, including excessive fertilizer use. Heavy fertilizer application has many impacts on the environment that intensify the effects of climate change. The flows of nitrogen and phosphorus have doubled, which creates huge problems with water quality in rivers and oceans (Foley, 2010). Nutrients from fertilizers are leached into rivers and lakes through the soil or reach water sources by soil erosion. Given the proximity of the farms around Common Harvest to the St. Croix River, the potential for leaching is a concern for the Osceola neighborhood (Guenthner, & Pennings, 2016) as well as areas downstream that have to deal with polluted water. The high usage of fertilizers and pesticides also plays a role in the cycle of soil degradation. Monocultures deplete the soil, even switching between corn and soybeans, a very common rotation in the Midwest, does not fully rejuvenate soil after nutrients have been sucked out by the crops (Guenthner, & Pennings, 2016). In order to continue growing crops successfully in diminishing soil, farmers must add additional nutrients in the form of fertilizers, contributing to leaching as well as the perpetuation of the soil depletion cycle.

Tilling is another conventional agricultural practice that contributes to soil degradation. Particularly in regions with long, cold winter seasons, land is often left bare and exposed to wind and water erosion when it is not growing season. This exposure leads to loss of fertility in the soil, which in turn causes to farmers to use more fertilizers to boost output. The process of tilling itself also affects the soil. Intense tillage and the type of plow

commonly used by conventional farmers break up soil aggregates and compacts the soil. Organic matter is lost, and water storage in the soil and soil organism diversity decrease, resulting in reduced crop yields (Guenthner, & Pennings, 2016). Soil health is important because good soil is needed to grow food successfully. As the population grows and climate change alters agricultural practices worldwide, we must insure that the foundations for producing food are stable.

One impact of conventional farming methods specific to the western Wisconsin region and the Osceola area stems from its geologic features and glacial history. Unlike the agricultural plains of southern Minnesota and Iowa, the Osceola area was not scraped flat by glaciers, so the landscape consists of many small hills generally with 2-6 percent slope (Guenthner, & Pennings, 2016, University of Wisconsin, 2013). This bumpy landscape is best suited to permanent vegetation in order to keep erosion at a minimum. During the period of small family polyculture farms, much of the hilly area was kept as pasture to graze livestock. This changed when animals disappeared from farms as monoculture became more profitable. Now these slopes are often left bare during the winter months and are even more vulnerable to erosion than flat exposed earth (Guenthner, & Pennings, 2016).

Just as conventional farming practices do not lend themselves to paying attention to uneven ground, they tend to ignore irregularities in soil type as well. As Dan demonstrated on Common Harvest, there can be many different types of soil even in one field. Most big, conventional farmers don't pay attention to that and till all soil types the same way. However, sandy soil and clay soil react very differently to tilling, and the inability of the conventional farming system to address such variation has lead to deterioration of the soil, erosion, and a need to use more fertilizer so crops will grow (Guenthner, & Pennings, 2016).

The efficiency prized in a monoculture system creates a single approach to farming for all environments, which has counterproductive effects on the health of the soil and thus crop yield.

Conclusions and Policy Recommendations

The historical changes in land use and agriculture methods contributed to the beginnings of climate change, by releasing stored carbon and establishing an unsustainable system that persists today. Current conventional practices of farms play a role in their own downfall - they are contributing to climate change and exacerbating the effects of the changes. Agriculture is one of the most, perhaps the most, transformative human processes, yet it is also vital to our survival. Since agriculture is not going to disappear, changes must be made to limit the contributions to climate change. Some of these changes are at the level of the farmer – individual actions that can be taken to reduce the impacts of climate change. These include cover crops, precision agriculture, drip irrigation, new crop varieties, polyculture, grey water recycling, and better tillage practices. Some farmers in the area are already taking some measures – a few plant winter rye as a cover crop, and Dan and Margaret take part in an effort to restore prairie patches. Other solutions are national and international, like changes to the farm bill to provide incentives for farmers to partake in the alternative practices mentioned above. Overall, we need to find a balance. In order to shift from conventional methods to more sustainable practices, advocates from all sides – commercial agriculture, organic and small farmers, and environmental groups – must participate in a dialogue about what should be done and collaborate. No single solution above will suffice. Instead a combination of solutions should be established to best cope with climate change.

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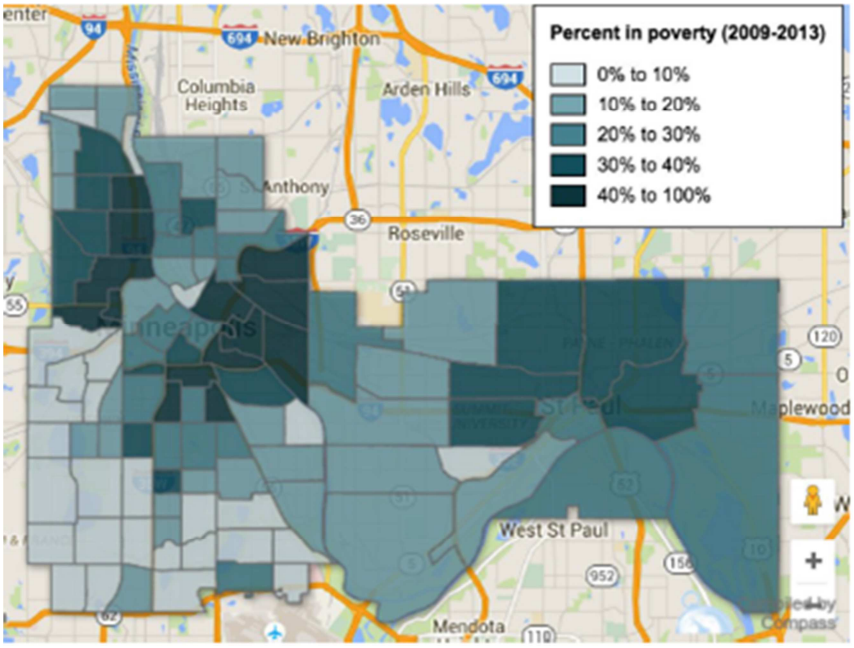
Chapter 5: How might CSA farms better cater to minority and low income populations?

The Findings of Research Group 5 (Ariana Jahiel, Garrett Eichhorn, Lorna Sherwood-Caballero, Lena Pransky & Abby Cox)



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The Accessibility of CSA's: Case Studies in the Twin Cities and Beyond

Introduction:

Common Harvest farm is one of a myriad of Community-Supported Agriculture (CSA) farms in the United States. CSA farms run through a network of members that buy shares of the harvest, sending in regular payments in exchange of a fraction of whatever is grown. This system creates connections between consumers and farmers, allowing farmers to share their farming risk with CSA members, resulting in the development of trust between members and farmers. Common Harvest's shares run around 600 dollars per season, and can either pick up their shares of the harvest at the CSA farm or at several drop-off locations (Common Harvest Farm, 2012). With most conversation surrounding localized food movements, there is also the question of accessibility for vulnerable populations experiencing the highest levels of food insecurity, typically located in urban areas far from CSA farms. The question arises as to how Common Harvest, or CSAs in general, can best incorporate vulnerable communities as members, allowing for dignified participation that does not magnify a member's income level. To contextualize Common Harvest's efforts and provide context for CSA efforts towards sustainability, I examine other CSAs, both within the Twin Cities and in the US at large to understand the efforts of CSAs in increasing accessibility and how that matches with the supporting the needs and dignity of vulnerable populations.

Research Methods:

To understand CSA accessibility and how it relates to Common Harvest, I first examined Common Harvest's own efforts towards accessibility, speaking with farmers Dan and Margaret and looking onto the farm's website. I combined word-of-mouth references with online webpage research to pinpoint what I consider to be the most inclusive CSA's in the Twin Cities, comparing and contrasting their efforts with those of Common Harvest. Looking to a national scale, I used my own experiences and references to incorporate a case study from Arizona, where a farm dedicates itself fully towards accessibility, and examine how their efforts could be implemented in the Twin Cities, or at Common Harvest. I combined this research with existing literature from food sovereignty organizations, activists and university-based academics, focusing on the standards and limitations of creating accessibility that could apply to Common Harvest Farm.

Common Harvest's Accessiblity:

CSAs typically work to include vulnerable populations through emergency food banks. Common Harvest is part of the Emergency Food Shelf Network (EFN)'s Harvest for the Hungry (HFTH) program, which allows for farmers to make tax-deductible donations to emergency food shelves (Hunger Solutions, 2016). Farmers also have the choice if they would like to directly engage with the communities involved in this program, through volunteer service. Common Harvest Farm also allows for build-your-own payment plans, although this can become quite difficult to enforce and

implement, as Dan Guenthner explained. Aside from Donations and this payment plan, Common Harvest's drop-off sites are located almost exclusively within more affluent neighborhoods, engaging mostly with well-off buyers. The farm focuses most of its efforts on academia, educating primarily university-level students about the scientific and socioeconomic benefits of localized food, guest lecturing in several Macalester College classes (Personal interaction with Dan Guenthner, 2016).

Twin City Case Studies:

In talks surrounding accessibility of CSAs for vulnerable populations, dignity cannot be ignored. An argument against emergency food banks is that it creates a sense of dependency within vulnerable populations, sending a message that these communities are helpless instead of active participants in fighting for greater access to healthy food (Ahmadi and Ahn). Several CSAs combat this undermining of dignity through offering ways for community members to directly help in the growing process of their food. These "working share programs" allow for farmers to work on CSA farms in exchange for a share of the food on the farm. These work programs can either be through logistical office work or through offering physical labor in the CSA fields.

In the Twin Cities, the most widely acknowledged CSA for its efforts towards accessibility is Stone's Throw Urban Farm. This CSA transforms abandoned plots of land throughout the Twin Cities into urban farmland. In the transformation of urban tracts of land and through the process of growing its operations, Stone's Throw works with cultural-specific and migrant rights groups, partnering with the Latino Economic

Development Center and local community churches (Stone's Throw Urban Farm, n.d.). Stone Throw's mission statement is clear to include that it wishes to create accessibility for the surrounding community, stating, "We are working to create a dynamic urban farm that strives toward ecological sustainability, community empowerment, and financial viability in Minneapolis and Saint Paul" (Stone's Throw Urban Farm, n.d.). Stone's Throw also incorporates a labor-trading program, with six open positions for individuals to work on the farm in exchange for a farm share. Through its location, partnerships and labor-share efforts, Stone's Throw dedicates itself to integrated accessibility within the CSA movement.

Boot Strap Urban Farm also dedicates itself to incorporating members from various economic backgrounds. The CSA describes its now five years of work as not only growing local food, but "community building" (Middleton and Marie, 2012). The CSA provides a sliding price scale to make farm shares available to more income levels, splitting members into 'high,' 'middle,' and 'low' income CSA share groups. The shares range from 250 to 500 dollars for an entire season of shares, and, for each income bracket, members can opt for a five-part payment plan, instead of paying the full amount at once, which can prove difficult for many members. Boot Strap strives to locate itself in areas that can be accessible to all city-dwellers, no matter their transportation means. Finally, the urban farm donates much of its produce to a local food bank to "take an active role in creating food justice" (Middleton and Marie, 2012). Bootstrap moves beyond donations to find creative methods of inclusion within its operations.

Moving Beyond Food Banks:

As aforementioned, out of the numerous CSA's in the Twin Cities, the vast majority do not focus on greater accessibility, focused instead on simply competing with our industrialized, large-scale farming system. Common Harvest's efforts center mostly on educating college-level students and farmers to strive for a more sustainable food system from academic conversations, visiting classrooms here at Macalester and hosting seminars at their farm (Personal interaction with Dan Guenthner, 2016). Out of the CSA's that do focus on accessibility and food justice, accessibility and community support stems from donations to local food shelves. Whereas the highest demand at food shelves is for fresh produce (Middleton and Marie, 2012), the structural issues that lead to inaccessibility within the CSA movement can be more fully addressed when integrating donations within a greater scope of community engagement.

In their article, "Beyond the Food Bank," Ahmadi and Ahn explain why donations to food banks are not enough in addressing the underlying issues of food insecurity. They explain that, "a more robust and more equitable food system is needed to expland alternatives to food give-away programs: wholesale or subsidized food outlets, community gardens and kitchens, and alternative buying clubs" (Ahmadi and Ahn, 2004). This listing of alternative solutions all seem well within the scope of possibility for CSA's. The article explains that whereas food banks are growing in number, so too is hunger, as the banks are meant to be an emergency source of food, "not to supplement one's income month after month" (Ahmadi and Ahn, 2004). The article expresses that integrated approaches, like education and community involvement, are what is needed to

end the cycle of dependency on emergency food supplies and allow for vulnerable populations to have more sovereignty over their access to healthy food.

In Tucson, Arizona, donations to the Food Bank of Southern Arizona can be made in ways that add the element of dignity to supporting vulnerable populations that can sometimes be absent with typical CSA efforts. The Arizonan food bank works to tackle the underlying causes of food insecurity, linking communities with the land in urban gardens while supplementing these efforts with education and donations. Working with the food bank is Las Milpitas Urban Farm, where migrant organizations, food bank participants, and high schools located in lower-income areas all participate on the farm to learn about growing healthy food. Individuals can also use the farm as a space to grow their own food (Lowen, 2015).

Las Milpitas operates on a limited acreage, in the middle of the desert, yet it has been able to support numerous groups within the Tucsonan community. It then does not seem too outlandish that CSA's in (much more fertile) Minnesota could offer a small tract of their land to serve the surrounding community, or to work with local food banks to not only donate, but provide a more dignified path for communities to engage with and access healthier foods. Common Harvest farm is a highly "intellectual" farm, guest lecturing at Macalester and providing internships primarily for university students who understand the complex workings and failings of our global and local food systems. Perhaps this community-oriented strategy used by Las Milpitas would not seem appealing to somewhere like Dan and Margaret's farm, but there is little reason it would not function in an urban CSA like Stone's Throw or Boot Strap Urban Farm.

Linking Integrated Accessibility to Common Harvest Farm:

There are certain limitations of providing accessibility within the context of Common Harvest. One limitation to providing accessibility is the income needs of CSA farmers themselves. Dan and Margaret of Common Harvest are full-time farmers, and need to support themselves, so they have clear limitations in finances and time for how they can support accessibility in the Twin Cities. Most of the farms that best support accessibility are either non-profits or run by farmers who rely on off-farm incomes (Stone's Throw Urban Farm, n.d). The CSA movement can only support accessibility in ways that allow for the livelihood of farmers. As full-time farmers, Dan and Margaret can only give so much time, resources and effort towards supporting accessibility. Furthermore, located in a rural setting provides transportation limitations to Common Harvest, unlike the other case studies examined earlier. Finally, unlike the public secondary school focus of Las Milpitas, Common Harvest's prioritizes its efforts and limited off-farm time to educate university-level students in order to make changes to the food system after graduation. Thus, with such limited time, it could be seen as a trade-off between maintaining such a highly academic focus and working to educate different communities for greater accessibility.

Conclusion:

In the push for accessibility, price and location seem to be the standards used by CSA's in the Twin Cities, including Margaret and Dan's Common Harvest Farm.

Furthermore, food justice is supported mostly through donations to local food shelves. These CSA efforts are impressive, and they do a great deal in promoting accessibility for CSA members. However, I hope that farms like Common Harvest will follow in line with farms like Stone's Throw and Boot Strap and push for more creative ways of making CSA's accessible for vulnerable populations. The labor-trading programs are a good example of ways of how some local CSA's support creative accessibility. Commitment to accessibility can serve to educate and link communities, creating changes that can directly confront issues of food insecurity. Las Milpitas is a good example of how CSA's could engage with food shelves and community centers in a more holistic way. Ultimately, accessibility is multi-faceted, and meaningful change would mean a great deal of work on the part of CSA farmers. However, a focus on accessibility would have incredible impacts on our localized food system, allowing CSAs to truly serve their local communities.

