Getting down to earth: Revisiting sustainability on a small, diversified farm in Maryland

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ABSTRACT

Since sustainable agriculture exploded in popularity in the late 1990s, researchers and practitioners have posed the question of what makes agriculture truly sustainable. Sustainability is typically thought to encompass ecological, social and economic dimensions. Many studies have attempted to measure sustainability on farms, using both quantitative and qualitative methods. Qualitative methods often use a subjective approach, which allows for exploration of farmer perceptions of sustainability. Using grounded theory methodology, this case study explored how two farmers perceive and practice sustainability on their small, diversified farm in Maryland. Semi-structured interviews and participant observation were conducted for four weeks. The interview data was used to develop a set of indicators for measuring sustainability, using four components: ecological, social, economic and farmer well-being. The farmers were then asked to rate themselves on a one to five scale on each of the indicators, based upon their current progress toward sustainability. Use of the farmers’ responses directly meant that they were able to create their own self-assessment tool for sustainability. The study provided a useful framework for future attempts to evaluate farmer perceptions of sustainability.

Keywords: Community Supported Agriculture (CSA), organic, indicators, farmer, success and perceptions
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INTRODUCTION

When people ask me what I want to do with my life, which happens frequently as graduation looms, I feel fortunate that I can answer them: I want to be a farmer. I know that I want to farm sustainably, but explaining what exactly that means to other people (and often myself) can be difficult. As an aspiring farmer, I knew that I wanted to look at farm sustainability from a farmer’s perspective. One day I will be making decisions that will determine the viability of my own farm, and I wanted to gain as much insight to this decision-making process as possible. This thesis is my attempt to better understand how two farmers perceive and practice sustainability on their farm, using qualitative methods.

The widespread interest in sustainable agriculture (Geng et al., 1990) is largely a response to industrial agriculture, which essentially began with the Industrial Revolution of the mid eighteenth century (Deane, 1979). Beginning with the Green Revolution of the 1960s, there was a significant gain in agricultural productivity due to the use of synthetic fertilizers, pesticides and herbicides on farms (Mulvaney et al., 2009). This use of synthetic, energy-intensive inputs was alarming for many, who began to look for more sustainable, or ‘alternative’, agricultural methods. More recently, sustainability in agriculture has grown to encompass social and economic concerns as well as environmental ones (Congress, 1996; Harwood, 1990; Allen et al., 1991). The question of what makes agriculture sustainable in both theory and practice is one that many scientists, researchers and practitioners strive to answer.

As alternative agricultural methods become more widespread, more and more farms pursuing sustainability are popping up around the country. The thought process that farmers go through each day on these farms has intrigued me since I worked at Flying Plow Farm (FPF) in 2011. Tom Paduano and Sarah Rider are the farmers at FPF, which “strives to create a truly sustainable farm, both agriculturally and financially” (Paduano & Rider, 2013). After dancing back and forth with my thesis topic for quite a while, I finally decided to go back to their farm to do my research. Rather than try to generalize or make conclusions from a large number of diverse farms with different goals, I decided to do a case study. I wanted the in-depth analysis that can be achieved with case studies. During 2011, I worked on the farm from May to September, which I believe strengthened my case study because of my prior knowledge of the farmers and their operation.
Perhaps the most important goal of my research was to explore the farmers’ perspective on sustainability. From the beginning, I tried to separate their perceptions of sustainability from my own and those that I have researched in the literature. My specific goals within the umbrella of farmer perceptions of sustainability changed significantly over time. When I began my research, I was looking at the “three-legged stool” of sustainability, consisting of the economic, social and ecological components which, in theory, should be equal in any truly sustainable system (Suvedi et al., 2003; Allen et al., 1991). As the interviews progressed, I realized the importance of another whole category: farmer well-being. This criterion proved so important that I decided to make it a grouping of its own, even though I did not anticipate this distinction in the beginning. When it did appear in other studies, farmer well-being was typically included in the social section.

Many people have tried to measure sustainability in agricultural systems, using very diverse methods. Both quantitative and qualitative studies use indicators in some way to evaluate sustainability. Sometimes these indicators have different names, like components or goals (Zahm et al., 2008; Goldberger, 2011). They are designed to measure improvement in a wide range of areas, from pesticide use and agricultural emissions to worker quality of life and animal welfare (Zahm et al., 2008). Generally, from the studies that I came across, indicators are developed using past research or scholarly recommendations. For example, Goldberger (2011) developed her list of goals for sustainability based upon social science literature on sustainable agriculture. Although the researchers largely formulate the indicators based upon previous research, some have employed them as self-assessment tools for farmers to evaluate their own progress.

When I began the process I expected that I would analyze the results of the interviews, which would coalesce with my observations at the farm, to produce fodder for my discussion. Halfway through the interviews, however, further study of the literature prompted me to incorporate a second result component into my paper. I decided to go another step further and ask the farmers to evaluate themselves using a series of indicators that I would create based upon their responses to my questions. I wanted them to come up with their own standards for sustainability through our conversations and then see how they would rate themselves on those criteria. This is perhaps the most distinguishing characteristic of my thesis; instead of using solely the literature to come up with my indicators, I used the information conveyed to me during the interview process, directly from the farmers. Corresponding with the studies I read, I did ask
Tom and Sarah to evaluate themselves on each of the indicators. My hope was that they could use the indicators as a self-assessment tool in the future, much like previous studies.

My research provides a comprehensive analysis of one particular farm in one particular place, occurring during a specific snapshot in time. I do not attempt to generalize or make assumptions about other farms using the results of this research. However, the qualitative methods of interviewing that I used and the indicators that I developed from the interviews were similar to some research that I encountered, to be explained later in this paper. Though I obtained them differently, they ended up being closely related to many indicators that emerged from other studies. The methodology that I used in coming up with the indicators could inform other studies. Obtaining the in-depth analysis that a case study provides, using participant observation and interviews, was key to my approach and could be applied to future research.

My initial goal, which did remain a core component of this study, was to find exactly what is important to these farmers in their daily work, and how they grapple with the arduous subject that is sustainability. In the end, I set out to create a relevant, real and applicable framework that these farmers could use to evaluate their advancement on the journey of sustainability. It is my hope that they can refer to it in later years, to re-evaluate and reflect on what they have accomplished. I hope that they will amend it: make substitutions, add new things, omit sections they no longer find relevant. I hope that other small farmers, or anyone interested in the idea of sustainable agriculture, can use it in developing their own set of indicators that fits them and the needs that they have observed in their particular place.
LITERATURE REVIEW

Although it emerged on the periphery of environmental discourse during the 1970s, the concept of sustainability did not become widespread until the late ‘90s and early ‘00s (ECIFM, 2013; Kates et al., 2005). The word *sustainability* itself is notorious for its ambiguity; definitions vary widely among researchers and practitioners (White, 2013; Suvedi et al., 2003). Gatto (1995) presents different perspectives on the idea of sustainability, arguing their inconsistency. An ecologist’s view on sustainability might include sustained abundance and diversity of individual species in ecosystems, while an economist might think of “sustainable development, without compromising existing resources for future generations” (Gatto, 1995, 1181).

Perhaps the most well-known definition is that of sustainable development, articulated by the Brundtland Commission of 1987 (Shaharir, 2012): “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Meeting the needs of the present without sacrificing future generations’ needs is often a core goal of sustainability (Young & Burton, 1992). There is a great need to define the term in order to develop a common, shared vision and to make more effective decisions (White, 2013). Varying definitions of sustainability can make cooperation among stakeholders difficult.

In addition to terminological confusion, the Brundtland definition of sustainability has been criticized by many, particularly due to the fact that the present economic system is not considered conducive to sustainable development (Daly, 1990). Ecological economists have presented many of the arguments for this conclusion, the earliest being Kapp (1950), Postel (1990), Hopwood (2005) and others (Shaharir, 2012). Neoclassical economists, environmentalists, business people, politicians and the general public might have very different opinions on the definition of true sustainability.