For Common Harvest Farm, working towards integrated accessibility does not necessarily have to be a trade-off with the farm's academic goals within university-level students and fellow farmers. Common Harvest has an impressive network of devoted members, along with connections with young university-level students passionate about making a difference within our food system. These members and students can support Common Harvest in expanding its approach to accessibility. Students and members could provide the personnel needed to connect with cultural-specific or migrant organizations within the Twin Cities, establish more accessible drop-off sites, provide transportation, or create education programs for schools within lower-income communities. With the

support of Dan and Margaret's ever-growing social network, Common Harvest can persist as an *intellectual* farm while amplifying its accessibility.

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Multicultural Approaches to Empowerment and Community

Abby Cox

2016

While CSAs do provide incredible benefits of educational-awareness of wider political and environmental issues, they only reach a population that is largely white, upper class, and already environmentally-aware and health conscious. Furthermore, existing CSA members and farmers should ask how they can expand their access to minoritized racial and lower-income groups. The expansion of CSAs to cater to minoritized groups is important because of the fact that if CSAs are going to be a viable alternative against existing food systems, then CSAs must be accessible to all intersectional groups of class, race, and gender.

People, Agriculture, and the Environment
William Moseley
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Introduction

As the moment of crisis for modern cybernetic capitalism and its global system edges closes, alternatives to existing paradigms must emerge and develop. According to Cox and Holloway, alternative food networks (AFN) link producers and consumers in comparison to "conventional food supply systems" (204). CSAs as an alternative for communities have many benefits including: capacity-building, ecological sustainability, community empowerment, as well as an implicit "localness" against existing transnational food systems. While CSAs are perceived as a viable alternative, only select groups within society have true, uninhabited access to CSAs considering issues of transportation, affordability, and education.

While CSAs do provide incredible benefits of educational-awareness of wider political and environmental issues, they only reach a population that is largely white, upper class, and already environmentally-aware and health conscious. Furthermore, existing CSA members and farmers should ask how they can expand their access to minoritized racial and lower-income groups. The expansion of CSAs to cater to minoritized groups is important because of the fact that if CSAs are going to be a viable alternative against existing food systems, then CSAs must be accessible to all intersectional groups of class, race, and gender.

Roadmap

In order to examine how CSAs can better cater to minoritized groups, I will answer the sub-research question of how conventional CSAs view various forms of education and multi-culturalism through a review of scholarly literature. Education represents how CSAs market themselves to possible new members as well as inform existing members and non-members on sustainable agriculture and broader environmental issues. Considering knowledge is a means to

elevate a groups' social capital, education is influential in how CSAs and minority groups interact in information-sharing. The second sub-research question is how existing CSAs and food organizations are using concepts and various forms of education in order to accommodate and encourage multiple cultural identities within the alternative food movement (206). In the following paper, I argue that existing, scholarly views of education in CSAs ignore and limit education, especially in terms of the multicultural approach and catering to minoritized groups. Instead CSAs can utilize three lessons from other food and cultural organizations: physical, community spaces, empowerment through education, and community collaborations and partnerships.

Methods

By answering the two sub-research questions about cultural education and CSAs, I first conducted a literary analysis, examining conventional articles regarding how CSAs view and utilize education towards members and non-members. Secondly, I compared literature that promotes a multicultural approach to education in the food movement. My last method of research was an analysis of case studies of existing food and community organizations in the Twin Cities and how they utilize multicultural approaches to aid lower-income groups and communities of color.

Literature Review of Education within CSAs

A majority of the existing literature claims that an educational relationship between the "producer and consumer" stimulates positive broader action and raises overall awareness of these communities. However, a large majority of the literature lacks the appropriate scholarship on exactly how existing CSAs expand their consumer base to various cultural and ethnic groups and how the cater to those differentiations

In “Common Ground? Motivations for participation in a community-supported agriculture” Rosie Cox argues that members of the CSA understand, engage, and participate in wider political positions due to the knowledge-sharing as a source of information about food and awareness of environmental, ethical issues. Through a series of interviews, Cox and Holloway discovered that the motivations for consumers to join CSAs evolved to gain more “food knowledge” through various scales. One interviewee demonstrations motivations as “knowing where [food] comes from definitely, the reduction of food miles…There are a lot of people not aware of the externalities…how you then combat the supermarket is another issue” (212). In terms of education, Cox and Holloway describe the CSA as a site of exchange of information dually between producer and consumer, yet purely for the benefit of the consumers. While Cox and Holloway describe knowledge-sharing in CSAs as a process of broader social change, their perspective is limited for what education means in the directional flow of information, meaning education can only benefit the consumers. Lastly, through their discussion, it is evident that there is a lack of discourse of education in terms of culture; the authors restrict their rhetoric strictly in terms of “producer/consumer” and “farmer/member,” lacking any resource for certain cultural and ethnic groups to enter the conversation.

Continuing this trend, in “Community resilience and contemporary agri-ecological systems” Christine A. King attempts to negotiate this dual flow of information by reflecting on how farmers and CSA management should reflect the culture of the community (2). While King briefly emphasizes the importance of the farmers to adjust and learn from the community it surrounds, she still favors the learning relationship to increase the “consumer’s awareness” about food choices and production. While the development of these AFNs do connect people across cultural lines, both articles have failed how to address and recognize these cultural differences

and how CSAs cannot just accommodate, but also promote and celebrate these communities through the use of these food systems.

Similarly Timothy Donahue in his article "Community-supported agriculture opportunities for environmental education" highlights that CSAs are a means for the highest of quality of food to reach certain populations, while creating a new culture based on "healthy earth, social, and economic relations" (25). Reflecting similar rhetoric of partnerships and interactions between producers and consumers, Donahue reveals the importance of the transcendence of intersectionality of race and ethnicity for a new "foodie" culture. In the Community Farm information flyer, a CSA is described as the "mutual cooperation" between farmers and consumers through increased awareness of environmental issues, availability of educational workshops, nature and science studies, and participation for policy changes (8).

I will use the following framework by Rachel Slocum to shift the focus and introduce the idea that farmers and CSA's must introduce a dual flow of exchange of information in order to change not only the behavior of consumers, but farmers' production of culturally appropriate informational material as well as crop resources in order to increase food security and access to CSAs to various cultural groups through educational empowerment.

Through the alternative framework of Rachel Slocum in "Anti-Racist practice and the Work of Community Food Organizations,' claims that the progress and change of alternative food systems are undermined due to a systematic failure to confront practices of *white privilege* (327). Through an analysis of a local food organization, Slocum asserts that there is a "loss of food knowledge" within the alternative food movement. A member of a food organization claims "the biggest problem is some ethnic groups don't have any 'culturally appropriate' foods that are healthy" (341). In response, Slocum highlights an email from another member, which claims:

"first colonialism introduced these communities to unhealthy food, while indigenous farming was eliminated by imperialism." Secondly Slocum highlights the incredible injustices due to neoliberal economics in minoritized communities:

> how violently changing a culture from a land-based self-sustainable model to corporate dependency through force and economics is an undertone that is conveniently omitted, yet iit is encouraged that African-American and Latino communities embrace a land-based self-sustainable model as if it were never a pre-existing reality…Missionary Complex is unfolding-the ideal that there is not innate Wisdom within the culture, that is must all come from outside-THROUGH EDUCATION no less.

Essentially, Slocum's argument reveals the emphasis of ways in "which people sidestep engagement with their own privilege and organizations to fail to confront their role in institutionalized racism (335). In order to change this systematic limitation even within alternative food movements, according to Slocum, anti-racist practices begin with establishing relationships with communities, reflecting those needs with food organizations and CSAs, and responding to community interests within that communal organization.

Case Studies: ***How are pre-existing culture-specific groups, food organizations, CSAs accommodating minoritized groups through education?***

While it is important to recognize that minoritized groups such as Native Americans, Hmong, Latino, African-American, and African communities cannot be reduced to essentialism in regards to their needs in terms of food security, the following case study analysis aims to reexamine the social relationships and hierarchical approach to education to a multicultural approach. Through the following case studies, I aim to highlight patterns of multicultural approaches to education in the CSA and food movements. The second question that I looked at culture-specific groups and other food organizations already using education in different ways to cater to minority groups? I did this by analyzing their rhetoric towards education and culture and

the programs they've promoted: Stone's Throw Farm, Hmong American Farmers Association, Women's Environmental Institute, Gardening Matters, the Ron Finely Project**.**

Lessons

Many community-supported agricultural farms such as Stone's Throw Urban Farm as well as the Amador Hill at the Women's Environmental institute describe their CSA farm as a psychical space in which community gathering and building occur. By describing their CSA as a farm for "ecological sustainability, community empowerment, and financial viability" and an "educational center," these organizations' philosophies promote these physical spaces as a tangible space to envision diverse and sustainable food systems. In comparison to the traditional farm model of the CSA which produces food, organizations such as Gardening Matters represent community members as not only "shareholders" but empower communities to grow their own food. Groups such as Hmong farmers at HAFA, address challenges of access to affordable areas, equipment, and capacity training through "communitarian values" manifested within CSAs and community spaces. By shifting the CSA into an actual community hub where people learn about nutrition and cultures, plant, and work together, education becomes a more dual-flow interactions and the CSA begins to reflect the community around it.

Once these physical spaces are established as communal, education must be achieved through "empowerment" versus "awareness." Awareness is the ability of the CSA to market itself to other possible members and the knowledge about wider environmental issues; in comparison, empowerment is the ability for CSA and members to educate and practice sustainable agriculture to tangibly shift community growing. Many organizations approach knowledge-sharing through various methods in order to cater to various groups in different ways.

For example, the Women's Environmental Institute has educational programs such as Growing Power ROTC, Down to Earth, Folk Art School, Organic Farm School, Folk Art School. These educational programs aim to educate members and farmers on issues such as composing, aquaponics, winter climate culture, as well as management, business plans, and land access. In addition, education is multi-lingual, online, in workshops, start-up material and through cultural means such as storytelling and writing in the WEI's Folk Art School. Educating members to grow sustainable food themselves seems contradictory to CSAs, but many organizations such as the WEI, Hmong American Farmers Association claim that members are motived to maintain relationships because of the feeling of community and access to education; in other words, the CSAs are not just selling fresh produce, but a providing an educational service for the community.

The final lesson is that community partnerships must reflect the needs of the community, and secondly increase the resources shared between partners. CSA farms in the Twin Cities such as Stone's Throw farm describe their CSA as a larger part of a food network. One of the main components of Gardening Matters as a community development organization is Food Hubs, which are "networks [which] provide home and community gardeners the support to grow…their own produce by offering supplies, educational opportunities, and community connections." Through collaboration, social capital is built for these communities, redefining their access to resources and food. Cultural organizations such as the Hmong American Farmers Association have partnerships with other community organizations such as the Waite House and Latino Economic Development Center in the Twin Cities to truly produce an alternative network. These networks and collaborations ensure the CSA reflects the needs of the community, allows

traditionally marginalized groups to gain more resources and information, and lastly ensures that there is a dual-way flow of information between CSAs, community organizations, and members.

Conclusion

Community-supported agriculture is championed as a viable alternative to what Michael Pollan claims is the "Industrial Organic" as well as conventional "Supermarket Pastoral" systems. Although CSAs promote an image of healthy and environmentally-friendly, there are some systematic barriers to certain groups for access to CSA farms. One of those challenges is the ontological singularity of education and culture even within a seemingly open, alternative system. Through a literary analysis, both the utilization of education and view of culture is either highly restricted or non-existent. Many scholars view information exchange and knowledge-sharing strictly as one-directional and singular from the "farmer" to the "consumer." Through Rachel Slocum's argument, it is evident that there are other forms of racism within the alternative food movement that needs to be addressed.

In examining various cultural and food organizations through the Twin Cities area, there are three lessons for future CSAs: establish CSAs as physical, community gathering hub and space for communal use, empowerment through direct education in various forms, and lastly, community partnerships with other cultural organizations to reflect the needs of the community in the CSA. With these lessons to keep in mind, CSAs can be more inclusive in their applications and use of education and multicultural approaches.

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Prof. Moseley – People, Agriculture, and Environment

Community Supported Agriculture and Social Inequity: Examining the Role of Constraints in Dictating Access

Introduction:

The counter-cuisine that once defied industrial processes by calling for equality and access to fresh and local food is now fulfilling a particular niche within the contemporary market. This niche is home to alternative and healthy food, that has been branded as such at a much higher cost, in order to attract a base of health conscious consumers with affluence aplenty. Community supported agriculture (referred to as CSA's) is a testament to the counter-cuisine of old, growing local produce organically with reverence to the local ecology. And because this is accomplished largely on the unconsolidated countryside, prices are kept competitively low. This wholesome approach to circumventing the industrial food paradigm is grounded in community; members are required to sign a contract stipulating that the farm may be subject to low yields or lost crops, and that payment is merely an investment in the farm with reciprocal interest in providing the most plentiful harvest it can.

CSA's are dedicated to re-engaging urban communities with the pastoral ideal. In doing so, these farms are transcending tenets of passivity and convenience to provide consumers a fresh, local, and fully transparent product. And although the CSA model goes beyond the industrial food mold, it manages to keep produce cheap and available to those within its constituency.

Yet, the traditional CSA constituency is not representative of the greater urban community lacking access to fresh and local produce. Typical members of CSA farms include wealthy suburban elite, educated and/or gentrifying youth, and relocated farmers. Low income populations and minority groups are left out, forced to find nutritional alternatives that are sourced from all over the world, highly processed, and/or expensive. Obesity and healthcare rates rank highest among this population, and mainly because of this dietary intake (StateofObesity.org). So are these communities fundamentally less interested in access to the CSA model, or is this representative of a greater social inequity that undermines low-income and minority communities? In this paper, I will examine how the CSA model provides local and fresh produce to a budding constituency, but one devoid of low-income and minority populations. In doing so, I will delve into how this consumptive inequity is related to problems concerning accessibility, through the proliferation of institutional constraints that plague the CSA marketplace. I will be using the Farm Bill to elaborate on these constraints, using it as a proxy for a government–favored industrial food system. Specifically, I will be looking at the access to CSA food through drop-off sites and transportation, variability of payment plans, and distribution of government policy that undermines CSA infrastructure.

Methods:

In addressing this discrepancy between low income and minority populations versus an urban elite, impacted by a myriad of institutional constraints, I utilized several research methods to illuminate information surrounding drop-off sites, payment plans, and government policy. By looking at accessibility within the CSA movement, I determined it paramount to obtain a wide variety of information from several CSA farms, including Stone's Throw Urban Farm, Driftless Organics, Buttermilk Farms, Avodah Farm, and Common Harvest Farm to determine the

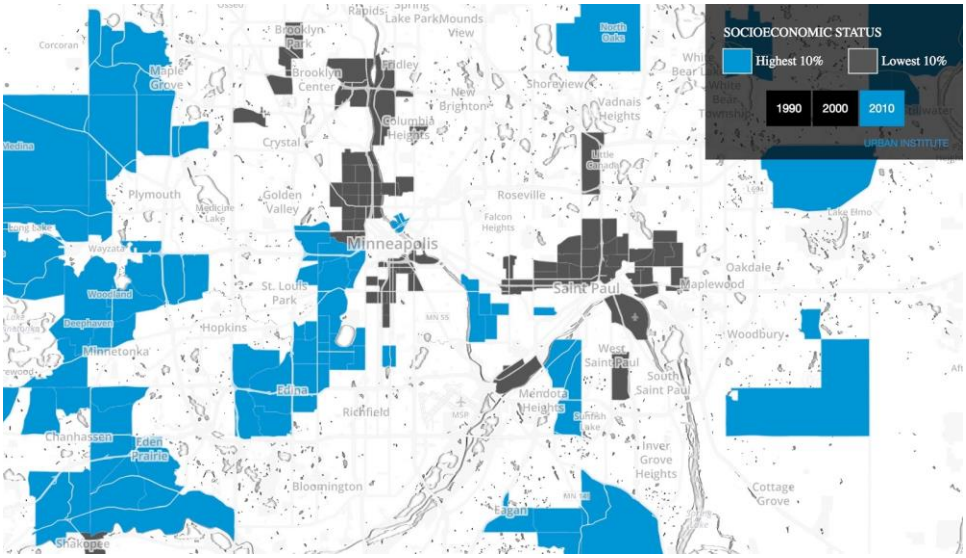
"regular" organization of CSA infrastructure. In addition, I visited Common Harvest Farm and met with owners Dan and Margaret Guenthner to explore the finer details of operating a small-scale CSA farm. I perused academic literature related to the Farm Bill and government policy concerning small and large scale farming operations. Lastly, I pull from my experience of subscribing to Drifltess Organics in the previous season and Common Harvest Farm for the upcoming season, which will impact my analysis pertaining to CSA organization and community.

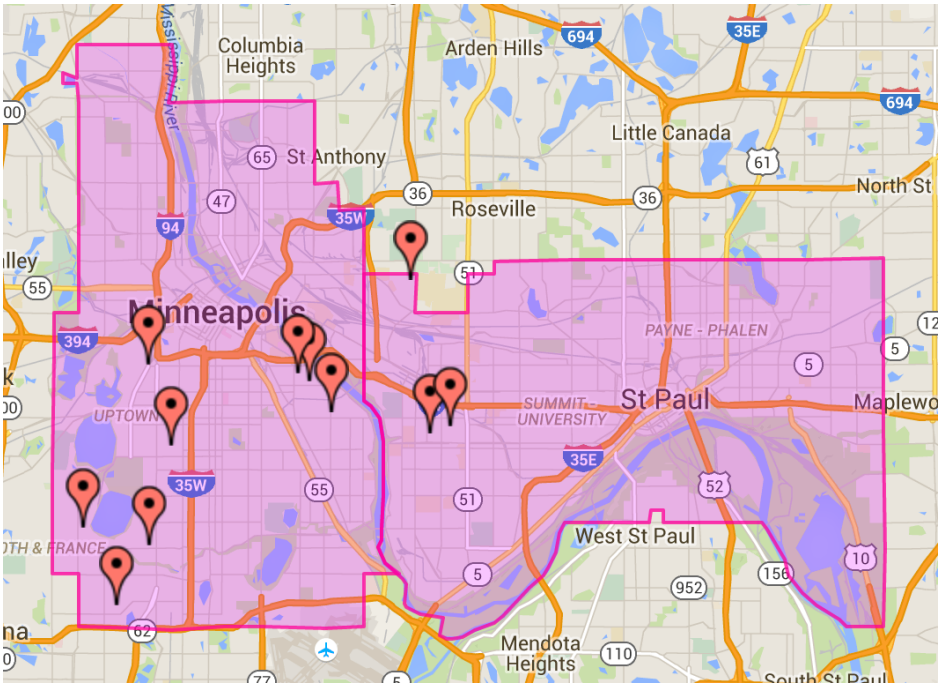
Institutional Constraints:

When looking at Community Supported Agriculture, it quickly becomes clear that there are several key infrastructural problems in providing equitable access to under-represented demographic groups. When looking at the industrial food system and the proliferation of highly processed foods, tenets like cheapness and convenience supersede nutritional qualms. This type of food is accessible by all, although particular groups may decide not to engage based on the environmental, social, and health implications associated with production. Food grown by the CSA model is highly nutritious, socially and environmentally conscious, and links consumers with the process of production, culminating in a more holistic interpretation of "health". Yet because of this wholesale rejection of "unhealthfulness" tied to the industrial food paradigm, it fundamentally isolates those that engage with it.

Drop-off sites are the locations where CSA "boxes" are delivered, linking the farm to a particular community. I think of drop-off sites much like a reverse supermarket: instead of hundreds of food producers coming together in a single space, a single farm is tasked with delivering a box of vegetables to many different locations. Herein lies a critical distinction, that individual farms incur the burden of transporting produce to a local but variable community network. Instead of engaging in complex systems of commodity chains where food passes

through many hands and forms, CSA farms must provide to more simplistic and localized communities, rooted in the cost of transportation and known demand. In the case of Common harvest, there are two Mac-Groveland drop-off sites located one mile from each other, and five South Minneapolis locations situated merely seven miles from one another (Common Harvest Farm). There are several other "zones" located around the city and in particular suburbs, but each reflect this pattern of localization and homogeneity in some propensity. I cross-referenced the drop-off sites with the highest and lowest socio-economic zones in the Twin Cities, shedding light on what type of consumer subscribes to the CSA model. Interestingly, most of the drop sites fell within the top 10 percent socioeconomic strata, including the two in West Saint Paul and the five in South Minneapolis (Urban Institute, Common Harvest Farm).





I also referenced the drop-off sites of Stone's Throw, Driftless Organics, Buttermilk, and Avodah, confirming that all operate within a similar framework that favors distinct communities over others. Similar to the food crisis of 2008, it seems that fuel costs and transportation impacts the availability of food more than the actual production cost of the food itself (Moseley). And, because the unconsolidated market for CSA shares dictates the price of membership, farms are forced to adhere to a somewhat arbitrary price constraint of around 600 dollars (Avodah, Buttermilk Farms, Driftless Organics, Stone's Throw). Common Harvest prices their product right on the money, leaving them precious little room to stray beyond the localized communities that have "supported [Common Harvest] since the beginning, for nearly 25 years" (Margaret Guenthner).

If healthy food quickly became available to those beyond the homogenous and localized communities enumerated above, how might low income and minority populations address the problem of price? Clearly, less nutritious and processed foods are cheap and convenient, making

them more approachable on behalf of cost constraints. CSA produce, if marketed at the going rate of approximately 600 dollars per share, costs about 15 dollars per week if shared with another person and spread throughout the 18 – 20 week season (Common Harvest Farms, Avodah, Buttermilk Farms, Driftless Organics, Stone's Throw). As someone who eats more than their fair share of vegetables, I found my half share absolutely overwhelming; I always had more produce than I knew what to do with. Engaging with the CSA model is actually just as expensive, if not less, than going to the supermarket and shopping for industrial alternatives (Common Harvest Farm). Yet, cost constraints seem to be a major hindrance for low-income communities, especially when considering problems concerning proximity. Typically, the 600 dollars share-fee must be paid up front and in full in order to sign up for a CSA membership, unless the particular farm offers an alternative payment plan. Of the five farms I examined in detail, Common Harvest is the only one to offer such a plan: the "pay as you please" model is rooted fundamentally in trust and interaction between farmer and share-holder. It is important to note that most of Dan and Margaret's constituency is made up of long-time friends and community members; Dan acknowledged that he knows personally all but one of his share-holders (Dan Guenthner). Variable payment plans are not commonplace among the CSA infrastructure, simply because they are difficult to organize and enforce as constituencies become larger and less localized; Dan's role as farmer might be compromised if he had to play the role of debt-collector. If CSA infrastructure was to spread out to favor less homogenous groups, it might compromise the tight-knit communal identity inherent to Common Harvest that rationalizes the variable payment plan. It seems that some constraints in providing to low-income and minority demographics might be contradictory to one another, dictated largely by the capacity of the CSA farm to operate beyond its "comfort zone" fundamentally intertwined with community.

There is no question that government farm policy favors large-scale industrial agriculture, devaluing soil fertility and ecological consciousness for economic efficiency and yield. The U.S Farm Bill, which provides the framework for contemporary policies, subsidies, and market controls in the agricultural marketplace, favors monoculture cash crops inherently over others (Farm Bill 101). This collection of policy guards against swings in price, providing a "safety net" for large producers contributing to the global marketplace for commodities like corn, soybeans, and wheat (Farm Bill 101). However, it leaves small and medium sized farms "at the mercy of market fluctuations", providing them with few resources if at all to compete on the local scale (Farm Bill 101). As the dichotomy between large scale and small scale farms increases, the autonomy of small scale farms decreases on behalf of corporate consolidation: "hollow[ing] out the economies of rural communities, sucking profits out of small towns back to their corporate headquarters" (Farm Bill 101). Small and medium sized farms with annual sales of $100,000 and $250,000 accrue an average $19,724 per year, classifying them as low-income (Farm Bill 101). Clearly, the greater agricultural market system is broken, leaving low-income CSA farms with little agency to tackle the greater problem of providing for low-income and minority populations. The Farm Bill is renewed about every five years, making available the opportunity to vitalize rural and small scale farming operations in the hope of creating greater access to healthy and nutritious food for all. Giving more agency to CSA farms would allow them to expand that alternative niche, fundamentally spreading out distribution schemes and opening to door to assess greater institutional constraints.

Conclusion

There are a myriad of institutional and policy constraints that plague the alternative market for local, fresh produce. Specifically, drop-site locations are homogenous and localized,

favoring specific communities that buttress particular CSA farms. These drop-sites are largely dictated by transportation limits, which explains why they are so congruous with high-income communities that have proven demand. Beyond availability, cost constraints inhibit low-income and minority populations from engaging in the CSA model. Payment plans are rare, but display the greater communal relationships that fundamentally root a CSA to a place. Because of inadequate agricultural policy on behalf of the government, small CSA farms are forced to operate within a particular "alternative niche" with little room to stray. CSA farms are low-income, and therefore lack the agency to seriously challenge greater constraints to providing for low-income and minority populations. There has been an increased demand for local and alternative food, but a general decrease in the number of farms tasked with production. In order to make this distribution more equitable, CSA farms need to engage with under-represented communities. Contemporary agricultural policy needs to empower small and medium sized farms to contribute to local food infrastructure, starting with a refactoring of the U.S Farm Bill. However, CSA farms also need to break the mold of being "alternative", because so long as this infrastructure is contradictory to the contemporary food paradigm, the less accessible the model becomes to those constrained to operate within it.

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Implementation of CSA System in Low Income and Minority Communities
Group 5: How might CSA farms better cater to minority and low-income populations?

Introduction

The purpose of Community Supported Agriculture (CSA) is to create food systems that are local, nutritious, sustainable, accessible and affordable. CSA farms also take out the middleman (the supermarket), allowing clients to have a direct relationship with the farmers that are growing their food. Traditionally, CSAs have catered to white, educated and middle class communities. However, as environmental problems are on the rise, and as we are realizing that industrialized agriculture is unsustainable, CSAs and other sustainable or organic farmers are creating alternative agricultural systems that seek to create a better food system. While CSAs are accessible to the white middle class, they must also be accessible to people from all walks of life, including people of low income and minority groups--especially if alternative agricultural systems are the path towards a sustainable future. In this paper, I seek to explore how the existing structure of the Community Supported Agriculture system works in order for CSA farms to better cater to minority and low-income populations. I will focus on the limitations and benefits of the local agricultural movement and propose solutions that will make nutritious and sustainable food available to marginalized groups. In order to propose solutions for CSA farmers to better cater to minority and low income populations I asked the following sub questions: How can existing infrastructure be implemented in a minority or low income community? And what are the benefits and limitations of the CSA system when implemented in low income and

minority communities. In order to answer these questions, I visited Dan and Margaret Guenther's CSA farm, as well as reviewed scholarly literature and case studies.

Methods

In order to explore how the existing CSA system functions I visited Dan and Margaret Guenther's Farm, Common Harvest, in Farmington, Wisconsin on April 9th, 2016. The Guenthers provided invaluable, first hand information about the inner workings of a CSA farm, how they obtain their customer base, and how they price their shares. The Guenthers use an informal word-of-mouth system to obtain their customers, and it is not usual for their customers to be friends, family, or members of spiritual organizations they participate in. The Guenthers operate in a shareholder system for their CSA, charging an upfront cost of $500 to $600 per share, per season. Though they also offer flexible payment plans upon request.

The literature I reviewed included scholarly articles Social Justice Deficits in the Local Food Movement: Local Food and Low-Income Realities, a Canadian perspective by Ellen Smirl and *Anti-racist Practice and the Work of Community Food Organizations* by Rachel Slocum. I also reviewed the case studies by Sara Quandt et al's *Feasibility of Using a Community Supported Agriculture Program to Improve Fruit and Vegetable Inventories and Consumption in an Under Resourced Urban Community* and Thomas Macias' Working Toward a Just, Equitable, and Local Food System: The Social Impact of Community-Based Agriculture.

Discussion

Limitations of Community Food Systems

Community Supported Agriculture, as explained by Dan and Margaret Guenther is a system where community members or individuals make a pledge to a local farmer who grows food for them in return. Members of a CSA are known as shareholders and they promise to pay

the farmers up front for all of the costs associated with growing the food. Shareholders essentially are investing in the growth of their food, knowing that there is a shared risk of pests, poor weather and other factors that can result in a bad harvest. By paying in advance, shareholders are providing financial security and capital for the farmers to be able to operate at ease. Shareholders then receive shares of the food produced throughout the growing season. Typically, CSAs operate within local communities, or the food is transported within a larger radius that the farmers establish, especially if there is a market they can sell to in an urban center. However, CSA farms can be located in both rural and urban areas. The farmers and shareholders of a CSA do not just seek food, many seek to form relationships with the land and be more conscious of where their food comes from. As a result, many CSA network seek to build and reinforce community bonds.

However, within the discussion of making CSAs more accessible to minority and low-income populations, race and class dynamics need to be taken into account in a movement that is predominantly white. The inherent problem with community supported agriculture and the larger umbrella of community food organizations is that they inadvertently foster white privilege despite their goals of promoting sustainability, equity, accessibility, nutrition etc. A paper written by Rachel Slocum, argues that the failure to confront white privilege and racial dynamics within a social movement such as community food organizations undermines the movement's goals. It is a reality that minority and low income communities are often located in food deserts, face food insecurity, and are at risk for nutrition related health problems due to the inaccessibility of nutritious, affordable foods, (Slocum 2006). When thinking of food justice, members of sustainable farming organizations often think of promoting social justice and economic equity without thinking of workers rights or racism, "This view of the big picture—absent an

understanding of the intersections of race, class and gender—represents a more general limitation of the anti-corporate, environmentalist and local empowerment movements. Without attention to social relations, community food and similar movements will remain limited in scope no matter how welcoming or inclusive they aim to be," (Slocum 2006). The author suggests that anti-racism practices be employed in the nonprofit sector in order to, "...Know what issues are of concern to communities and then to evaluate whether these concerns are being addressed by their work. Organizations would then attempt through resource allocation, rhetorical practices, policy advocacy and so on to shift the balance of power toward historically oppressed groups in order to enable problem identification, leadership and solutions to develop within these communities," (Slocum 2006). It is important to note that Slocum acknowledges that it is important to not want, "...To reduce all aspects of the modern food system and states of food insecurity to white privilege because to do so would ignore the agency of diverse peoples of color as well as the role of class exploitation and gendered relations of power in the mix," (Slocum 2006). However, it is important to address that the United States as a whole is responsible for institutionalized racism, and that even left-leaning progressive white people benefit from white privilege. Despite the best intentions of the larger community food movement, not all is being done to cater to minority and low-income populations if race and white privilege are not taken into account.

Further, minority and low-income people often do not have the same accessibility to CSAs because networks between growers and buyers are established by word of mouth, or are sought out by people who are mostly middle class, white people (Guenther Field Visit 2016). If the goal of alternative agriculture is to create sustainable food systems, more people need to have equitable and just access to nutritious, local and affordable food. Studies show that "direct-market"-- or farm-to-table, local agricultural-- systems consumers are predominantly white,

affluent and educated individuals that have the means to access foods with higher nutrient quality (Smirl 2011). While it is important to acknowledge the community and relationship-building goals of small-scale CSA farmers, the informal word-of-mouth system of gaining customers may result in only members of predominantly white communities to have access to the products. The broader issue of "class based diets" therefore, emerges in the discussion of community-supported agriculture and the overall alternative agriculture movement because of issues of accessibility. One Canadian report states, "There have been efforts to increase low-income participation in community supported agriculture programs (CSAs) through financial subsidies, but in some cases this has attracted low-income educated professionals rather than working class people or the traditionally poor people towards whom such efforts were directed," (Smirl 2011). Again, in order to move towards a more sustainable agricultural system, CSAs and alternative agricultural systems must implement measures to better cater to low income and minority populations.