Sustainability, and particularly sustainable agriculture, is generally regarded as a long-term goal, rather than an end in itself (Ikerd et al., 1997). According to Ikerd, sustainability is a “direction rather than a destination, like a star that guides the ships at sea, but remains forever beyond the horizon” (Ikerd, 2008, p. 95). The question of whether an activity is sustainable can only be decided as an ongoing, continuous process (Ikerd, 2008); it is a matter of whether or not sustainable producers and businesses are moving in the right direction (Rigby & Cáceres, 2001, 33). Sustainability is comprehensive and transdisciplinary, incorporating a wide range of
interests and stakeholders. According to the literature, it encompasses three dimensions: social, environmental, and economic (Goldberger, 2011; Shaharir, 2012; Brodt et al., 2006; Hanson et al., 2006; Rodriguez et al., 2008; Patricia et al., 1991). Each of these components is essential to the dialogue about true sustainability.

**Sustainable Agriculture**

Sustainable agriculture has acquired enormous interest in both public discourse and academia (Geng et al., 1990). Principles of sustainable agriculture began to be articulated in the United States during the 1980s (Suvedi et al., 2003). Before that, agriculture in the United States was highly mechanized and relied heavily on chemical and synthetic inputs for crop production (Suvedi et al., 2003; Rodale, 1984). The Industrial Revolution of the mid-eighteenth century instigated this rapid mechanization in agriculture (Deane, 1979). Non-renewable sources of energy, such as coal and crude oil, were used to mass-produce goods for an increasingly global distribution system (Toffler, 1981). The advantage of productivity that industrialization brought to agriculture meant that small, self-sufficient farms were less competitive (Geng et al., 1990). Large farm conglomerates that were able to obtain land, capital and equipment were favored by the system and were able to buy out many of these small, family-run farms.

Traditionally, industrial agriculture relied on productivity-boosting technologies like chemical fertilizers, pesticides and herbicides (Rodale, 1984). They were applied generously nationwide because they were cheap, productive and allowed for a greater profit for farmers (Rodale, 1984). Although praised by many, there were others who considered these technologies harmful to the environment and human health (Canter, 1986). Additionally, as fuel prices climbed, farmers who could grow their crops without the use of fossil-fuel intensive synthetic inputs began to instead enjoy an economic advantage (Rodale, 1984, 294). The modern-day environmental movement of the 1970s brought an increased interest in a different kind of food production. Farmers, along with consumers, were growing critical of the long-term viability of the industrial agricultural system (CAST, 1988). Sustainable agriculture began as a direct response to the industrial model; it was an alternative type of agriculture.

Much like the concept of sustainability, there are many definitions of sustainable agriculture. Congress funded the Sustainable Agriculture Research and Education Program (SARE) underneath the USDA in 1988. The purpose of SARE is to support agricultural ventures
that are economically, ecologically and socially sound. Today, SARE is funded through the USDA-CSREES under Subtitle B, Chapter 1 of Title XVI of the Food, Agriculture, Conservation and Trade Act of 1990 (U.S. Congress 1990). Congress defines sustainable agriculture as:

An integrated system of plant and animal production practices having a site-specific application that will, over the long term, (a) satisfy human food and fiber needs; (b) enhance environmental quality and the natural resource base upon which the agriculture economy depends; (c) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (d) sustain the economic viability of farm operations; and (e) enhance the quality of life for farmers and society as a whole (Title XVI, Subtitle A, Section 1603).

Another definition is offered by Harwood (1990). He calls it a “framework definition” of sustainable agriculture that would be expanded with specifics of the location and time frame. He acknowledges that arriving at consensus of this definition is unattainable due to the excess of ideas, trends and targets of many different authors. His workable definition is:

An agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species (Harwood, 1990, 4).

Allen et al. (1991) reiterates the ‘three-legged stool’ perspective to sustainability, comprised of ecological, economic and social criteria. Like many other researchers and practitioners in the field, they recognize the need for balance among these three elements which all play a vital role in the agricultural system (Allen et al., 1991):

A sustainable food and agriculture system is one which is environmentally sound, economically viable, socially responsible, nonexploitative, and which serves as the foundation for future generations. It must be approached through an interdisciplinary focus which addresses the many interrelated parts of the entire food and agriculture system, at local, regional, national, and international levels. Essential to this perspective is recognition of the whole-systems nature of agriculture; the idea that sustainability must be extended not only through time, but throughout the globe as well, valuing the welfare of not only future generations, but of all people now living and of all species of the biosphere (Allen et al., 1991).

The three elements—economic, social and environmental—essential to sustainable agriculture are noted repeatedly in the literature. Congress includes the need for preservation of environmental health, economic viability, and societal improvement (Suvedi et al., 2003). De
Groot (1992) identifies nine values that fall within these elements: conservation and existence values (ecological); human health, personal, community and option values (social); and consumptive, productive and employment values (economic).

Hanson et al. (2008) advise that social and political commitments are required to balance the goals of improved production and profitability, stewardship of the natural resource base and ecological systems and enhancement of the vitality of rural communities (p. 326).

Sustainable agricultural development is only possible through improvement of economic policy (Young & Burton, 1992). Agriculture that seeks sustainability recognizes this whole-systems and interdisciplinary approach, integrating microeconomics of place, ecological concerns and the needs of the human community (Allen et al., 1991).

Riley (1992) discusses the various levels of sustainability mentioned by Allen et al. (1991). According to Riley, the scale of analysis chosen is critical to the way one thinks about sustainability. At the field level, precise practices and management techniques are most indicative of sustainability, while at the farm level, farm practices must support a farm business and household (Riley, 1992). One step higher is community sustainability, which involves farm and business collaboration and support. At the global level, there are conversations about climate stability and use of nonrenewable resources such as fossil fuels (Riley, 1992).

Another quality that is often associated with sustainable agriculture is resilience. Resilience is the capacity of a particular system to absorb disturbance and adapt in order to maintain its desired state (Anderies et al., 2004; Walker et al., 2004; Berardi et al., 2011). Sustainable systems are able to endure necessary modifications and retain their core structure and function (Magis, 2010). A sustainable agricultural system (often also known as an agroecosystem) is resilient if it is able to recover from the regular disturbances of cultivation and harvest over time (Gliessman, 2001). Regenerative agriculture accurately describes this idea; it focuses on simultaneously restoring the health and productivity of agroecosystems, which improves adaptive capacity, or resilience (Rodale, 1984; Berardi et al., 2011). Maintaining a high level of biodiversity is another key component of sustainable agricultural systems and directly influences their ability to adapt to disturbance (Gliessman, 2001; Berardi et al., 2011).
Defining Characteristics of Sustainable Agriculture

Sustainable agriculture is typically characterized by methods of direct farm marketing, including farmers’ markets, community-supported agriculture, pick-your-own farms, and farm stands (Kantor, 2001). Often, though certainly not always, these types of farms are distinguished from large-scale, industrial farms by their size. They are commonly smaller both in cultivated land and annual revenue.

Community Supported Agriculture

Community supported agriculture, or CSA, is an arrangement between farmers and eaters in which members purchase a share in the harvest before the growing season (Grubinger, 2004; Cotler, 2009). Each week they receive a box of fresh produce (usually vegetables) but can include other items like eggs, cheese, meat, fruit or breads (Cotler, 2009). The price of the share depends on the quantity and type of produce provided and the duration of the share. Approximately 12,500 farms participate in community supported agriculture in the United States, and they are on the rise (USDA, 2007; Grubinger, 2004). CSAs were designed to build community between farmers and members, particularly as members often pick shares up at the farm (Pole & Gray, 2013). This gives them an opportunity to see the farm and interact with the farmers growing their food.