In addition to social inaccessibility, low income and minority communities may face geographic and financial barriers that can prevent them from accessing a CSA share. While it is laudable that alternative agricultural systems focus on shifting consumption away from industrialized agriculture to a more localized system, it has the potential to overlook social inequalities and inequities in low income and minority communities. While CSA model presented by Dan and Margaret Guenther may not exist within these communities yet, access to farmers markets and other forms of community agricultural systems have the potential to be physically inaccessible or require multiple shopping trips for household items or other culturally unique products (Smirl 2011). The cost of CSA shares may also be difficult for marginalized communities to access because of up-front costs for a share at the beginning of a season may not be feasible for people who live paycheck to paycheck, or are unwilling to share the risk taken by

the farmer if the investment is lost due to a bad harvest (Smirl 2011). Additionally, "Nutrient-dense foods associated with better overall health cost more per kilocalorie (kcal) than highly processed foods linked to diet-related illness," (Smirl 2011). Therefore, in order for alternative systems such as CSAs to thrive questions of limitations need to be addressed and resolved in order to integrate more communities into movement.

Existing Implementation of CSA and Community Food Systems

Case studies from across the country emphasize that CSAs and direct-market organic farming attract college educated and middle class people who can afford the higher costs associated with alternatively grown food. Higher costs of organic food are what generally prevent people from marginalized communities from having access to them (Macias, 2008). A solution to the problem as implemented in a town in Vermont was to target "lower-income families through the placement of the Tuesday market in a working-class neighborhood and the promotion of farmer-to-family coupons signals a number of key innovations in the protection of local food markets," (Marcias, 2008). While this case study was not a traditional CSA as modeled by Common Harvest Farm and the Guenthers, it does provide a valid alternative system that can provide nutritious food options to communities that otherwise would not have convenient access to sustainable and nutritious foods. Implementing a coupon system would require government intervention, however, and not all farmers are willing to participate in governmental programs, as they would prefer to maintain independence (Guenther 2016).

The general benefits of CSAs and other alternative agricultural systems not only support community building, sustainable practices, and local farmers, but also provide nutritious food and an increase in fresh fruits and vegetables. CSAs have the potential to increase inventories of fresh fruits and vegetables in under-resourced areas. A study conducted in 2013 found that it is

indeed feasible to introduce CSA networks to under-resourced communities. The study found that people within these communities positively responded to CSA networks, and would be willing to continue buying shares after the trial period. A goal of the study was also to evaluate whether or not CSA could improve inventories of fruits and vegetables, which are important components of living healthy lifestyles and preventing chronic diseases. Although the study was conducted on a small scale of fifty families over sixteen weeks, the results were positive and they concluded that, "CSA is a feasible approach for providing fresh fruits and vegetables to an under-resourced community. Future studies should evaluate the impact of such a program in a larger sample and should take additional steps to facilitate participation," (Quandt et al 2013). While it is impossible to reach a conclusive verdict that a CSA system can thrive in an under-resourced community based on the nature of the study, it is worth a try to implement a trial on a larger scale to see if the results are consistent. I think that if CSA were introduced to under-resourced communities by providing affordable and alternative payment plans, as well as drop off hours that are appropriate for working class people, providing culturally appropriate foods, and providing flexibility based on individual communities such a system has the potential to be successful while maintaining some of the original CSA framework.

Conclusion and Way Forward

If alternative agriculture is to create sustainable food systems, more people need to have equitable and just access to nutritious, local and affordable foods, and therefore, the needs of low income and minority populations must be taken into account as the sustainable food movement unfolds. CSAs and other community food systems may be feasible options if they are structured to meet the needs of under-resourced and minority communities. The existing structure of CSAs as presented in the case of Dan and Margaret Guenther may be inadequate in catering to minority and low-income populations due to their small scale and reach, but as more CSAs develop, they

could implement the changes necessary to be more accessible. Also, if and when the CSA and community food systems develop, issues of race, class, and gender must be addressed within organizations and communities in order to prevent the dominance of white privilege, inaccessibility and class-based diets. Moving forward, I would recommend more government involvement with certain CSAs and community food networks in order to allow under-resourced people to have access to coupons and discounts. I also recommend that more farmers markets be placed in under-resourced communities, given that they provide affordable and culturally appropriate products that have high nutritional value. Finally, for CSA farmers such as Dan and Margaret I would recommend that they continue with alternative payment plans for those that cannot provide up-front costs. However, given the small scale of their operation, their implementation of the traditional model and philosophy toward community it would be difficult to uproot and restructure their CSA structure. In order to better cater to low income and minority populations, the infrastructure of the CSA model needs to be re-evaluated and restructured to meet their needs. The CSA is feasible as we saw in the Quandt study, but measures must be taken to structure the system to be more inclusive. Sustainable agriculture, as it is based on community, should not only be accessible to white, middle class and educated populations if we are at all concerned about the future and mitigating the larger effects of industrialized agriculture, and food injustices.

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5/6/16

Why should CSAs cater to minority and low-income populations?:

An in-depth study of the benefits of diversifying CSAs

Introduction

As the controversy related to corporate farming has become a public issue, the rise in demand for alternative agriculture has increased. One response has been the development of community supported agriculture, or CSAs. Community supported agriculture is defined as an agricultural form of organization in which a farmer and a group of individuals agree in advance to share the risks and benefits of the farmer's food production through financing the farm (DeMuth, 1993). The individuals reap the benefits of the harvest, but also share in the farmer's hardships—an extremely hot year, a flood, or severe pests could cut crop production by a substantial amount (DeMuth, 1993). CSAs usually grow organic produce, are located locally, and serve a specific community (DeMuth, 1993).

CSAs not only provide fresh, non-processed, organic food, but they also help suburbanites and urbanites in developing a connection to land and building a community. However, the CSA model tends to cater towards a specific demographic of people—educated, upper-middle class, white populations who value higher quality food. Though unintentional, CSAs tend to exclude minority and low-income populations. Thus these communities are subject to further environmental injustice as they often do not have access to healthy food options.

In this paper, I ask: why should CSAs cater to minority and low-income populations? To answer this question, I investigate the national and regional demographics of CSAs, discuss the defining characteristics of those who are considered to be minority or low income, as well as the specific needs of these communities, and focus in on the demographics of the Twin Cities. I narrow in on the Twin Cities because a chief goal of this paper is to help Common Harvest CSA Farmers Dan Guenthner and Margaret Pennings accommodate low-income and minority groups. Finally, I will discuss the benefits of being a CSA member for minority and low-income groups as well as the benefits for CSAs in serving a diverse community.

Methods

In trying to better understand the characteristics of CSAs and of minority and low-income populations, I utilized two methods for research collection. First, I spoke with Farmers Dan and Margaret on the demographics of their CSA and what they believe to be the benefits of belonging to a CSA. Second, I consulted various literature on the topics of CSAs as well as minority and low-income populations nationally, regionally, and locally.

Findings, Discussion, and Analysis

This section is broken down into the discussion of current CSA demographics, the general characteristics of minority and low-income populations, the needs of these populations and how these needs can be met, and lastly the benefits to diversifying CSAs.

a. Current CSA demographics

As mentioned in the introduction, CSAs typically attract a certain type of person for membership. In general, CSA members are well-educated, female, and middle income. A study conducted by Utah State University found that over 50% of members of a Nevada CSA have a graduate degree or higher (Curtis, 2011). The same study showed that most members were fully

employed and over 80% of members were female (Curtis, 2011). In addition, CSA members tend to be upper-middle class, having an annual income of $50,000 - $100,000 (Ernst, 2013; Curtis, 2011). Commonly, members value and are interested in buying higher quality, organic, or local food (Ernst, 2013). Common Harvest co-owner Margaret described her members as not particularly wealthy, but generally middle class, educated, white, urbanites and suburbanites who are socially conscious.

CSAs across the United States tout that members gain a stronger connection to their food and the land on which the food was produced ("Kimberton CSA : What's CSA?", n.d.; “CSA Harvest Share", n.d.). In addition, in the local context, Dan and Margaret mentioned the importance of the community to both them and their CSA members. This aspect of strengthening community relationships through CSAs seems to be important for most CSA farmers and many members ("CSA Harvest Share", n.d.).

b. Defining Minority and Low-income Populations

In defining minority and low-income populations it is first important to note that these are two distinct populations who, due to racial and ethnic inequalities, often overlap. In the United States, 58% of low-income families are racial or ethnic minorities, despite only accounting for 40% of the nation’s workforce (Povich, Roberts, & Mather, 2015). In fact, families headed by racial or ethnic minorities are twice as likely (47%) to be low income as non-Hispanic whites (23%) (Povich, Roberts, & Mather, 2015).

For the purposes of this paper, a “minority population” is defined as a racial, ethnic, or social subdivision of society that is subordinate to the dominant group in political, financial, or social power ("the definition of minority", 2016). In America, minority groups collectively are

predicted to out number non-Hispanic whites by 2044 and, in Minnesota, this change in demographics is anticipated to occur even sooner (US Census Bureau, 2015; Smetanka, 2013).

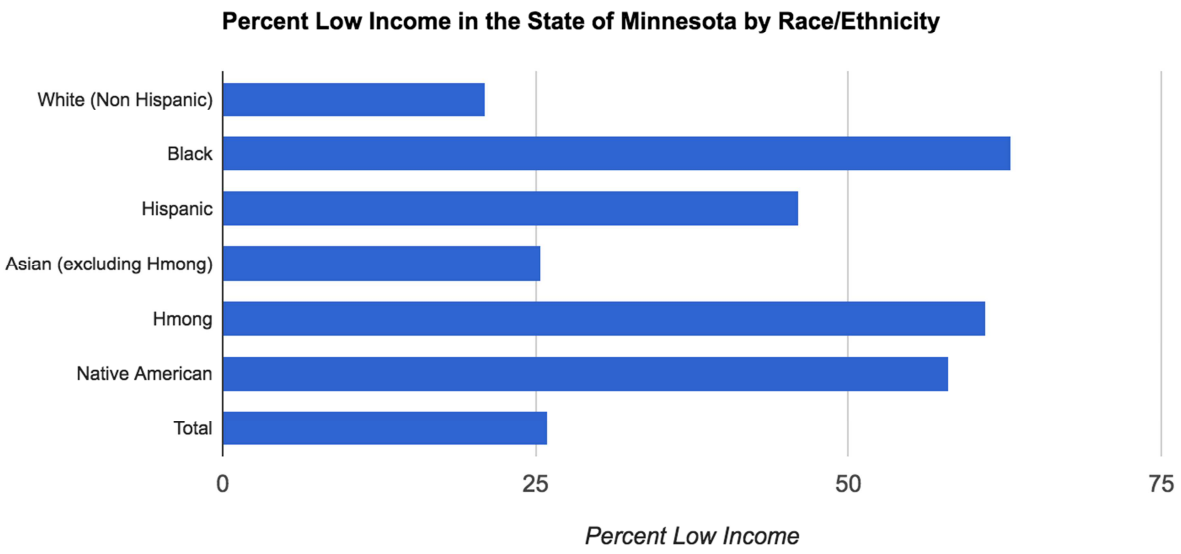
Nationally, “low income” is defined as a household that makes less than twice the federal poverty line. In 2011, the low-income threshold for a family of four was $45,622 (U.S. Census Bureau, 2011). In the same year, the percent of American families considered low-income was just over 30%. In addition, low-income families are twice as likely to experience food insecurity as middle income families (Acs & Nichols, 2006). In terms of overlap between minority and low-income people, of those considered to be low income, roughly 30% are immigrants compared with 15% from middle-income families (Acs & Nichols, 2006). It is also important to note that low-income and minority communities disproportionately live in cities, due to accessibility to public transportation as well as cost of land (Glaeser, E., Kahn, M., and Rappaport, J., 2008).

The Upper Midwest (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin), has a slightly higher number of residents who qualify as low income than most other parts of the country. 17% of the nation’s population lives in the Upper Midwest, and this region accounts for 17% of those eligible for the national Temporary Assistance for Needy Families. The Upper Midwest also accounts for 18% of the nation’s population that meets the requirements to enroll in the Food Stamps program ("Institute for Research on Poverty | Midwest Resources", 2014).

As for the Minneapolis-St. Paul metropolitan area, the most prevalent minority groups include black, Hispanic, Asian, and Native American populations (Smetanka, 2013). All of these minority groups are significantly more impoverished than their white counterparts, except for the Asian population. The Asian population of the Twin Cities follows a similar trend to the white

population, apart from the Hmong community, which follows the same trends as the black, Hispanic, and Native American populations (Minnesota State Demographic Center, 2016). Figure 1, pictured below, provides information on the break down by race and ethnicity of low-income residents in the state of Minnesota.

Figure 1



(Minnesota State Demographic Center, 2016)

In Minnesota, 13.1% of the citizens living in the Twin Cities metropolis are considered low-income (Rohrer, 2016). Blacks disproportionately qualify as low-income in the state. In fact, in the last two years, the average black Minnesotan income has dropped by $4,500—resulting in a change in the percent of low-income blacks from 33% to 38% (Reinan & Webster, 2015). It is also significant to note that more than 70% of low-income workers in Minnesota have less than a four-year college degree, suggesting that education plays a significant role in whether or not an individual is low income.

Figure 2: Percent of residents of color by neighborhood

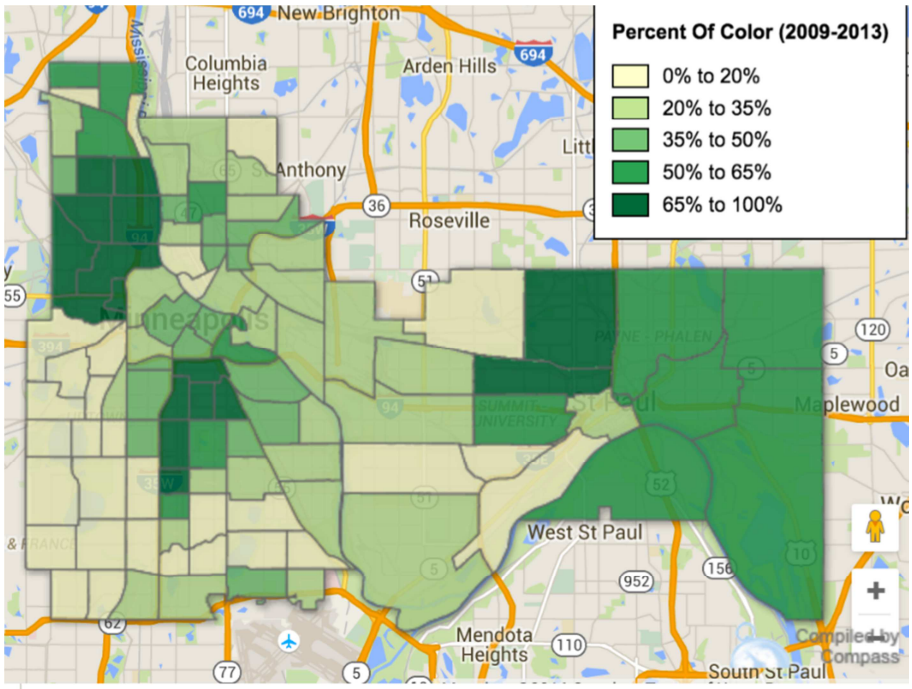


Figure 3: Median household income by neighborhood ($45,600 is the low-income threshold)