Farmers’ Markets

From traditional mercados in the Peruvian Andes to quaint street markets in Asia, farmers’ markets are one of the oldest forms of direct marketing by small farmers (Local Harvest, 2012). Farmers’ markets have been introduced or reintroduced in many Western countries in the past 10 years (Svenfelt & Carlsson-Kanyamab, 2010). The number of farmers markets in the USA has grown exponentially in the past few decades; they exist in all 50 states and most major cities host several markets throughout the week (US Department of Agriculture, 2006). They are one of the leading sources of direct farm marketing in the United States (Kantor, 2001).

A farmers’ market enables farmers and consumers to come together at the same time and place, usually once or twice a week and typically in an outdoor setting (Kantor, 2001). Parks and other public areas are popular market venues. Markets range in size from small, community-based markets with a few vendors to a large market run by a farmer organization and serving several thousand consumers (Kantor, 2001). Farmers’ markets allow consumers to have access to
locally grown, fresh produce and enables farmers to have a direct relationship to the people eating their food (US Department of Agriculture, 2013).

**Pick-your-own and Farm Stands**

Pick-your-own, or ‘U-pick’, operations have long been a feature of farm-stand businesses but have recently become popular among small, CSA farms (Cotler, 2009). Customers and their families travel to the farm to pick some of the harvest themselves. Some typical u-pick crops include small berry fruits, like blueberries, raspberries, and strawberries; stone fruits like apples, peaches and plums; and vegetables snap peas, green beans, and cherry tomatoes. Harvesting these crops is particularly labor-intensive for farmers and having customers pick their own saves them time. It also provides an additional opportunity for eaters to see what goes on at the farm and participate in the process.

Farm stands can vary widely in size, style and formality, which gives them “lots of local character” (Cotler, 2009, 40). Some stands are small, with a main focus on one or two crops, like sweet corn and tomatoes. Others are large and stock many items, from fruits and vegetables to meats and value-added products like jams and pickles (Cotler, 2009). Farm stands are another method of direct marketing, allowing for the chance to observe the fields and chat with the farmer.

**Diversification and Farm Size**

Because sustainable agriculture is often assumed to be more labor-, information- and management-intensive, socioeconomically smaller farms are more efficient (Brodt et al., 2006). Socioeconomic factors are thought to favor small, family farms over large corporate farms (Brodt et al., 2006). Additionally, the notion that smaller farms are beneficial to rural communities has been widely documented. Several researchers have shown that larger and more industrial, corporately-controlled farms with less personal ownership have negative socioeconomic consequences for local communities (Goldschmidt, 1947; Lobao, 1990; Welsh and Lyson, 2001). Tolbert et al. (1998) demonstrate that small to mid-sized farms have a tendency to be more tied to place by both social and economic relationships, civic engagement within rural communities.
It has been mentioned previously that diversification is key to resiliency, an important component of sustainable agriculture enterprises. It is so essential that it is a criterion for the farm of this study. Diversification of an operation insures against both economic and ecological risks, even if a farmer must give up a level of economic return that he/she might receive from an especially lucrative single crop (Pope & Prescott, 1980). Crop diversification can promote resilience in multiple ways on the farm: prompting greater protection against pest outbreaks and disease transmission as well as providing a buffer from climate change effects and extreme weather events (Lin, 2011).

Crop and animal biodiversity may move an agroecosystem from a state of stress to a state of vigor, due to the diversity of organisms that is required for ecosystems to function and provide services (Heal, 2000). Removal or insufficient support of entire trophic levels can cause ecosystems to shift to a less-desired state, affecting their capacity to yield services (Folke et al. 2004). Biodiversity enhances ecosystem function in several ways, expounded by Vandermeer et al. (1998). First, different species perform slightly different roles in the ecosystem and therefore occupy different niches. Second, there are many more species than there are functions, so redundancy is inherently characteristic of a diverse system. The third issue is key, particularly in our changing climate: those elements that appear redundant now might become important when environmental change occurs. In the instance of change, redundancies allow for continued ecosystem functioning and provisioning of services (Lin, 2011).

The Three Pillars of Sustainability

The three legs of the stool of sustainability are revealed in every agricultural enterprise in one way or another. MacRae et al. (1989) note that sustainable agriculture today is predominantly typified by the practices that minimize environmental degradation; there is a need to move beyond this limiting preconception. Theoretically, social factors should be equally important to ecological concerns, yet they are often excluded from the reality of sustainable agriculture (Pilgeram, 2011). Likewise, maintaining a viable economic operation is critical to farm sustainability but is often ceded to sound environmental practices (Grubinger, 2004).
“It’s ironic that, while more and more researchers and farmers are developing ecologically sound production practices, the social and economic challenges to farming are as serious as ever.”

-Vern Grubinger, *With an ear to the ground*

**Social Responsibility**

Social concerns are classically more difficult to quantify, measure and evaluate on farms, making them less researched and more equivocal than environmental components. Scholars and researchers have different ways of rationalizing and evaluating social sustainability. According to Sumner (2005), sustainability means “promot[ing] the civil commons, not the profit margins of an elite group” (309). Macias (2008) defines two concepts he perceives as critical to understanding the connection between agriculture and communities: food equity and social integration (to be discussed further).

Food equity encompasses discussions on food security, distribution, access and affordability. Because sustainable farms utilize ecologically sound practices, they have greater labor requirements and consequently demand a higher price (Allen et al., 1991). One inadvertent social outcome of this has been that many people with low incomes cannot afford ‘sustainable’ food, such as organics (Allen et al., 1991; Macias, 2008). Deeper structures of inequality and class privileges affect social sustainability in terms of who has access to and is able to afford sustainably produced foods (Pilgeram, 2011; Macias, 2008). Local food initiatives typically aspire to involve the surrounding community but many struggle to include a diversity of people due to factors such as income, education or occupation (Hinrichs & Kremer, 2002; Hinrichs et al., 2009). Pilgeram (2011) also addresses the lack of widespread food access among various demographics, such as race, gender and socioeconomic status.

Although ‘sustainably’ produced foods are often more expensive than conventionally produced foods, there are a number of government-sponsored programs available to make them more widely accessible to low-income Americans. These programs are increasingly accepted at direct-marketing venues like farmers’ markets and farm stands. The largest of these programs are the Supplemental Nutritional Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) (USDA, 2013). Formerly known as the Food Stamp Program, SNAP provides monthly benefits to eligible low-income families.
which can be used to purchase food (USDA, 2013). WIC provides benefits in the form of vouchers specifically for improving the health and nutrition of low-income mothers and their children (Tester et al., 2010).

Another one of these federally funded programs is the Farmers’ Market Nutrition Program (FMNP), offered by nearly all 50 states (Eat Fresh MD, 2013). It provides low-income women, infants, children and seniors with checks that can be exchanged for eligible foods at authorized farmers’ markets and roadside stands (Eat Fresh MD, 2013). It aims to supply participants with fresh, nutritious, unprepared, locally grown fruits, vegetables, cut herbs and honey. For instance, in Maryland, the Maryland Department of Agriculture authorizes farmers to participate, which means that consumers may redeem their checks with authorized farmers at the farmers’ market or at the authorized farmer’s roadside stand (Eat Fresh MD, 2013).

Social integration is another important factor in social responsibility of farms. A decline in social integration among people today, as compared to 30 years ago, is due to lower levels of civic engagement (Macias, 2008). Participation in civic life has decreased, as consumer identity has come to play a more important role in social affiliations (Bourdieu, 1984; Campbell, 1986). ‘Civic engagement’ indicates deliberate and action-oriented participation in civic life (Bagdonis et al., 2009). Goldberger (2011) measures civic engagement in terms of direct marketing, sustainable/organic agricultural membership and leadership and community involvement. ‘Civic agriculture’ is the implanting of local agricultural and food production within a community (Lyson, 2004). Lyson (2004) characterizes civic agriculture with specific criteria: (1) local markets that serve local consumers; (2) agriculture embedded in rural communities; (3) farmers concerned with high quality and value-added products; (4) small-scale, labor-intensive, and land-intensive production; (5) reliance on local knowledge; and (6) direct market linkages between producers and consumers (85). Civic agriculture enterprises consist of farmers’ markets, community supported agriculture, community gardens, farm stands, u-pick operations, and on-farm processing (Goldberger, 2011).