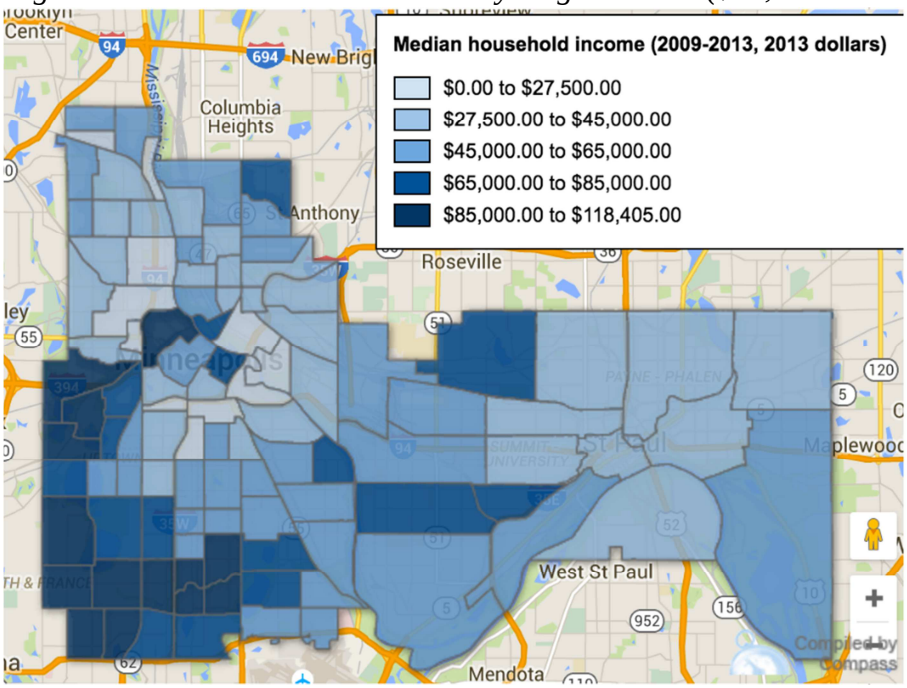
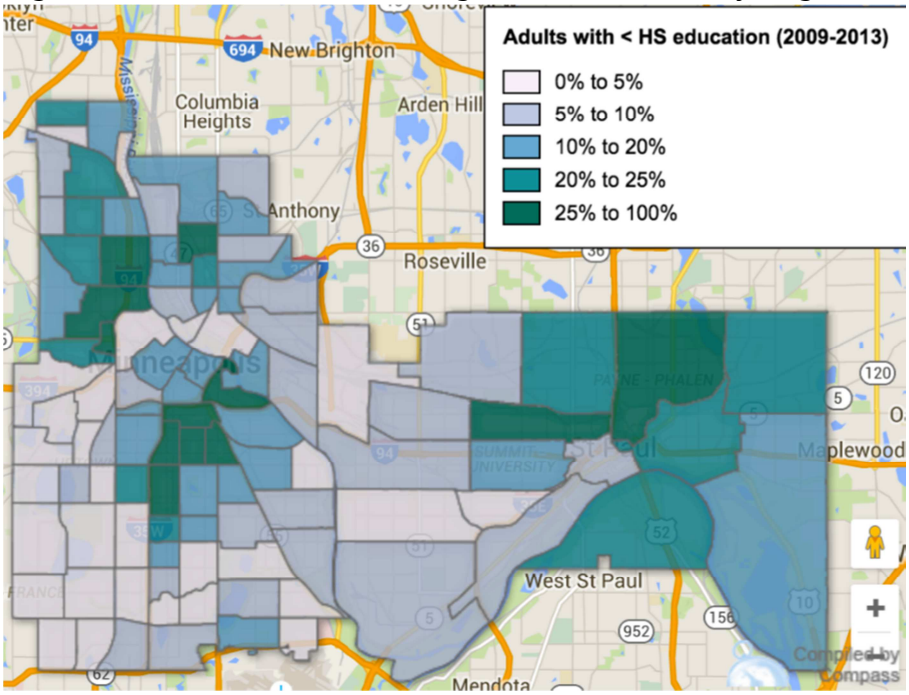


Figure 4: Adults with less than a high school education by neighborhood



Citation for all maps: ("Neighborhood data & trends for Minneapolis-Saint Paul", 2016)

Figure 2 is a map of Twin Cities' residents of color. Figure 3, which depicts median household income, and Figure 4, which depicts individuals with less than a high school degree, follow a similar trend to Figure 2: residents of color tend also live below the low-income threshold and have not received a full high school education.

c. Needs of Minority and Low-income Populations

Often minority and low-income populations live in food deserts, areas in which healthy, fresh, affordable food is not available. Thus, there are three main categories of needs for minority and low-income populations that must be met: dietary, monetary, and accessibility. The dietary needs of these communities are the same as any humans—healthy, nutritious food. This means that fresh fruits and vegetables should be a major component of a person's daily caloric intake ("How to have a balanced diet", 2016). In addition, since education seems to play such a crucial

role in determining how an individual eats, there should be more education on the benefits of eating fresh, non-processed, organic food.

This produce must also be affordable for these populations. The U.S. Department of Agriculture estimates that feeding a family of four a healthy diet costs $146 to $289 a week (Hellmich, 2013). However, to low-income families even $146 a week can be too much. Government subsidies should be allocated to CSAs that cater towards minority and low-income populations, and CSAs should try to integrate payment plans into their organizational framework. Finally, these populations need accessibility to healthy, affordable food. Accessibility is twofold—this food must be either within walking distance or accessible by public transport and it must be available at after-work or early-morning hours.

d. The benefits to diversifying CSAs

First, diversifying CSAs means that minority and low-income populations have access to fresh, non-processed, organic food as CSAs provide such produce that is affordable (although it might require a payment plan with the farmer). In addition, these predominately urban minority and low-income populations become part of a wider community and may develop a connection to their food and to the land that most urbanites do not have (Wells, Gradwell, & Yoder, 1999). By bringing these two groups into the alternative food system, more and more individuals will develop a deeper understanding of food politics and in demanding change in our current agricultural system (Hinrichs & Lyson, 2007; Wells, Gradwell, & Yoder, 1999).

Second, diversifying CSAs means creating bridges between different communities. By encouraging minority populations to join CSAs, CSAs will create a space for the participation of different backgrounds and heritages. One form of this is in the sharing of different recipes. It is

thus evident that diversifying CSAs not only benefits minority and low-income groups, but also the entire CSA.

Conclusion

CSAs play an important role in the alternative agriculture movement. However, CSAs across the U.S. and near the Twin Cities continue to cater to a certain elite demographic. The current minority and low-income populations in the U.S. reside in urban areas, tend to be less educated, and make less than $45,600 a year. The minority and low-income populations in the Twin Cities reflect these trends. These communities should be able to buy fresh, nutritious produce, but are often unable to do so due to price, timing, and transportation. Making CSAs more available to minority and low-income groups will help meet the needs of these groups as well as create a larger, more diverse community. Therefore, diversifying CSAs is important to the continuation of sustainable agriculture. In order to do so, on a local scale, CSA producers should work with consumers to build alternative payment methods as well as expand local food educational efforts. On a regional scale, policies should be passed to implement the usage of food stamps at CSAs, and on a national scale, the government should offer subsidies to CSAs that are attempting to diversify the community that they serve.

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Chapter 6: How might CSA farms better cater to minority and low income populations?

The Findings of Research Group 6 (Noah Nieting, Lucia Hunt, Temmy Soyebo, Grady Johnson & Andrea Kvietok)

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Catering the CSA Product to the Marginalized: Price, Qualities, and Branding

Academic and popular literature alike have recently pushed for changes in the ways Americans receive and perceive their food (Pollan, 2006). One promising alternative to conventional approaches of rows of monoculture on the farm and endless rows of products at the grocer is community-supported agriculture (CSA). CSA refers to a group of consumers who have pledged to support one or more local farms, with growers and consumers sharing the risks and benefits of food production. Such a system supports farmers, their incomes, and, often, environmentally friendly practices such as polycropping. Consumers generally become closer geographically and personally to the sources of their food instead of buying into global, fossil fuel-reliant, and opaque supply chains.

The successes of CSA, however, have been tempered by their positioning as an alternative food source catering to middle- and upper-class, often white consumers. This perpetuation of privilege alarms a movement so motivated by justice and an ethos for progress. As part of a series asking, How might CSA farms better cater to minority and low income populations?, this paper assesses the shortcomings and potential of the CSA product itself in catering to such demographics. In essence it asks, How do CSA products fail to cater to minority and low-income populations, and how can CSA change that? The primary components of CSA products are price, physical characteristics, and brand image, all of which formulate how CSA

enterprises fail and can improve to cater to minority and low-income populations. Much of the data come from Common Harvest Farm, a CSA enterprise south of Osceola, WI, and recommendations will be made specifically for their operations.

Methods

The findings of these papers, like the discipline of geography, are rooted in a particular space. That space is Common Harvest Farm (CHF), a CSA enterprise comprised of 40 acres south of Osceola, WI in the northwest quarter of the state. Without going into too much detail, the Guenther family runs the agricultural and managerial activities of CHF alongside a troupe of seasonal interns. Their agricultural approach centers around soil management and includes methods such as polycropping, crop rotation, and cover crops. The author took a tour of CHF from the Guenthers and later participated in a discussion with Margaret Penning, the farmer-manager more occupied with the business practices of CHF. Careful notes were taken throughout the day in an effort to consistently and accurately document the presentations and personal exchanges. Other sources from academic journals complement the primary source work from CHF. These articles come principally from geographic literature pertaining to the topic of CSA and questions of access, but also from the disciplines of economics and sociology.

Findings & Analysis: How do CSA products fail to cater to minority and low-income populations?

The main product of CHF is a box of vegetables grown on the farm (Field Visit, 2016). Each box forms a portion of a "share." One share equals one ¾ bushel box of 10-12 vegetables for each of the roughly 19 weeks between early June and late October. Each box provides

requisite vegetable servings for a family of 4-5 for the week, though Margaret believes it could service more depending upon their vegetable preferences (personal communication, April 9, 2016). CHF also provides half, fruit, and extended season shares. CHF half share members receive the same full share product every other week throughout the growing season. This paper will primarily focus on the full and half shares since the fruit share involves national supply chains and the extended share can be seen as an extension of the full and half share products.

The first of three aspects of the CHF product is price. CHF prices full shares at $600 and half shares at $325 (Field Visit, 2016). They request up-front payments of shares but also negotiate lay-away payments. CHF determines its price after budgeting for the labor of the family and interns, insurance and loan payments, organic fertilizers, and energy prices (M. Pennings, personal communication, April 9, 2016). They then divide their costs by 220, the number of shares CHF believes the soil can ecologically sustain. They also compare this number to the range of market rates among other upper-midwestern CSA producers. This scheme has been seen among many other CSA enterprises (Cooley & Lass, 1998). In this sense CHF and other CSA enterprises are not "price-takers" like those in conventional food markets. Instead, as Margaret phrased it, their pricing remains rather "arbitrary" (personal communication, April 9, 2016).

As part of their pricing scheme, CHF also deploys a few price discrimination tactics. They offer discounts up to $150 for hosting one of the drop sites in Osceola or the Twin Cities where members retrieve their boxes each week (M. Pennings, personal communication, April 9, 2016). They also barter shares and boxes to meet some of the needs of the farm and enterprise. In

the past, members have had the option of 5 and 7-year shares given lump payment. CHF used the larger sums as financial capital to invest in their greenhouse and barn.

Other comments from Margaret and the literature related to pricing touch upon competitiveness. The full share coming in at $33 per week for up to 19 weeks remains far below the $70 seen at regional co-ops, let alone comparable grocery options (personal communication, April 9, 2016). Studies on CSA shares in Massachusetts showed that even when taking into account the heterogeneity of CSA enterprises and prices, CSA prices were lower than their nearby organic and conventional competitors (Cooley & Lass, 1998; Forbes & Harmon, 2007).

On the contrary, many consumers still perceive CHF prices as too high, often relating organic[1] and alternative agriculture to expensiveness. Margaret noted this in reference to personally marketing to potential members. Similarly in the literature, surveys among disenfranchised consumers in Baltimore and New Orleans have shown that many low-income families of color find box prices too expensive (Hu et al., 2013; Kato, 2013). Focus groups of low-socioeconomic status consumers have also mentioned the perceived expensiveness of CSA shares (Markow et al., 2014). Additionally, the frequent need of full preseason payment makes the single, lump-sum purchase less attainable for low-income consumers (Macias, 2008).

The second aspect to the subject of the product is the qualities of the product itself. As mentioned at the beginning of this section, shares come in boxes of up to 12 different vegetables including but not limited to basil, beets, broccoli, onions, cabbage, carrots, cauliflower, cucumber, eggplant, kale, lettuce, parsley, peppers, potatoes, spinach, swiss chard, and tomatoes

[1] CHF products do not use synthetic fertilizers but are not certified organic.

(Field Visit, 2016). The diversity of their produce reflects not only their attempt to support diversity in consumers' diets, but also the soil management philosophy of the Guenthers.

Both CHF and wider CSA members have had issues with the size of shares. Some CHF members find they receive too much produce in a given box and report waste or sharing their boxes. Occasionally, they receive large amounts of a single product such as kale, a vegetable well-known for its chips but notorious in other ways among CHF members for its alienness (personal communication, April 9, 2016). Surveys of CSA members and disenfranchised consumers alike have shown that many think shares are too large for proper consumption (Kane & Lohr, 1997; Cooley & Lass, 1998).

Kale is not the only vegetable seen as alien; the literature also cites a mismatch between produce demanded and produce supplied. While this has not been as much the case for CHF, studies have shown it has been one way where CSA products have failed to cater to low-income and minority populations. Kato (2013) documented instances where low-income consumers mentioned the seasonality of fruit as a reason they shop infrequently or not at all at farmers' markets and among CSA enterprises. Further, low-income consumers of color looking for staples of the southeastern diet such as winter greens, peppers, and onions disavowed CSA producers when they serviced only arugula, turnips, and beets. Guthman (2008) cites an African-American mother calling CSA products "birdseed" that does not resemble food and is not enough "to feed [her] family." In these cases, CSA products no longer catered to minority and low-income diets, favoring those of affluent white populations instead.

Also on the topic of product composition, the contents of shares are restricted to what CSA farmers grow and reap at a given time. CHF tries to provide a wide variety of vegetables

not only at a given time but throughout the growing season. Nonetheless, their members may still feel a lack of choice given such constraints; consumers have already paid for the share, so they must accept the predetermined product they have received. Survey data have shown consumer discontent with such constraints, particularly among non-members (Hu et al., 2013; Kato, 2014). Often this issue primarily stems from members' lack of input on produce selection.

The final product characteristic is branding. Margaret brands their products in several ways, often catering to specific demographics (personal communication, April 9, 2016). Among Weight Watcher clubs she exclusively stresses healthy eating and how CHF membership provides nutrient-rich vegetables dieters would not otherwise purchase. At churches she emphasizes the stewardship qualities of CSA and its social and environmental responsibility. Overall, she tries to frame produce from CHF as byproducts of a relationship with the earth grounded in sustainable resource management. She tries not to associate with non-organic CSA as not to spoil the image of CHF practices as providing for healthier soils and air.

Literature on CSA branding points out that it often relates strongly to class exclusivity and whiteness. Surveys have shown that some producers knowingly cater their branding to middle- and high-class consumers (Kato, 2013). Consumers of color have noted that the language and general notions of healthy eating often relate to white diets (Guthman, 2008; Hu et al., 2013). Farmers' markets and CSA-related locations have also been found to be predominantly white spaces in both attendance as well as character (Guthman, 2008). Real or perceived price premiums, the entertainment of outdoor markets, and product choices often contribute to the whiteness of the product and its surroundings. Similarly, whiteness manifests itself in the imaginary of CSA agrarianism. Calls to re-work the land and "get your hands dirty"

evince images of slavery and land disenfranchisement for African-Americans instead of the idyllic, bucolic imagery evoked in contexts of whiteness and white privilege (Guthman, 2008).[2]

Findings & Analysis: How can CSA better cater to these populations?

CSA has several tools by which to better cater to minority and low-income populations. This section will first present tools related to price, product qualities, and branding from the literature and then apply them to the attempts of CHF to cater to these demographics.

Concerning price, half shares have been found as an effective way to provide accessible prices (Lang, 2010). Other literature points to discounts as particularly effective, though only under conditions of desirable products (Lawson, 1997; Kato, 2013). Variants of discounting include sliding scales of prices where prices reflect earnings (Forbes & Harmon, 2007). People self-select into one of three price categories, yet all members receive the same product. Variations of this scheme have offered the chance to pay for more than just the value of a share where additional donations subsidize those who pay less. Other CSA enterprises have offered free shares to those who work for a portion of the growing season (Forbes & Harmon, 2007).