A concept deeply embedded in sustainable agriculture principles is that consumers in a community will have a relationship or “social linkage beyond atomistic market relations” with producers of food, or farmers (Kloppenburg et al., 1996, 307). These atomistic market relations are those prevalent in today’s global food system, operating on rules of efficiency, utility
maximization, competitiveness and calculated self-interest (Kloppenburg et al, 1996, 306). Food production should not be centered on profit generation, but rather feeding communities the types of food that they value. Sustainable agriculture draws people closer to the farmers that produce their food through programs like Community-Supported Agriculture (CSA), farmers’ markets, and other direct-marketing practices, to be discussed later. Closer ties between growers and consumers lead to new relationships that did not exist within a predominantly global food system (Kloppenburg et al, 1996). With this system of direct purchasing, farmers are able to meet community needs and interests.

To Vern Grubinger (2004), the real definition of sustainable agriculture means “profitable farms that protect natural resources and are valued by their communities” (53). In his view, sustainable agriculture understands the connection between healthy farms and strong communities. Grubinger is an Extension Professor and the Vegetable and Berry Specialist at the University of Vermont. Suvedi et al. (2003) recognize that one of the main indicators of the status or condition (also known as a state indicator) of sustainable agriculture is the “quality of life of the people in the community” (441).

Jules Pretty, in Agri-Culture: Reconnecting people, land and nature, suggests that there is a logical need to draw attention to agriculture’s connection to communities (2003, 116). Humans have a deep, visceral connection to our local ecology and fellow beings through the food that we eat, and this connection can be revived through sustainable agriculture. People eat food on a daily basis, and each meal is an opportunity to become connected with the surrounding community. Agriculture is truly a commons; something that belongs to all (Pretty, 2003, 116). Sustainable agriculture seeks to encourage social responsibility and increase community understanding of issues that farmers face (Pretty, 2003, 119).

Developing relationships with food producers and increasing community understanding of agricultural issues indicate that education is an important part of social sustainability. According to Lasley et al. (1993) and Kirschenmann (1992), sustainable agriculture’s philosophy includes not only environmental stewardship but also encouraging cooperation with one’s neighbors and cultivating a community spirit. Education of the consuming public is vital for the community’s support of sustainable agriculture methods and policies (Brodt et al., 2006). In
2001, Lass et al. found that 73.5 percent of the CSA farms that responded organized educational and social events for their shareholders and communities.

Educating new farmers is a key part of sustaining small-scale, alternative agricultural operations. Farming is a profession that requires multiple skills related to production, marketing and financial management (Carey et al., 2006). Beginning farmers need to learn these skills, while established farmers constantly work to improve their skills in response to new agricultural methods and a rapidly changing environment (Carey et al., 2006). Through their research with organic direct marketing farmers, the Growing Growers Training Program developed a set of core competencies essential for successful farmers. They identified 68 specific areas of competency in 15 general areas, including soils, weeds, harvest and post-harvest, equipment and farm business management (Carey et al., 2006).

New farmer training can take several forms: internships, apprenticeships, and workshops (Carey et al. 2006, Chait, 2013). An increasing number of small, diversified farms are incorporating internships and apprenticeships as part of their operations; many even consider them part of their core mission. An internship is a type of training that allows participants to gauge their interest in farming by working on the farm (Chait, 2013). While they work, they are able to learn from an experienced farmer and gain hands-on farming experiences. They can be paid, unpaid, or provided with non-monetary benefits like room and board. Apprenticeships differ slightly in that they are typically offered to individuals with previous internship experience and are usually more demanding of the individual’s time and energy. Apprentices are usually expected to live on the farm and work more hours each week than interns do. A farm apprentice is typically more serious about farming than an intern just trying to get her hands dirty.

Workshops are less rigorous and do not require as much of a commitment. Groups like the Northeast Organic Farming Association (NOFA) and the Maine Organic Farming and Gardening Association (MOFGA) have long held workshops in the northeast region for beginning farmers to learn tricks of the trade. Universities throughout the country often offer workshops and training programs for aspiring farmers. Workshops can be focused on a variety of agricultural topics, including soil fertility, composting, vegetable crop planning, cover crops, on-farm slaughter and butcher, small dairy management, construction and building, marketing, pest control, and farming with horses (MOFGA 2013, UVM 2013).
Questions of social sustainability also pertain to the farmer side of the equation. Sustainable farms, because they generally demand a higher price for produce, are more profitable for the farmer (Allen et al., 1991). Pilgeram (2011) asks whether or not sustainable agriculture is a system that provides meaningful and equitable employment to farmers, laborers and their families, particularly considering labor practices that can exploit the bodies of the farmers (375). Farmers and laborers may work long and physically strenuous hours each week without adequate compensation. The ability of farmers to support their families exclusively on farm-generated income is not always feasible. This requires many farmers to work off-farm jobs in order to support their families and help fund the farm operation (Pilgeram, 2011).

Ecological Health

Ecological components are the classics—those that one typically connects to the concept of sustainability. Even in the social sciences, much of the research views sustainability only having environmental implications (Pilgeram, 2011). There are many related terms used to describe sustainable agriculture, including ‘regenerative’, ‘ecological’, ‘organic’ and ‘alternative’ (Geng et al., 1990; Harwood, 1990; Rodale, 1984 Vandermeer, 1995). These ideas resonate strongly with the environmental component because they particularly emphasize ecological practices that characterize sustainable agriculture.

In 1984, Rodale articulated the idea of regenerative agriculture, an alternative to ‘traditional’ farming methods. To be truly regenerative, according to Rodale, a farm must produce its own fertility; it must generate and recycle nutrients on-farm. Ecological agriculture seeks to apply principles of ecology to agricultural systems of production (Vandermeer, 1995). It aims to “enhance beneficial biological interactions and natural processes” (National Research Council, 1989). Management of pests, weeds and soil is done from an ecological perspective, with careful attention to interactions that occur in a natural system. According to the National Research Council, alternative agricultural systems are “not a well-defined set of practices or management techniques” (1989). Rather, forms of alternative agriculture by definition seek to increase sustainability (Vandermeer, 1995; Parr et al., 1992). Those who practice alternative agriculture generally challenge the modern agricultural system.

Every ‘sustainable’ farm is different; a farm that is organic is not necessarily regenerative, and a farm that is ecological might not necessarily be organic (Rodale, 1984). For example, a
USDA Certified Organic farm that buys manure from off the farm would not be regenerative, or self-producing. Farms that encourage ecological health might employ a strategy of integrated pest management (IPM), which does not guarantee organic amendments. However, IPM uses pesticides only as a “last-resort”; cultural and biological mechanisms are used first to minimize the health and environmental risks of pesticides (Puente et. al., 2011). Although each subset has its differences, they are similar in their divergence from the industrial system and their pursuit of a more environmentally conscious farm.

In order for a farm to become organically certified, it must adhere to a specific list of standards on wild crop harvesting and handling (USDA, 2011). Products that are grown and produced in accordance with the National Organic Program (NOP) standards are able to carry the USDA organic label. The label is a way to assure customers of at least the practices on the NOP list, although farms can certainly go beyond the list, employing additional ecological practices. Organic fields must be free from prohibited substances for a period of three years, have distinct and defined boundaries and include buffer zones (USDA, 2013).

There are many well-recognized practices that characterize sustainable agricultural systems. As mentioned previously, these aim to maximize productivity while minimizing off-farm inputs, highlighting nutrient recycling processes (Gliessman, 2001; Rodale, 1984). Nutrient recycling can be achieved in a number of ways, including composting, cover cropping and on-farm animal integration. Examples of natural processes that recycle valuable nutrients include biological nitrogen fixation and mycorrhizal relationships (Gliessman, 2001). Soil health and conservation is another key feature of sustainable agriculture. Incorporating perennial crops with annuals, cover cropping, and reducing tillage improve the health, structure and retention of soils on farm (Rodale, 1984).

Some farm practices are so central to sustainable agriculture that they are part of the very definition. Francis et al. (1987) describe a sustainable agricultural system as one which embraces a management strategy which helps the producers to choose hybrids and varieties, a soil fertility package, a pest management approach, a tillage system, and a crop rotation to reduce costs of purchased inputs, minimize the impact of the system on the immediate and off-farm environment, and provide a sustained level of production and profit from farming.
Economic Factors

The economic piece of the puzzle can be more ambiguous. Several researchers have developed their own criteria for economic sustainability in agriculture (Goldberger, 2011; Bécot, 2013, Pilgeram, 2011). Goldberger (2011) outlines her criteria of individual financial security and community vitality. Individual financial security is comprised of the “economic wellbeing of both farmers and farm workers”, while community vitality refers to “community based social capital, agricultural literacy, social justice and local economic development” (Goldberger, 2011). Within this domain, Goldberger identifies several factors that she uses to analyze economic wellbeing, including: supporting local businesses, enhancing rural economic development, providing adequate farm income, and providing a living wage to farm workers.

Supporting local businesses, such as agricultural producers, stimulates the local economy and improves the viability of those operations. Enhanced rural economic development is achieved when the community’s labor and population force can support these businesses, and maintaining the viability of historic operations, including farming (Useful, 2010). Rural economies must take responsibility for their own economic well-being, create innovative businesses and must diversity in order to reduce the risk of concentration in one particular area (Useful, 2010).

Farmers and farm workers of an economically sustainable venture, Goldberger (2011) asserts, receive a living wage. A ‘living wage’ is defined as the amount of income sufficient for a person to live on, and should provide basic expenses like food, housing and utilities (Jackson, 2013). The farmers also generate adequate farm income, which means that the farm business produces enough income to support itself; i.e. no or minimal outside income is necessary to keep it going.

An economic argument for sustainable agriculture practices is that they generally require more local inputs, in terms of fertilizers, to replace the purchasing of agrochemicals that support large corporate enterprises. Others maintain that because farmers must have a deep understanding of the relationship between their crops and the greater environment, they are inclined to view themselves as embedded within local social and economic community relations that are critical to their well-being (Brodt et al., 2006, 76). Flora (1990) argues that sustainable agriculture is more consumer-oriented and therefore closely tied to local markets.
According to Pannell & Schilizzi (1999), economic sustainability can refer to preserving many factors, including farmer income, number of farmers, land productivity, and aggregate national welfare (60). Sassenrath et al. (2010) describe the various drivers that influence the adoption of sustainable agricultural practices, maintaining that economic factors are one of the most prominent drivers on which farmers base their decisions (690). Economic concerns have to do with access to start-up capital, access to land, managing risk, marketing output and the net return (Sassenrath et al., 2010).

The market power small farmers have to set their own crop prices is particularly significant. Farmers of commodity crops that are subsidized by the government do not have this power; they are restricted to charge prices set by the buyers (Sassenrath et al., 2010). Direct-marketing arrangements such as farmers’ markets and CSAs allow for farmers to be the ‘price-setters’—they can determine the amount that they receive for their output. Niche market support through cooperatives helps to give producers greater control over economic risk, marketing output, and net return (Sassenrath et al., 2010). Small milk cooperatives often allow for dairy farmers to negotiate their own prices and develop their own markets.

Making Connections

The three factors—ecological, social and economic—coexist in agricultural systems, whether farmers seek sustainability or not. Integrating the objectives can be challenging. Hanson et al. (2008) claim that social commitments are necessary to “balance the goals of improved production and profitability, stewardship of natural resource base and ecological systems, and enhancement of the vitality of rural communities” (326). Hanson et al. go on to say that the transition from conventional to sustainable agriculture will demand a careful management strategy that integrates economic, social and political aspects of economic development and protection of the environment. Brodt et al. (2006) propose that two emerging areas are the environmental impact of farming practices and the socioeconomic sustainability of family farms (75). Several researchers have looked at how environmental sustainability and community viability are inherently connected and must be addressed together (Flora, 1990; Bird et al., 1995; Campbell, 1997).

Ecological stewardship, key to sustainable agriculture, is directly connected to the wellbeing of a community, according to Cornelia Flora (2001). Responsible stewardship of
natural resources will “sustain businesses and families in a community over the long-term” (Flora, 2003, p. 11). Further, communities that plan and act in harmony with their surrounding ecosystem encourage farmers to do the same, increasing the likelihood that sustainable farms will thrive (Flora, 1995). There is a strong possible connection between farms, ecology, and community with successful sustainable agricultural systems.

Decision-makers across disciplines are interested in the trade-offs between environmental integrity, social welfare and economic efficiency, as described above (Pannell & Schilizzi, 1999). Increased economic efficiency has positive social implications; it increases the quality of life for a greater number of people. It can be argued that economic efficiency can even enhance and protect the environment (Pannell & Schilizzi, 1999). The level of current wealth and a high standard of living appear to be prerequisites for a society’s collective investment in conserving the health of the environment.

Characteristics of farm operations that might often be considered purely environmental could also have profound economic and social effects. For instance, a high level of biodiversity fosters ecosystem resilience, along with other ecological advantages. On a farm, not only does high crop diversity provide ecological benefits, but economic ones as well. Diversity in crops reduces a farmer’s economic risk, providing multiple successful crops to bring to market in case a crop fails (Sassenrath et al., 2010). Sassenrath et al. (2010) and Hoshide et al., (2004) argue that strong social ties can also contribute to diversity and resiliency of agricultural endeavors. A potato farmer who is less diverse can collaborate with a nearby dairy farmer by sharing fields. The potato farmer could plant alfalfa and allow the herd to graze and fertilize his field, while the dairy farmer could lend some land for potato production (Sassenrath et al., 2010). Even though individual farms are not diversified, this “neighborly exchange” allows for greater regional diversity of production (Sassenrath et al., 2010, 690).

Conclusion

Sustainability is an ambiguous concept that is being increasingly applied to agricultural enterprises. It is thought by many to be an on-going process rather than a destination. There is general agreement in the literature that the concept of sustainability contains social, economic and environmental dimensions. The dimensions are expressed on sustainable farms through several models, including community supported agriculture, farmers’ markets, and u-pick
operations. No matter the goals or circumstances of a particular farm, the “three legs of the stool” emerge in one condition or another. There are known trade-offs among the factors of sustainability; they interact with each other in the daily decision-making processes that farmers experience. Between the factors is a clear and compelling relationship which often causes conflict in the pursuit of a more truly sustainable agricultural system.
METHODS

The Literature

Goldberger (2011) suggests that the economic, social and environmental elements of sustainability can be assessed from either an “objective” or a “subjective” approach. Objective assessments of sustainability typically use quantitative methods—indicators that can be measured. One example of such a study is the Wallace Center’s Charting Growth Project (2010). The project developed indicators to measure progress in each of the sustainability arenas, including: farmworker wages, pesticide exposure, incidence of food contamination, emissions from agricultural sources, water contamination from pesticides, and several other measures. Objective studies can be beneficial because they can be used in multidisciplinary research (Reganold et al., 2001). However, they are limited in what can be measured and counted (Goldberger, 2011).

Subjective approaches, alternatively, allow for exploration of farmers’ perceptions of sustainability (Goldberger, 2011). Shreck et al. (2006) use a subjective approach to ask the question: “from the perspective of organic farmers, does ‘certified organic’ agriculture encompass a commitment to ‘sustainability’ that prioritizes social goals?” (2006, p. 439). To answer this question, Shreck et al. used qualitative data in the form of surveys and interviews. Qualitative interviews of open-ended questions allow for participants to focus on what is most important to them, even permitting the topic to change organically as the interview progresses (Leech, 2002; Denscombe, 2010). Because they often meander in unanticipated directions, interviews do not typically provide reliable data that can be compared across cases like quantitative methods (Leech, 2002). They do, however, provide an opportunity to reveal fresh ideas and give the interviewer an “insider perspective” (Leech, 2002, p. 665). When studying individuals’ perceptions, social scientists usually prefer qualitative methods (Goldberger, 2011).