Additionally within the realm of price, the literature points to payment options as ways to improve accessibility. Many CSA enterprises accept food vouchers, a key medium of exchange for low-income families (Forbes & Harmon, 2007; Jones & Bhatia, 2011; Kato, 2013). Incremental payments also provide an option that permits families with tighter budgets to forego the large lump-sum initial payment in favor of smaller, more manageable (Forbes & Harmon, 2007; Markow et al., 2014). Also, farmers often utilize grants or off-farm income to provide

[2] Guthman (2008) interestingly notes that CSA managers saw catering to minorities as racist by adding unnecessary difference to perceived universally held values, which further undermined any attempts to include people of color in CSA organizations.

early-season capital in lieu of lump-sum payments (Forbes & Harmon. 2007). In addition, electronic payment options essentially provide credit to cash-strapped families (Markow et al., 2014). Finally, some CSA farms accept bartered "Time Dollars" that equal one hour of time providing any good or service such as babysitting or carpooling.

Changing product qualities can also better cater CSA products to minority and low-income populations. An ethnographic study of low-income African-Americans in New Orleans found that price discounts and accommodating payment options were not enough for disenfranchised residents to participate more in their local CSA (Kato, 2013). Alongside concerns about the product brand (to be addressed momentarily) and transportation to and from the CSA, disenfranchised residents longed for more choice in the products included in shares. Variety within the confines of familiar cuisine provides another option for improving accessibility via product qualities (Hu et al., 2013).

Finally, re-branding provides an opportunity to better cater to these demographics. Framing CSA brands in environmental and social justice could better cater to their preferences since frameworks in agrarianism, alternativeness, and healthiness related to whiteness have not appealed to African-Americans. In fact, African-Americans have been shown to have greater concern for environmental justice than other demographics (Jones and Rainey 2006; Mohai 1990, 2003). Thus, framing CSA products as byproducts of an agriculture engrossed in environmental justice and wellbeing may better cater products to African-American consumers specifically.

CHF already permits half shares, some discounts to drop site hosts, delayed payment, and occasional bartering. Margaret noted many members appreciated the half share option since they

would not otherwise participate if they were required to purchase a full share (M. Penning, personal communication, April 9, 2016). Given its remoteness from the inner Twin Cities, labor and "Time Dollars" may not be as advisable as other options such as price scaling that permit high-income members to subsidize low-income members. Concerning product qualities, CHF surveys its members for their opinions on the products included in share boxes in order to avoid giving out what will not be eaten. It should continue to do so if not expand this endeavor to better cater to those who may feel disenfranchised by product choices. Last, CHF already characterizes its products differently among particular groups and should emphasize the environmental justice component of alternative agriculture in order to better cater to African-American consumers in particular.

Conclusion: The Way Forward

In order to seek greater social justice and equity, CHF and CSA in general must better cater to underprivileged minority and low-income populations. Failure to do so only exacerbates the marginalization of these groups. CHF in particular could expand its pricing accommodations to include price scalings that allow high-income members to subsidize low-income members. This and prolonged payment options ameliorate the perceived expensiveness of CSA products. In order to avoid disenfranchising the dietary preferences of marginalized demographics, members should continue to have a voice in the size and composition of products. Finally, African-Americans show greater proclivities to environmental justice than to American agrarianism. Emphasizing the former avoids perpetuating the whiteness of CSA products. Altering product qualities may not serve as a panacea for the need of CSA to better cater to

minority and low-income populations, but it serves as an accessible and impactful starting place for CHF and countless other organizations.

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Are there CSAs that cater to low income groups and what makes them successful

Introduction

Community Shared Agriculture systems (CSAs) have exploded in popularity since spreading from Europe in the 1980s (Cooly and Lass 1998). A CSA or Community Based Food System (CBF) is a "dynamic social contract" Kelvin 1994 quoted in Cooly and Lass 1998 that produces significant benefits to both consumers and producers. Let's take a look at how it works. Since the end of World War two agriculture has increasingly become an industrial affair. Less and less farmers are required to produce increasingly growing tons of crops. While this may seem efficient there are substantial drawbacks and subsequent backlash against practices considered to be industrial agriculture, like the organic food movement. CSAs grew out of this environment and often espouse the organic ethos that has become so popular among western consumers. CSAs take these ideas of organic and combine them with the closely linked local movement to create something similar to a farmers market but on a much smaller scale. Since their advent CSAs and their related businesses, farmers markets have exploded. There are over 60 CSAs that deliver to the Twin Cities (Landstewardshipproject).

Farmers ask for a lump sum of money at the beginning of the growing season to finance that year's harvest and in return those who paid will receive a weekly distribution of vegetables throughout the growing season. This is beneficial for the farmer as they are no longer required to expend massive amounts of capital at the

beginning of the season and the capital provided by members, those who buy a 'farm share' acts as insurance in a way since there is no guarantee of a return on the initial investment. Since nearly all of the produce is accounted for before the growing season the farmer is free to focus on the actual production and land stewardship instead of worrying about finding a market for the produce (Cooly and Lass 1998). As LocalHarvest writes, The CSA model is structured around the need for capital before the growing season begins (January 2008) because farming costs have a high initial cost including things like insurance, organic fertilizers and seeds. This translates to a high upfront cost to those who purchase farm shares. It is well documented that CSAs have trouble serving low income populations despite their success across the country. (LocalHarvest 2008, Markow et al. 2014, Project for public spaces 2003, Forbes and Harmon, 2007). Furthermore CSA members "are typically Caucasian, younger, and better educated than the general population…" (Forbes and Harmon 2007).

Keeping that in mind, and using Common harvest Farms as a case study, I will seek to investigate if there any examples of CSA farms in the country that have been successful catering to minority and low income populations and, upon discovering them seek to understand what they do and why they're successful. I'm glad you're coming on this journey with me.

Methods

I relied on a number of different tools to understand why CSAs have trouble recruiting low income families and finding where successful low income CSAs have set up shop. I relied mostly on a case-study First, visiting Common Harvest farm was instrumental not

only in giving me firsthand experience with a CSA (and a lovely day) but also in pointing me in the right direction in terms of where and how to contact other CSAs in the Twin Cities. In addition to interviews with individuals involved in managing and operating CSAs I relied on academic journal articles that have looked into this issue in particular as well as CSA websites that are seeking to lower the barriers for entry into CSAs and CSA related online Newsletters and other non-academic literature like LocalHarvest.

Findings and Discussion

While some literature suggests that social differences play a larger role than economic disparity in separating those who participate in CSAs (Forbes and Harmon 2007; Guthman 2008) in interviews with Robin (last name?) of Shared Ground Farmers' Cooperative and speaking with Dan and Margaret at Common Harvest farm it seems as though low income groups are not well represented in these CSAs either. On my time at the farm Margaret and Dan demonstrated a few of the different practices they put in place and answered all of our questions about the farm's operation. Robin was equally helpful in explaining the operations of Shared Ground Farmers Co-op.

Common Harvest farm operates in a fairly standard CSA model. The farm is fairly small roughly 40 acres not all of which is used for agriculture production. They grow a variety of crops making sure to not over fertilize and use the varying soil characteristics to their advantage. The motivation for running a project like this began with a small idea; "what if we sold food to our friends?" According to Dan, they subscribe to something that is "more than just dollars for veggies" meaning while it's true CSAs may not always be able to compete with large retailers like Walmart, something Robin also

expressed in our conversation but there is an investment and arguably positive externalities to participating in CSAs.

Common Harvest has roughly 220 shares available every growing season with full shares priced at about $600 and half shares costing $325. At Common harvest both shares receive ¾ bushel of produce, with the half shares getting the crate every other week as opposed to every week. Dan and Margaret mentioned that there are about 20 opening a season and they don't advertise relying on word of mouth to fill openings. Their pick up zones are at members' homes, members who are willing to host a pick up site receive a discount on their share. Relying on members for pick up sites has the benefit of fostering a tighter community between members who use the same pick up site and also between site coordinators and the farmers. However, relying on members limits exposure. Outside of immediate neighbors and friends or colleagues of the site organizer it is nearly impossible for anyone to know there is a pick up site nearby. Pick up sites at farmers markets provide a solution as they would grant Common Harvest the visibility to everyone shopping at the farmers market. For example, one woman who worked in Minnetonka was able to rally eight people to buy shares and created a pick up zone in Minnetonka where Common Harvest had no presence before. However, this can also be a weakness since the entire Minnetonka program relied on this woman. I originally assumed that Common Harvest's distance might be a barrier for low income persons but after speaking with Robin and looking at another urban CSA, Boot Strap farm, it doesn't appear that Common Harvest location outside of the Twin Cities is as important as pricing and visibility.

Shared Ground is set up in a different way but follows many of the same principles and practices as Common Harvest. Two thirds of the farmers in Shared

Ground are Latino farmers outside of the Twin Cities that before the founding of the co-op had trouble accessing markets in the Twin Cities. Robin and her partners were running a small urban farming operation and it just so happened that forming this co-op allowed for the farmers, urban and non-urban, to reach a larger market and provide a wide range of produce to customers in the Twin Cities. Much like Common harvest Shared Ground's members are mostly well connected community groups, neighbors, coworkers, and other close knit communities. Shared harvest relies on a number of different pick-up sites including a space at a brewery, family tree clinic and various other homes and businesses. When I asked Robin the demographics of the Shared Ground's members she mentioned that most of the members fit the typical CSA member, well educated, concerned with organics and local food movements and not low income. She went on to explain that the formation of the co-op was founded around the principles of farmer justice, farmer's rights, farmer's wages, and sustainability. Two sides of the same coin really. They charged a similar price for a farm share and half share as Common Harvest, full shares were on a sliding scale from $525-$625 and half shares cost $325-425. Most farm shares for a single growing season around the Twin Cities metropolitan area is $600 dollars for a full share. Also like Common Harvest, Shared Ground doesn't advertise, relying mostly on word of mouth for filling the 200 shares available every season. Shared Ground does make itself more available to those outside of these close knit communities by offering a more diverse selection of pick up locations, but only marginally.

In particular the number of shares, pick-up sites, payment options, advertising could all be contributing to the lack of low income members among both Common Harvest and Shared Ground Farmers Co-op.

Another issue expressed in the literature (Markow et al. 2014) and one I can relate to is the lack of choice and various quantities of produce received from a farm share. Besides price, my largest concern with opting for a CSA share is based on my experience growing up. My mother got a farm share one year and I will always remember that summer as the time when I had to eat kale every day. It seemed that the only vegetable we got from the farm share was kale. The lack of choice or say in what is grown contributes to the barrier of inconvenience. Pick-up locations that are out of way or only accessible by car coupled with the uncertainty of what produce will be received and in what quantities can make farm shares appear inconvenient. This isn't to say that CSAs only give out kale all the time but the lack of information surrounding how CSAs decide what to grow and what will be provided is another facet.

Common Harvest and Shared Ground expressed interest in increasing the number of low income and minority members that participate in their CSAs. There is a growing body of academic literature that suggests ways to increase accessibility of CSAs and some solutions are easier to implement that others. Something Dan and Margaret mentioned was including a recipe book with the farm share so people can find new foods to prepare with the produce that has been provided. Price is perhaps the largest barrier to solve as many of the proposed solutions, and the ones implemented by farms like Uprising Farm change the payment plan from a beginning of the season lump sum to a monthly or weekly payment plan by using electric food stamp benefits (EBT) (LocalHarvest 2008). While the farmers from Uprising said that getting approval from

the USDA was “easy” they also mention hang ups with getting approval and having to restructure their CSA to be a “farm stand” to fit the USDA EBT requirements (LocalHarvest 2008). That process doesn’t sound particularly easy.

Many other farms have been successful but the general model is the same. Because CSAs require upfront capital before planting the extra capital must be provided by either nonprofits, other organizations, or by members who pay premium. Otherwise federal assistance is required and the money can’t be provided before-hand according to the USDA, the provider of EBT and SNAP. Early Morning Farm is another CSA that relies on grants and member donations to subsidize farm shares.

There is another common thread among these CSAs and that is the scale. Many of the farms that support EBT or subsidize shares are much larger farms than Common Harvest or Shared Ground. Larger farms often have other sources of income besides the farms shares from the CSA and are more flexible with capital requirements.

Conclusion

There aren't necessarily perfect solutions but there are ways for CSAs to become more accessible. The upfront cost is a large part of it. This is probably the toughest issue because the need for capital means at some scale there is no getting around lump sum costs at the beginning of the season. Fundamentally government assistane requires the CSA model to change. Other examples of CSAs providing assistance to low income groups requires funding from other sources which isn’t necessarily sustainable. However, as Uprising Farm has demonstrated using EBT, SNAP or other government programs can increase participation among folks who wouldn’t otherwise be able to

afford a farm share. Awareness is another area where small improvements can create large returns in participation.

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GEOG 232

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Us vs. Them: Catering to Low Income and Minority Groups in the Absence of Visibility of CSA

I. Introduction

Community-supported agriculture (CSA) is an alternative method of agriculture and food distribution in which there is a shared risk between the farmer and the members/communities involved. CSA farms came as a result of the farm crisis of 1980s and there was the question of how to recreate relationship between the land and consumers. The farm crisis of 1980s was a result of failed policy, mountain of debt, land and commodity price booms and busts as well as two droughts that occurred in 1983 and 1988 (Iowa Public Television 2013). Farmers in the Midwest were mostly affected with many losing their land and their sense of being (Manning 2002). The distrust that resulted causes more people to seek out where and how their food is being grown and how it does reach their tables. The desire to be more sustainable and to move away from big industrial agriculture caused CSA farms to be successful early on and to still remain today.

To become a part of a CSA farm, the members have to buy a share at the beginning of the growing season which is their way of saying that they agree to eat what the farm harvest come harvest season. The payment helps the farmer buy materials (seeds, tools, etc) they need for the

growing season, allows them to focus more on the quality of the food they are growing and, build relationships with their members. Come harvest season, the members, depending on the share size they bought, receive boxes/crates of food at an agreed upon delivery site. These boxes are filled with various vegetables and whatever else the farmer harvested that season. The cost of subscriptions to CSA farms range from $400-$700 depending on size of share and members' customization. With all the good that CSA farms promise and carry out, they are plagued with an issue of lack of diversity in their membership. The members are generally white, middle-class people who are aware and either concerned about environmental issues or want to eat more locally grown food. Low income and minority groups are often left out of the equation, although it is not the intent of these farms because they want to be able to provide as much good food for everyone as their farms would allow. While the goal of CSA farms is to be more inclusive, and CSA farms have been around for a few years now, they are relatively unknown by a large amount of the population. The questions become how that minority and low income groups consider buying a share of the farm if they are not even aware of their existence. What are CSA farms doing to educate/inform the communities and possible buyers around them of their philosophies?

II. Methods

A variety of methods was used to gather information for this essay including direct contact with CSA farms through visit to farm and phone call and reading articles about other CSA farms in other parts of the country.

The class had the pleasure of hearing CSA farmer Dan Guenthner lecture about soil ecology and the importance of knowing the soil you have before beginning to farm. This lecture

was a nice preview for the class field trip to the Guenthner's own CSA farm, Common Harvest Farm, a 40 acres farm south of Osceola, WI where they are "cultivating Community through soil stewardship". Upon arrival, we were taken on a tour of the farm community and shown how different farms look and their practices either good or bad. Once at Common Harvest, we meet Margaret Pennings and she discussed the ins and outs of their farms with the class. Notes were taking during all discussions to ensure accurate portrayal of ideas and analysis were drawn from all discussions.

III. Findings, Analysis, Discussions

Early on in the development of their farm as a CSA, Dan and Margaret did a lot of public speaking to draw in interest in the CSA philosophy. They discussed the practices of the farm as well as its sustainability. Some of the practices include using organic seeds when available, avoiding the use of pesticides, using green fertilizers, and staying within the limits of the farms. They discussed with their audience the importance of building a relationship with the land and each other and that the audience should consider CSA as a partnership to the earth. Margaret described CSA as an "economic environment experience" where the buyers are investing into something whose yield help them save money in the long run and it better for the earth in comparison to conventional agriculture. There is also a sense of community that is created between members and the land by learning the land from which their food is coming from and are able to trace it back, members and members through the pickup locations where they see other members and interact with one another sometimes by exchanging recipes, and members and the farmers when the members come visit the farm and get to know Farmers Dan and Margaret (Pennings 2016).