Goals of the Study

My research seeks to answer the following question: How do two small-scale, diversified farmers perceive and practice sustainability? I am looking to find out what ‘sustainable agriculture’ means to them and how they feel true sustainability can be achieved on their farm. These farmers are unique because they have defined and continually shape their farm around a
framework of sustainability. They strive to be a model of sustainable agriculture. I used a case study approach to answer this question. I chose to do a case study because rather than getting a broad, superficial view of farmers’ perceptions of sustainability, I attempted to become fully immersed in the small-farm culture to get a deeper understanding of one farm’s take on sustainability. I feel that submerging myself in the distinctive culture of small-scale, organic and diversified farming was gave me the greatest understanding of this unique farm. Based upon my current understanding, small farms are too diverse to allow for making any significant generalizations. For this reason, I chose to collect qualitative data of just one farm instead of gathering data from multiple farms.

I also used grounded theory as a qualitative research approach. Grounded theory was developed by Glaser and Strauss in the 1960s (Descombe, 2010; Trochim, 2006). The basis of the approach is that it is better to develop theories from a foundation of empirical research, building theories upon what emerges from the data (Denscombe, 2010). Fieldwork is the fundamental part of grounded theory research; researchers using this approach should be continually engaged in data collection (Denscombe, 2010). The theory that emerges from the data is rooted in the observations of the researcher (Trochim, 2006). In accordance with this approach, I chose to conduct semistructured interviews and participant observations during my time at the farm. I allowed these interviews and observations to shape my theories.

The ecological component is typically the one that first comes to mind when thinking about a sustainable farm. Ecological factors include all of the practices that contribute to the health of the physical soils, water, air, and biota of the farm. There are many specific questions and observations that can be made about the farm’s ecological sustainability. Social factors are those that concern all of the people involved with or in close proximity to the farm operation: the farmers, employees, customers, and the surrounding community. Economic factors include the ‘money questions’; essentially, whether or not the farm able to support itself financially. This also includes how the farmers think about profitability and if they feel that they can support themselves with the income generated by the farm alone. Are they farming to make their living?

**My Case Study**

My case study of a small, diversified farm was of Flying Plow Farm in Joppa, Maryland. The farm that I chose is USDA Certified Organic, with four and a half acres in vegetable and
berry production and ten acres of pasture for grass-fed beef. The farm runs a Community Supported Agriculture operation and also attends farmers’ markets. There are two full-time farmers who rent the land on a short-term lease. The summer of 2013 was their fourth season on this current piece of land. This summer they had one full-season apprentice and two summer-season interns. They also welcome work shares and volunteers, who provide much-needed help, particularly in the thick of harvest season. Work shares pay half the price of a regular share and ‘work-off’ the rest of the share over the course of the summer.

I chose Flying Plow Farm because it exemplifies the ‘standard for sustainability’ that I would like to study. Goals for sustainability lie at the center of its mission. The website for the farm reads:

Our goal is to produce local food for our region while caring for our land, vegetables, animals and community. We strive to create a truly sustainable farm, both agriculturally and financially. We are dedicated to the craft and lifestyle of small-scale, diversified farming.

They mention all three components in some capacity in these statements, making it clear that they attempt to include all of them in their operation.

**Overall Strategy**

I was a participant in the daily farm tasks; I worked there five days each week for four weeks this summer. During the month I conducted semistructured interviews and recorded my observations each day. I was able to complete seven interviews over the course of the month. Working alongside the farmers and interns for an extended period of time allowed for conversations to develop organically, in an ethnographic interview style. I feel that this approach enhanced my understanding of the ‘farm culture’. Dialogue, as opposed to structured and closed-ended questions, allowed for farmers to talk about the areas in which their interests and passions lie. I hoped that through my work and conversation I would be able to develop an ‘insider’s perspective’ by becoming fully immersed in their world. One of the purposes of an ethnographic interview is for the topic to be able to change as the interview progresses. Shifts in topic became data in themselves; when one of the farmers mentioned an economic factor several times in one day, he implied its significance. During all interviews I used a tape recorder and simultaneously took hand-written notes. When I was in the field I used a small notebook to record my observations.
After deciding to include the self-assessment tool as part of my research, my observations became less of a core focus. I instead analyzed my interview results and Tom and Sarah’s ratings for each of the indicators. In spite of this, I believe that they were essential in the research process itself. Working alongside the farmers allowed me to integrate myself into the farm as much as possible, making me less of a researcher and more of a co-worker. Using observations as part of my methodology was key to collecting my data.

I began by asking the farmers what sustainability means to them and how they perceive it on their farm. I was specific in which environmentally-sound practices they employ and why they have chosen those practices. I asked them what social responsibility actions they take within the community: do they strive to increase food access among low-income individuals? What are their perceptions of terms like ‘community involvement’ and ‘civic engagement’? Do they have goals related to social sustainability? If so, what exactly are they and how do they strive to achieve them? I asked them some questions about finances about the farm. Rather than ask for specific information about income, I asked general questions about what percent of their income is generated off the farm. They shared some of their financial records with me, which can be found in the appendices section of this thesis.

Participant observation was critical to answering my thesis question. Throughout the month at the farm I recorded my observations in a field notebook. June is one of the busier months for farmers, so I was able to experience many activities: planting, weeding, feeding chickens, rotating cows on pasture, harvesting, and working at the market. The recordings, interview notes and observations were integrated in my data collection and used together in data analysis. The types of observations that I made varied. Farm activities with animals, plants, and people were important data. I made notes of particular practices and anything pertaining to decisions made by the farmers or the farm crew.

Social indicators are slightly more ambiguous than ecological ones. I conducted two separate interviews on social sustainability: one on community and outreach and the other on food equity issues. I began by asking them their understanding of who makes up their community and the strength of their community currently. We talked about the importance of the farmer-consumer relationship and how they work to develop this relationship. I asked questions about their presence at the farmers’ market, which is a direct linkage to their surrounding
community. I talked with the farmers about food shelf donation and outreach to lower-income and minority populations.

Economic indicators include factors discussed previously, including the degree to which the farm supports itself financially, land productivity over time, and the development of the farm budget. As with the other dimensions, I began by asking the farmers how they think about economic sustainability. What does it mean to be economically viable? How do they work toward economic viability as a goal? We talked about the idea of economic resiliency and what this means on their farm.

I also devoted one interview session to the farmers’ perceptions of their own health and wellbeing. The perceptions that the farmers have of their operation are valuable pieces of data. I asked them about perceived quality of life, hours currently worked each week, and their general level of fatigue. They shared information about their eating and sleeping habits and also how much leisure time they typically have each week.

**Distilling my Indicators**

Using what I learned from the literature I developed a list of indicators for sustainability at Flying Plow Farm. There were several studies that guided me in putting this list together. Goldberger’s (2011) assessment of farmer’s perceptions of sustainability in their operations was particularly influential. I knew that I wanted to come up with some sort of ranking system in which the farmers could evaluate their operation with a value within a set range. I used some of Goldberger’s (2011) “sustainable agriculture goals”, which she developed using social science literature on sustainable agriculture, to guide my own indicators. I also found her three factors useful, though I deviated from them: environmental stewardship, community vitality, and individual financial security. For my scales, I kept the three basics: social, economic and ecological/environmental, but I added a fourth: farmer well-being.

Another study that was instrumental in developing my indicators was done by Zahm et al. (2008). The IDEA method (Indicateurs de Durabilitié de Exploitations Agricoles, or Farm Sustainability Indicators) is an ideal example for my purpose because it was designed as a self-assessment tool for farmers. I used the same basic structure of scales, components (I call them concepts) and indicators that Zahm et al. use in the study. I came up with four scales, as I previously mentioned. Each of these scales has several concepts, and each concept has specific
indicators. For example, within the environmental/ecological scale, there are six concepts, and 15 indicators within those. The first concept is ‘soil health as foundation’ which has the indicators ‘organic matter’, ‘soil life’ and ‘soil structure’.