Common Harvest Farm has since moved away from public speaking and just recently made a website with information about themselves and the farm. Margaret stated that there is no advertising done and that the farm relies mostly on word of mouth of current members who would hopefully inform those around them about Common Harvest and CSAs. She described their current target members as white, educated, middle-class people between the ages of 24 and 80 (Pennings 2016). By relying solely on word of mouth, the Guenthers are limiting their reach into minorities and low income communities. Whether intentional or not, they are participating in keeping the demographics of their members the same because if you know what your current membership looks like and you would like them to tell others about the farm, they would tell those close to them which would be other white, middle class people.

Although CSA farms have been established for some 30 years now, they are still mostly structured and situated in white, middle-class values with limited participation and support from the minority community (Kato 2013). Margaret said that their members educated and when asked to clarify what she meant by educated, she said that the members are in pursuit of social justice. This implies that you cannot be a part of a low income and minority community and undertake social justice issues. Kato (2013) proves this to be false using Milwaukee, Detroit, and New Orleans as a case study where members of the community were non-whites but still cared about the environment.

Another reason why minorities and low income groups are unaware of CSAs is because they are generally not in urban setting which is where we find these groups of people. CSAs are found in rural areas where getting to know your neighbors and forming a community is easier than for low income and minority groups who live in the inner cities where land is cheap but accessibility might be low. While it makes some sense why rural CSAs have little participation

from low income and minority groups, it is interesting to see urban farms with the same issue. In the example of Shared Ground, a CSA farm in Minneapolis, MN within a larger urban farm Stonesthrow, they find themselves in the same struggle of lack of diversity in their membership as the Common Harvest Farm in small town, WI. This shows that there is a larger problem affecting the membership of CSA farms both in rural and urban locations.

A focus group discussion done in Australia with participants who were described as having "lowing-paying, low-skilled occupation; had not completed beyond year 10 schooling; and were the primary food procurer for their household" reveals that there are confusions in the distinction between a farmer's' market and CSAs when comparing to conventional produce markets (Markow et al, 2014). The question becomes if CSAs are not visible to these groups, how might they consider it as an option? Visibility of CSAs will help low income and minority populations understand CSAs and their philosophy and have more information available to make choices on whether they would rather stick with the conventional produce markets and/or farmer's market or align and commit to CSAs.

It is also important for CSA farms to tailor their advertising to minority and low income group because at the end of the day, saving the earth and respecting her is important but if it might come at a significant impact to already low incomes, then there is less chance of them buying in. In the case of the Guenther's farm, Common Harvest, Margaret stated that while the cost of their regular share is $600 but looked at on a smaller scale, the season is about 18 weeks long which results to about $33 which is generally less than a trip to the supermarket (Cooley and Lass 1998). The regular share size at Common Harvest is enough to feed about two families of four so now the price is now halved to about $16.50/wk. Another CSA farm in Rush City, MN, Treasured Haven Farm also has extremely customizable share options where families can

get exactly what they want. Members are able to place weekly orders that can be submitted 24 hours before scheduled delivery times (Treasured Haven).

This should be the key selling point for CSA farms if they are truly interested in bringing in minority and low income groups. Once these farms have piqued the interest of these groups, then they can speak of other benefits of being a part of a CSA such as the privilege of knowing exactly where your food is coming from and the farmers growing the food. They can be assured that their food is truly fresh, and organically grown[1].

IV. Conclusion

While CSA farm moved away from this after gaining footing in current societies, it is important for them to go back to what led to their success earlier which was getting out there and telling the people about why they should buy a share in the farm and to think about all the good they are doing for the earth. The one way they can increase the minority and low income groups is to actively reach out to these communities and tell them about the CSA farm. They should first discuss the prices of the shares and the long run benefits of sharing the risk with the farmers because regardless of what happens at the farm, they are guaranteed food every week or based on the membership plan they agreed to. They should inform them about the nutritional values of having all these vegetables and fruits provided to them. Then, they can proceed to educating about the importance of caring for the earth and being sustainable and what it means when they have their food delivered to them locally versus the distance it takes for it to reach the nearest supermarket to them. There should be accessible information about more urban CSAs that are ran by other minorities that way these potential buyers feel more comfortable expressing their

[1] Although one of the premises CSA farms were founded on was growing food organically, there are some CSA farms that choose to use chemical based fertilizers and other practices associated with conventional agriculture.

thoughts and ideas regarding the program and they also learn that there are people like them. Once steps to educate and inform minority and low income groups is completed, CSA farms might be surprised by the response and change they see in their membership demographics.

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CSA and Government Cooperation:

The Role of Federal Funding in Promoting Access of CSA Produce

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Introduction:

With large industrial agriculture dominating our food systems today, there have been increasing alternative forms of agriculture that circumvent the domination of the monocrop industry. One of these alternatives are Community Supported Agriculture (CSA) farms which aim to bring fresh produce to a community of people who all hold a stake in the farm through buying shares at the beginning of the harvest (Field Visit, 2016). With these shares, the farm has the upfront money to run the farm, and then throughout the harvest delivers food installments to each of the members (Field Visit, 2016). While this is a promising option for how community members can feel more connected to where their food is coming from, and avoid the unsustainable industry of commercialized agriculture, unfortunately low income and minority populations have little to no participation in most CSAs. Thus, this system, which is growing in popularity, has not yet become a solution to solving food desert issues because it is primarily catering toward wealthier, white, educated members.

I aim to address the larger question of how CSA farms could better cater to low income and minority populations. There are many facets of racial and income disparities of food access, and for this paper, I have chosen to hone in on the role that the government plays in this relationship. Thus, my guiding question for this research is: What role does the government play in helping or hurting the goal of providing low income and minority populations access to CSA produce? Through this essay I will discuss my methods for researching this question, explain the findings and analysis of government funding and programs, and conclude with recommendations on the ways in which the government can better help this issue of food insecurity.

Methods:

The methods for this project stemmed primarily from exposure to the CSA farm of Common Harvest in WI. Common Harvest is a CSA farm run by Dan Guenther and Margaret

Pennings. While at the farm, I was able to gain valuable insight from Dan and Margaret about how the CSA works, and ask specific questions about this topic of low-income minority populations and CSA membership. In addition to questions on the farm, I followed up by email with Dan and Margaret with lingering questions. I also researched online in order to find more information regarding federal policies and their involvement or noninvolvement with CSAs. I gained a significant amount of information from the USDA government pages, which highlighted various federal programs. I also contacted a member of the Food Group and a member of the Oregon CSA SNAP association for more details on their programs. Both were able to direct me to online sites that provided more information regarding my questions.

Analysis & Findings:

The government has a massive stake in agriculture with the millions of dollars spent in farmer subsidies each year. However, this money is not going toward small-scale farmers like Margaret and Dan. Government subsidies are shelled out to monocrop farmers who fuel the industry of commercial agriculture, while small farmers get nothing through this farm bill (Pollan, 2007). These subsidies exist to keep the commodity prices cheap on the market, and still support the farmers enough so they continue to fuel the industry. This means that in the supermarket, processed foods made from these commodities of corn, wheat and soy are usually much cheaper than fresh produce from local farms (Pollan, 2007). As a result of this, low-income consumers generally choose these processed products because they can not afford the local, organic produce.

Food journalist Michael Pollan (2007) explains that the farm bill allows for the unsustainable low prices of these unhealthy products. Fast food restaurants also sell very cheap products that are the manifestation of this farm bill, which attract low-income populations because of the accessibility of inexpensive calories (Pollan, 2007). Due to the government's

influence in creating these inexpensive, but unhealthy and thoroughly processed foods, low-income consumers are driven to chose these products to feed their families rather than spending more money buying fresh, local, organic foods. Dan explained how through the farm bill, conventional farmers have income guarantees where the federal government pays 60% of the premium, and the farm is also guaranteed 90% of their average yearly income (Farm Visit, 2016). In comparison to this reliance, Dan explains that their farm is completely independent from federal help.

On one hand, Common Harvest's independence from the government is due to exclusion of small farmers with diversified crops on the farm bill, however Dan also claims that even if Common Harvest Farm was eligible for subsidies, he's not sure if they would want to participate (Farm Visit, 2016). Margaret also spoke on this notion of independence as well, claiming that staying independent from the government allows them to be more connected to their members and able to make decisions that work best for their farm (Farm Visit, 2016). She explained that if they had to be regulated through the government, then they would be much more limited, and they wouldn't be able to create as much of a community with their members because they would be relying on the additional funds from the government paychecks. Partially due to the lack of federal money offered toward CSA farms, prices of CSA shares are out of reach for low-income populations.

Federal programs:

While critics like Pollan are quick to villainize the farm bill, the most recent 2014 farm bill projected 79% of its budget toward "nutrition," which encompasses many federal food assistance programs (USDA, 2015). I researched into this nutrition sector of the farm bill to see what kinds of government programs focused on increasing access to local produce, and which were adaptable to work with CSA farms. First, I'll discuss the federal grant programs that aim to

increase production of and access to local produce. Then, I'll explain three food voucher programs that could be used at CSAs and farmers' markets: the Senior Farmers Market Nutrition Program (SFMNP), the WIC Farmers Market Nutrition Program (WIC FMNP), and the Supplemental Nutrition Assistance Program (SNAP) (USDA, 2015).

Both the Farmers Market Promotion Program (FMPP) and the Local Food Promotion Program (LFPP) were created to assist local food production and consumption by offering grants to agricultural entities which focus on localized agriculture (Grants & Opportunities, n.d.). The FMPP funds marketing projects that focus directly on connecting consumers to farmers. The LFPP offers outreach, research and implementation grants for both small farmers and regional businesses that focus on local/regional food distribution. While Margaret and Dan explained that they mostly were disconnected from federal money, Margaret did say that they applied for a grant to install the solar panels on their farm (Farm Visit, 2016). She noted however that this process was tedious, and it reaffirmed how glad she was that they were primarily independent from the government.

In addition to federal grant money available, food voucher programs allow participants the ability to use their vouchers to buy fresh produce at certified farms and farmers markets. The SFMNP aims to provide fresh, healthy, locally grown produce to low-income seniors. In the fiscal year of 2014, there were 787,139 seniors who received SFMNP food vouchers that could be used at state authorized CSA partnerships, individual farms, farmers' markets, and roadside stands (Senior Farmers' Market, 2015). In 2014, there were 154 participating CSAs that accepted these vouchers, in addition to 3,912 participating farmers' markets and 3,177 participating roadside stands (Senior Farmers' Market, 2015). Through email correspondence, Dan explained that Common Harvest Farm did register about 10 years ago to be able to accept SFMNP payments, and in that process, they delivered 4 full shares to a local food shelf, and volunteers

then split up the shares for participating seniors. Common Harvest received full reimbursement of that share money from SFMNP (D. Guenther, personal communication, May 3, 2016).

The WIC FMNP works similarly to the SFMNP, but provides for populations of low-income women and children. In the fiscal year of 2014, 1.6 million WIC participants received these FMNP vouchers (WIC, 2016). While the USDA mentions 154 participating CSAs for the SFMNP, the WIC FMNP does not seem to incorporate CSAs, according to the federal fact sheet on the program. The WIC FMNP also has slightly less total participating farms, at 3,484 farmers' markets and 2,931 roadside stands that accept FMNP coupons (WIC, 2016). In figure 1, a map reflects the various states that authorize Senior and WIC FMNP, showing how though these are federally backed programs, they are state authorized. Both of these programs also serve to educate the Senior and WIC participants about how to select and prepare fresh produce in order to encourage continued participation (Senior Farmers' Market, 2015; WIC, 2016). State and local agencies as well as program partners such as nonprofit organizations and local chefs provide these services (Senior Farmers' Market, 2015; WIC, 2016).

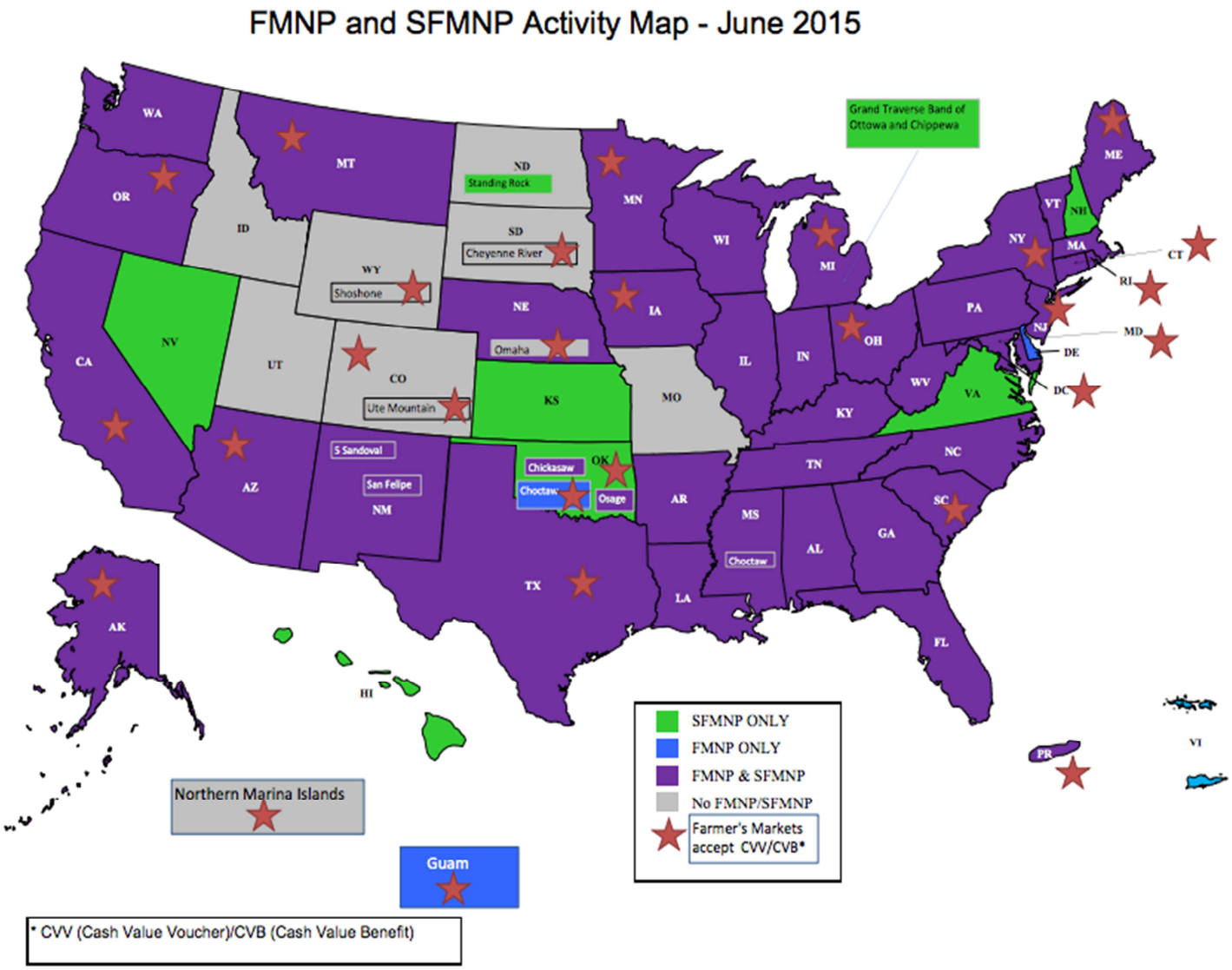

Figure 1: This map shows which states authorize farms and farmers markets to accept SFMNP and WIC FMNP coupons. Source: USDA Food and Nutrition Service

The largest voucher program of the "nutrition" segment of the farm bill is SNAP, which offers assistance to low income individuals and families (Supplemental Nutrition, 2016). While the funding for this program does not specifically focus on local farms like FMNP described earlier, there have been recent efforts especially within the 2014 farm bill, to connect more CSAs to SNAP (Operating, 2015). The largest problem with this SNAP CSA model is that SNAP requires payment to be applied no more than 14 days prior to product delivery, yet the CSA

program is designed to accept payment at the beginning of the harvest season (Operating, 2015; Margaret, 2016). The USDA claims that SNAP clients cannot risk investing upfront costs for an unpredictable growing season (Operating, 2015). Also, SNAP money cannot be used to pay membership fees or administrative costs of the farm, which limits the amount of funds that the CSA would receive from the government (Operating, 2015). Because there is a strong desire on the part of CSAs to make their food available to low income members, there have been movements to adjust the CSA system to fit with the federal system of SNAP.

For example, in Oregon, there is an association of "Oregon SNAP CSA Farms" which are farms that have been certified to accept SNAP customers through the voucher system (Oregon SNAP, n.d.). On their association website, 19 farms are listed as part of this group that started in 2012 that aims to provide the benefits of a CSA farm to low income populations. These CSA SNAP farms have adapted to work with SNAP stipulations of on-going payments so that at least half of their farm shares are ones of SNAP clients (Oregon SNAP, n.d.). In order to raise awareness about the ability to become a CSA SNAP farm, Zegner farm in Oregon produced a webinar on this this association website to show farmers how to get licensed to provide to SNAP clients while still maintaining their CSA identity (Oregon SNAP, n.d.).

Non-profit programs:

Though I initially set out to find the role of government funding and programs for increasing food access, I found that intermediary programs were able to strike a better balance between providing CSAs with independence and income, while also catering to low income populations. Most of these programs are funded in part by federal grants but also private donations and corporate funding. One program I looked at was the "Double Up Food Bucks" program based out of Portland Oregon which subsidizes shares from CSA SNAP members,

making the shares even more affordable for these families. Double Up Food Bucks subsidizes the cost of shares for CSA members paying with SNAP coupons by $200 (Double Up, n.d.).

Another program that acts as an intermediary in assisting this gap between CSAs and low income populations is a program from the Food Group in Minnesota called Harvest for the Hungry. This program buys extra produce from CSAs and other local farmers at $1 per pound, and then distributes the food to local food shelves for free (Hills, A., personal communication, April 25, 2016). The Food Group has various other programs that tackle food insecurity, including partnering with minority ethnic and cultural groups to bring healthy produce to minority populations that is culturally relative to those populations (Our Programs, n.d.).

Conclusion:

Through this research, I've found that there is a current disconnect between CSAs and low income populations partially due to the restrictions and limitations of federal grants and programs. There is not a lack of desire on the part of CSA farmers to reach these populations, but rather a lack of public funds in order to make their food accessible. While farmers do not want to forgo their community model in order to abide by strict governmental guidelines associated with licensure for FMNP and SNAP CSA farms, there is room for growth in this partnership. If farmers were willing to make some sacrifices in their own independence, and if governments eased up on their rules (such as allowing for upfront payments) then it seems CSA SNAP farms could significantly help poor families get healthy and affordable food. Future policy implementation could involve the expansion of the SNAP program to have more flexibility in authorization so that it would be adaptable to the unique CSA model. It appears that federal programs willing to cooperate with CSA farms do exist, and if they were more lenient with their voucher programs, then CSAs could partner with them for the result of cheaper, healthier food. Lastly, another recommendation would be for the government to fuel more grant money towards

non-profit programs that subsidize shares and bring fresh produce to low income and minority populations while also supporting the traditional CSA model. These programs strike the balance between providing funding and access while also respecting the community member model of CSAs. While CSA is an exciting alternative to commercialized agriculture, there must be adjustment and flexibility for both CSAs and the government in order to reach these poorer populations.

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Spreading the Wings: Practices and Strategies to Increase the Economic Accessibility of Low-Income, Minority Populations with Community Supported Agriculture

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GEOG 232 - People, Agriculture, and the Environment

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Introduction

Food availability and food security are ‘‘hot-topics’’ of discussion that are gaining attention in our modern contemporary society. Specifically, given the increase in knowledge about the perils of industrial food production, like the use of genetically modified organisms, pesticides, and insecticides as well as the environmental degradation produced by this agricultural system, consumers are starting to become more aware about where their food comes from and the agricultural practices entailed in the production of these foods. In addition, consumer consciousness about the aforementioned topics has been greatly influenced by the role of environmental justice groups in advocating for sustainable agricultural systems such as Community Supported Agriculture (CSA). Although the model of CSA was developed in the mid-1980’s with a few farms and members, today it is estimated that between 30,000 and 50,000 U.S. consumers belong to a CSA farm (Kelley, 2013). Despite the fact that the CSA model attempts to provide members with fresh, local produce that is grown through sustainable practices, a main criticism of this model of agriculture revolves around its inaccessibility to low-income, minority populations given the relatively high costs for membership and share fees. The topic of making CSA farms more economically accessible to these populations is important to study as it addresses the notion of food security and notions of structural inequality that impact minority populations unequally over white, high-income individuals. For this essay, I will address the question of how can CSAs better cater to low income, minority populations through a threefold scope by looking at: (1) What are the characteristics and criticism of the CSA movement? (2) How is price measured at Common Harvest Farm (CHF) and how can the economic accessibility of membership fees, or lack thereof, affect participation of minority and low-income populations in CSA farms? And finally (3) what are current strategies and efforts that try to bridge this gap?

Research Methods

This paper uses a multi-faceted methodology, including archival research and a field visit and set of interviews during our time at CHF, to analyze the economic inaccessibility of CSA and assess

strategies to increase the membership of low-income, minority populations at the local scale, taking the case study of CHF in Osceola, Wisconsin, and at a broader scale, by paying attention to CSA farms around the country.

The first site for analysis was Dan and Margaret's CSA farm, CHF, which lies alongside the bluff-top of the scenic St. Croix River. At CHF, both farmers make their living growing and harvesting ten acres of organic vegetables that they rotate throughout their 40-acre farm (Guenther, 2005). Our class got to partake in a guided tour of the farm and of the surrounding areas when we visited on Saturday, April 9th. This farm visit contributed to our understanding of the physical geography of the area and of the agricultural practices that are employed at CHG by Dan and Margaret and by the owners of the neighboring farms. In addition, the participant observation component was useful as it provided an environmental perspective (e.g. soil quality practices) that nuanced how shares were priced at CHF. Moreover, our tour of the farm also included some small-group interviews with Margaret that were focused around the history of the CSA movement and the history of CHF, CHF's dynamics with members, the prices they charge for membership and share fees as well as current strategies in which CHF attempts to be economically accessible for low-income, minority populations.

To complement the participant observation component with scholarly literature, I conducted archival research on the main goals and characteristics of the CSA movement, as I had not studied or heard about the CSA movement prior to this assignment. In addition, given the scope of my paper on increasing the economic accessibility of low-income, minority populations with CSAs, I did research on the current (in)accessibility that low income, minority populations experience with regards to sustainable agricultural systems. Furthermore, I studied relevant literature on strategies meant to address the gap in access of low-income, minority participation to the CSA movement (Donaker & Shute, 2006; Everson, 2015; Forbes & Harmon, 2008; Kelley, 2013; WSDA, 2016).

Findings, Analysis, and Discussion

The CSA movement and Race & Class-Based Food Inequities in the US and at CHF

Throughout this section I merge literature and archival research with Margaret's narratives to provide a broad overview of the characteristics of CSA farms, the economic and social dynamics at CHF, and the overall race and class-based food inequities present in the US. According to Everson (2015), CSA developed in the U.S. during the 1980's in the East Coast. This agricultural system represents a socio-economic agreement between consumers and farmers. In this system, consumers pay farmers in advance for a share of the summer harvest and are thus provided with fresh produce from the farms. This lump sum prepayment allows farmers to buy the seeds, transplants, and other inputs needed for the growing season (Kelley, 2013). As Margaret narrated in our small-group discussions, the particularity of CSA farming is that CSA members co-assume the risk of crop failure, pest, or disease problems and there is an understanding between the farmer and the members that a refund will not be issued in the event that no crops are harvested (Margaret Pennings, personal communication, April 9, 2016). Finally, delivery of the produce is set up in a way that members have the option of picking up their share of vegetables directly from the farm or from a previously arranged drop site in their neighborhood.

Despite the benefits of CSA farming in promoting the consumption of locally grown fruit and vegetables, this agricultural system is often questioned because of its inaccessibility for low-income, minority populations. Meaning, individuals benefiting from CSAs fresh produce tend to be white, high-income individuals, while low-income, minority populations do not have the means to access this service. As Kurtz (2013) comments on the relationship between food deserts and racial segregation, low-income, minority populations often lack access to nutritious foods and are over-exposed to unhealthy products because of structural factors such as racialized social relations, discrimination based on economic status of households, and lack of transportation access and infrastructure to ''healthy'' food environments. Thus, although CSA produce delivers a nutritious diet through foods with high-levels of anticancer activity, including carrots, parsnips, onions, broccoli, cauliflowers, tomatoes, peppers, potatoes, and cabbages,

much of these health benefits are inaccessible for limited-resource families because of the seasonal lump sum prepayments, which range from $300 to $600, for membership and share fees (Forbes & Harmon, 2008). During our small-group discussions with Margaret, she explained that the members' demographics were middle-class, white individuals who were ''educated'' and whose ages ranged from 24-27 to 70-80 years (Margaret Pennings, personal communication, April 9, 2016). This description of the demographics of CHF members sheds light on the continuing race and class-based food inequities with regards to economic accessibility of low-income, minority populations with CSA farms.

Membership Fees and Implemented Strategies at CHF

In this section, I will be addressing the way in which membership and share fees are priced at CHF and influence the participation of low-income, minority populations. Throughout our small-group discussions at the farm, Margaret emphasized the need to see membership and share fees as more than just the baseline price. The economic aspect, she explained, was quite simple as they had around 220 full shares and they charged $600 per share for the whole season, which ranged from mid-June to mid-October. On a weekly basis, this cost resulted in approximately $33 per week (Margaret Pennings, personal communication, April 9, 2016). Although at first sight, the costs of the shares may seem expensive, especially for low-income, minority populations; there are a lot of ''hidden costs'' for production and delivery that are not added to the membership costs. For instance, during our field visit at CHF, farmer Dan explained that costs do not fully include the regeneration rates of the soil as a lot of the vegetables produced, such as onions, potatoes, cabbages, beets, broccoli, Swiss chard, tomatoes, winter squash, and zucchini, are heavy feeders and thus demand a lot of nutrients from the soil (Common Harvest Farm, 2012; Field Visit, 2016). Other costs that are not included in the price involve the health benefits of a CSA-related diet and the ability to profit from freshly grown produce that did not require artificial fertilizers, pesticides, and insecticides in their production. Although the membership and share fees at CHF are expensive for low-income, minority populations, to a great extent, CHF cannot afford to substantially lower their prices for memberships as both farmers have a limited resource fund to draw

from (Margaret Pennings, personal communication, April 9, 2016). As we were gathered around the room during small-group discussion, Margaret explained that although they had applied for federal grants for their solar panel, they had not received any subsidies from the federal government because they 'don't grow monocrops' and are not large, industrial farms[1].

Strategies and Pathways for CHF to improve their Economic Accessibility

While the last section nuanced the way in which membership and share fees are priced at CHF, this section will provide different strategies to ensure greater accessibility of low-income, minority populations by drawing on examples of CSA farms across the country. Although Dan and Margaret already offer discounts for members who are willing to host a pick up site and offer half-shares, which provide members with the same size of box per family or individual, but last for half the season, and have an overall cost of $325 (Margaret Pennings, personal communication, April 9, 2016), there are plenty of strategies that could be additionally implemented at CHF including: government food assistance, subsidized low-income shares through sponsorships, and working shares.

One strategy that CHF could implement to make participation of low-income, minority populations more feasible is to accept government food assistance in the form of food stamps. In New York state, CSAs are accepting food stamps in biweekly installments instead of the typical preseason one-time payment (Forbes & Harmon, 2008). The introduction of biweekly installments eases the economic investment of low-income, minority populations in CSA farms, but does not necessarily ensure that these populations will get vegetables if there is a crop failure. An interesting example can be seen in policies implemented by the Washington State Department of Agriculture, whose regulations stipulate that the value of the produce received must meet the value of the food stamp vouchers redeemed, even in the event of crop failure (WSDA, 2016). Although this policy is promising in that it provides a safety net for low-income, minority populations, it also demands CSA farms the need to provide food in the case of crop failure, a factor that requires more economic capital on behalf of the farmers. Furthermore, the

[1] Margaret later added that she would not like to work with the federal government anyways as this would decrease their individuality as a farm and possibly impacts the number of members.

obligatory provision of produce to low-income, minority populations, even during times of crop failure, might create tensions within the community between food stamp-paying members and non food stamp-paying members.

Another strategy that CHF could use is provide subsidized low-income shares through sponsorships of their memberships. This strategy would entail working and networking with companies and organizations to reduce prices and subsidize shares. An example of a current CSA farm implementing this strategy is the Full Plate Collective of Tompkins County, New York. This CSA farm has been working with the Ithaca Health Alliance and United Way and these organizations are subsidizing five shares each annually for low-income, minority populations at a rate of $10 per week for the whole season (Forbes & Harmon, 2008). This strategy both decreases the economic investment of low-income, minority populations and does not put farmers at a risk of investing more of their economic capital. However, the strategy of subsidized low-income shares through sponsorships requires CSAs to establish connections with companies and organizations that share their goals to provide for these subsidized shares, which might take time and a strong relationship with these companies. Further suggestions to this strategy would entail that local low-income community organizations take the lead and make these connections with companies and institutions to increase their participatory role within the CSA movement.

Finally, another strategy that CHF could implement is the notion of working shares through working time at the farm. In exchange for a discount on the share price, members donate work time on the farm. An example of a CSA currently implementing this strategy is Gallatin Valley Botanicals in Belgrade, Montana. Here, the owners offer members an option of working a 4-hour shift per week for 15 weeks of the season in return of a 50% discount of the membership fee. Thus, the full cost of the membership fee of $360 is reduced to $180 (Forbes & Harmon, 2008). Despite the substantial decrease in price, this strategy assumes that members will have free time to go and work in the farm, that they have some form of transportation to get to the farm and that they are able-bodied individuals who can provide these working services. Further recommendations for this strategy would be to allow low-income,

minority members that may not be able-bodied to help out with office work for a discount on membership and share fees.

Conclusion

To date, the question remains whether or not the sustainable agricultural movement can and will become more accessible for low-income, minority populations. Regarding the boom of CSA in the U.S., the sustainable agricultural model is advantageous as it provides members with freshly-grown, local produce that is responsibly-grown and nutritious. The sad reality of it all is that the lump sum prepayment required to become a member in CSAs, usually around $300 to $600, is too high for most low-income, minority families. The relevance of this essay to the literature on ways to increase the economic accessibility of CSA for low-income, minority populations is that it provides strategies that are currently being implemented in CSA farms across the country dealing with price reductions such as: government food assistance, subsidized low-income shares through sponsorships, and working shares. CHF has multiple paths to take in widening the membership of low-income, minority populations. At the local level, my first recommendation to Dan and Margaret would be to get in contact with CSAs in the Minnesota and Wisconsin area to learn from existing projects on price reductions that could widen the participation of low-income, minority populations. In addition, through an analysis of the farmers' own economic capabilities, both farmer Dan and Margaret can implement government food assistance, subsidized low-income shares through sponsorships, and working shares. At the federal level, CSAs around the US should make it a point of increasing their memberships with low-income, minority populations to provide them with the health benefits of their produce. To do this, CSA farms could join forces with the federal government and ask for loans to fund the costs of seeds, transplants, and other inputs for the growing season so that individuals can pay membership and share fees over a certain period of time without resulting in an additional economic investment on behalf of the farmers or the members.

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