The list of indicators serves as a self-assessment tool for Tom and Sarah; I asked them to rate themselves on a one to five scale (see Appendix I). In addition, I asked Tom and Sarah to rank the four categories—economic, social, farmer well-being and ecological—in descending order of how they prioritize them on the farm. I used both the results of the interviews and the farmers’ ratings of sustainability in my analysis.
RESULTS

The Land: Nanasau Farm and Flying Plow Farm

Nanasau Farm is where Flying Plow Farm began four years ago. The property is set amid the hills and valleys of the Little Gunpower Falls, just south of Bel Air, in Joppa, Maryland (Gienow, 2012). Joppa is located in Harford County. Historically an agricultural county, Harford County is a unique and oddly challenging setting for new organic farmers like Tom and Sarah. Based on data in the 2012 Harford County Land Use Report, 55 percent of primary land use in the county is classified as agricultural. According to the Census of Agriculture, corn was the largest single agricultural product by sales volume in Harford County during 2007 (USDA, 2007). The corn grown in Harford County is exclusively conventional feed for livestock. With only eight organic farms currently in Harford County, organic farmers are few and far between. The challenges that they face farming in the region will be further discussed later in this section.

Tom Paduano and Sarah Rider currently run a 120-member CSA. Since the CSA began in 2010, membership has increased each year. Tom and Sarah offer one share size, which is suggested to feed one to three people (depending on the family’s vegetable consumption) and costs $700. Returning CSA members receive a $50 discount if they sign up before February 15. They do not offer a half share, but members can choose to split shares with other households if they wish. Members pick up their shares at the farm each week, with their choice of two pickup days—Tuesday or Friday, from 2pm to 8pm. The pickups start at the end of May and go until the week before Thanksgiving, which is about 26 weeks in total, depending on the weather.
Figure 1. CSA share board in the pick-up shed.

The content of shares changes each week depending on what crops are in season. Shares include a large diversity of vegetables, culinary herbs, cut flowers, and berries. Some of the vegetables, like beans, peas, and cherry tomatoes, are u-pick, meaning that customers go out to the field and pick their allotted quantity. Most of the herbs and all of the flowers and berries are u-pick as well. Members are able to pick in the fields during the pickup times. The majority of the vegetables, however, are harvested on Tuesday and Friday mornings by Tom, Sarah and their crew.
Figure 2. A U-pick crop of beans.

In addition to the vegetable operation, there are many animals residing at Flying Plow. There is a large flock of laying hens, meat chickens, a 16-cow herd, three draft horses and a pig named Sally. The laying hens, Rhode Island Reds, provide the eggs for an egg share, which consists of one dozen eggs each week, available for pickup with the vegetable share. The cows are raised for beef on pasture for most of the year, and are fed hay during the winter. The cows are mixes of several different breeds, including Highland, Jersey, Hereford, Maine Anjou, Angus and Holstein. Tom and Sarah make hay on fields that they rent. Three draft horses, Rocky, Rosie and Princess, live in the barn with Sally.

Figure 3. Rocky and Rosie at work.

The farm is financially supported primarily by the vegetable CSA, but is supplemented with a few other income sources. The farmers bring produce to two farmers’ markets on Saturdays: one in Havre de Grace, a neighboring town, and one in Bel Air. Prior to the farmers’
markets, they used to do a farm stand in the Historic Jerusalem Village, about a mile away from the farm. They also sell their chickens, which are raised on pasture and non-GMO (genetically modified organisms) local grain, at their farm for customer pick-up and at farmers’ markets. The chickens are sold frozen in whole and half sizes. The Laurrapin Grille, a restaurant in Havre de Grace, buys chicken and vegetables from Flying Plow.

![Image of Flying Plow Farm](image)

**Figure 4. The Jerusalem Mill farm stand.**

After the vegetable CSA ends each season they continue to sell vegetables using their winter harvest online ordering form. Each week, customers are able to select what vegetables they want and in what quantities. To lengthen their harvesting season, they have unheated high tunnels to protect the crops from snow and freezing temperatures. In these high tunnels they are able to grow mainly hardy, leafy greens like kale, lettuce, arugula, boc choi, and cabbage. They also sell root crops such as carrots, parsnips, turnips and radishes. In 2012, they sold winter vegetables through the end of January. Customers come to the farm during designated times to pick up their vegetables. There are almost always frozen chickens and brown eggs from their hens for sale as well.

Tom and Sarah hire seasonal interns and apprentices to help them with farm labor. They prefer to hire at least one full-time, full-season (March to November) apprentice. This person lives in camper-style housing on the farm. The other interns are typically hired for the summer
(June through September). This year they had one full-time apprentice and three interns. One of the interns worked from May through August and the other picked up from August until November. They also had a Beginning Farmer Training Program participant who worked three days each week.

The Farmers

Tom Paduano

Figure 5. Tom weed-wacking along the deer fence.

A New Jersey native, Tom Paduano did not start farming until the summer of 2004. He began growing food on about an eighth of an acre just outside Philadelphia in Rockledge, Pennsylvania. He and his farm partner at the time sold the food at a farmers’ market in West Philadelphia. While beginning to get his hands dirty, Tom was reading books about sustainable and alternative agriculture. It slowly became clear to him that anyone could be a farmer; even people who grew up in the suburbs could grow food, sell it, and make money doing it. The following summer, he left his job in Philadelphia and moved to Kimberton, Pennsylvania, to work at the Kimberton CSA. He applied for the internship because he wanted to make sure he truly wanted to farm. A couple of weeks into it, he was sure. Tom worked at Kimberton for two years when he got a call from a friend who knew someone starting a farm in Oley, Pennsylvania. They had already bought sheep, cows and pigs, and were looking for a farmer to manage the land and animals. Tom managed the operation for one very challenging year, primarily handling the
animals but also growing some vegetables and selling them in Philadelphia. He learned how to move cows, handle electric fencing, and rotate different species of animals through pasture.

In 2006, Tom went to Howell Living History Farm in New Jersey and worked with draft horses for three months. He did some plowing, manure spreading, driving and handling the horses. Following that, he went back to Kimberton as Farm Manager from June 2008 to July 2009. During that time is when Tom met Sarah, who was managing a neighboring CSA in Pennsylvania. In August of 2009, he left and went to a horse-powered farm in Asbury, New Jersey. There Tom gained experience with draft horses, working them on his own for three months.

Sarah Rider

Figure 6. Sarah and farm animals.

A self-described ‘horse person’, Sarah has handled horses since she was a young girl. Although she rode horses and worked in barns for years, she did not get farm experience until 2000 when she was in college and started working on a CSA. When she graduated in 2002, she got beef cattle, chickens and a few pigs. She managed her animals while working several different jobs at the university and continuing at the CSA. At that time she was taking the beef to farmers’ markets near State College in Pennsylvania. Sarah was finding it difficult to make her business work in the area and could not quite find the right land to farm, so she took a job in Virginia. Managing estates for people, doing consulting work, and working at different farms, Sarah stayed in Virginia for three years.
Sarah first came to Nanasau Farm, the farm from which Flying Plow now rents land, seven years ago. She worked on the farm for about a year, managing the horse barn, making hay and running her small beef cattle business. Although only on the land for a year, Sarah felt she had intimate knowledge about the farm. In 2009, she met Tom. A year later, in February 2010, Sarah and Tom arrived in Joppa and began Flying Plow Farm.

**Sustainability Definitions**

In order to have a meaningful conversation about sustainability at Flying Plow Farm, we had to begin by defining the word sustainability. I wanted to get a sense of what being a ‘sustainable farm’ means to Tom and Sarah and exactly how they perceive sustainability in agriculture. I asked them to describe what a truly sustainable farm might look like to them, in terms of practices, philosophies, values and principles. After I asked some general questions, Tom and Sarah took the discussion in several different directions. When asked about her perception of sustainability, Sarah first referred to *The Real Dirt*, which describes principles of organic agriculture. Compiled by NOFA (the Northeast Organic Farming Association) and MOFGA (the Maine Organic Farming Association), the objectives in *The Real Dirt* created the framework for organic and sustainable agriculture in the late ‘90s. As we talked further, several distinct meanings of the word sustainable developed from our conversation.

**Maintain and Support Ecological Systems**

One of the philosophies of the pioneers of organic farming is sustainable as being a whole, circular system that integrates animals, vegetables and farm workers. This idea is described in detail in *The Real Dirt*. Tom explains how this concept is one of the core guiding principles at Flying Plow.

Within farming, the big thing for me is, I like to see things working together. We aren’t just a vegetable farm, we’re not just raising chickens, we don’t just have cows, we’re not just making hay…all these things serve a purpose for each other thing.

He went on to explain how the animals benefit each other on the farm. The chickens fertilize the grass, which grows to feed the cows, and the grass acts as a long term cover crop that will eventually go into vegetables. The cows fertilize the grass, which fertilizes the vegetables. The horses’ waste becomes compost, which is applied to the vegetable fields to increase fertility,
organic matter, and overall soil health. The farmer is an integral part of the process, orchestrating the timing and arrangement of each element in the ‘farm organism’, in Tom’s words.

Figure 7. Cows among the cover crop of Sudex.

Long term fertility that enables farmers to produce high quality nutritious food is another facet of sustainable farming. Tom repeatedly stated that he thinks of sustainability as directly equated with fertility. Sustainable farms must produce their own fertility on the farm, by growing cover crops and generating compost.

At some point, it needs to be a closed system. I mean I’m thinking about sustainability from the farm sense as fertility. So if you can close your fertility loop…then you can have a sustainable farm.

The most extreme scenario would mean that people consuming food from the farm would need to deposit their manure back to the farm for composting. Recycling harvested nutrients back into the farm, in a closed loop system, ensures that the farm will continue to have adequate nutrients to produce food into the future. Nutrients, in the form of waste, that are generated on the farm must be kept on the farm as much as possible.

According to Sarah, sustainable farms strive to eliminate the dependence on outside fuels, whether its cash, fuel or fertility:

If a major source of their operation is coming from off the farm, then the farm is not sustainable. If you have another job and it’s supporting the farm. Or you go
and work [another job] for 30 years and you buy a farm, it’s not sustainable because it’s not a system that can renew itself. It relies on something else.

From Tom’s perspective, on the day of the interview on sustainability, he was considering any farm that uses nonrenewable resources to be unsustainable.

For any farm, a major income source is coming from off the farm if you are using fossil fuels. That’s a huge power source and pretty much every single farm uses it.

As he talked more about fossil fuels, ethanol and plastic, Tom grew uncertain about the prospect of a truly sustainable farm. He proposed that if a truly sustainable farm is a closed system, then one would be hard-pressed to find a truly sustainable farm anywhere, of any size. The only caveat, in his mind, would be a small homestead. He reasoned that the vast majority of farms are using at least some inputs from off the farm, in the form of fossil fuels. Tom began brainstorming some of the other items that they purchase off of the farm, including fertilizers, soil mix, and seeds.

**Land-Based Sustainability**

In order to be sustainable, farmers must have some kind of long-term land situation. “The thing that we struggle with the most…is land security, or land ownership”, Tom admits. Land-based sustainability was a frequently mentioned topic throughout the interviews. A long-term land situation could include owning the property, lease-to-own agreements, or some other method of land purchase. Sarah was quick to point out that because of their land situation, they did not know if they would be farming on the land a year from now. She felt strongly that a long-term land situation is critical; it determines whether or not a farm is sustainable. Sarah suggested that if a farm can continue to operate, than it is sustainable, because “ultimately sustainability just means it has to sustain itself!” The ecological and social practices that the farm employs are irrelevant when considering that Flying Plow might not be in business next year. Sarah emphasizes, “If you are striving for sustainability I think the number one thing would be, are you going to be around in another year?"

Ecological practices used on the farm can rarely reach their full potential without land security. “We are just starting, this year, to see the benefits of [rotating the animals on pasture], just in the fertility. It has taken over three years to just begin to see them,” Tom explains. Increasing organic matter content of the soil, for instance, takes years of cover cropping and
adding compost. Increasing the fertility of the soil is a similar undertaking; it takes a long time to see effects like increased yield and healthier, more nutritious vegetables. Even as nutrients are building in the soil, there is a significant lag time before change can be seen in the quality of the vegetables.

**Sustainability of the Community**

One of the themes that emerged repeatedly throughout our discussion was the importance of community. Both Tom and Sarah agreed that one of the key parts of true sustainability was community design. “There needs to be a conversation around designing a society in which there is food production within the same region”, Sarah declared. Tom expressed his doubt that a farm can sustain itself without help from others:

> There’s always going to be a need for things from off the farm, but if the farm is part of the community, and the community is part of something larger and it’s all working together, then maybe you could be something close to sustainable…

Building upon that, Sarah added, “It’s not just about the farm, it’s about the farm’s place in the bigger world”. When asked to describe a truly sustainable farm, Tom explicitly stated that the farm needs to rely on neighboring farms, but at some point, it needs to be a closed system.

**Ecological Health: Interview Responses**

Building fertile soil, which is connected with many ecological functions, was one of the major themes that surfaced from the interviews. Currently, Tom and Sarah use three methods of increasing soil fertility—organic-approved fertilizers, compost, and cover cropping. Together, these techniques are used in order to apply the necessary amount of nutrients for each vegetable crop. According to Tom, “each crop has a set need and we make up the difference with fertilizer.” The fertility at Flying Plow is in a deficit, so compost is applied with the fertilizer. “We’ve had our compost tested and we know the nutrient content…I am confident that we aren’t applying excess amounts of nutrients,” assured Sarah.

To decide how much fertilizer to apply, they look at soil tests from the previous fall and what the crop needs. The fertilizers used on the farm are all Fertrell Products: Super K (for Potassium), Super N (for Nitrogen), Blue N (time-released, multi-nutrient for Nitrogen), and Phostrell with Boron (for Boron deficiency). Fertrell is an organic and natural fertilizer company
out of Bainbridge, Pennsylvania. Occasionally, they will use fish emulsion as fertilizer but generally that is in the greenhouse on seedlings.

They make two different kinds of compost on the farm. Since 2010, they have been combining manure from the horse barn with sawdust to make compost. In 2011, they started also using cow manure, straw, and vegetable scraps to make a different kind of compost. Generally, the rate of application is ten tons per acre. In previous years, they put it on certain ¼ acre blocks of crops that were particularly nutrient deficient. But this past year, for 2013, they put compost on “pretty much everything,” said Tom. In the summer of 2012, they got Sally, their resident composting pig. Tom explains how Sally facilitates the composting process:

First she kind of packs the manure and straw, because the horse manure has a lot of loft, which has a lot of air, and a lot of nitrogen, and it heats up quickly so sometimes it will burn...so having Sally pack it down pushes the air out so it composts at a big lower temperature. That’s the first part. Then once she’s got three feet, we make holes with a post and drill corn so she roots the bottom of the pile and turns it. It’s still a work in progress.

Figure 8. Sally the composting pig.

Cover cropping is an important component of the farm, and increasing fertility is only one of its functions. “All of the cover crops will capture the available nutrients in the soil and keep them from leaching,” explained Tom. If you have ten pounds of nitrogen, and then you plant the cover crop, it will use that in its growth and hold it there. Then when you till it in and plant something else, which will use the nitrogen, so by planting the cover crop you have kept the nutrients in place. Legumes (nitrogen-fixers) are specifically used to add nitrogen to the soil.
In addition to soil fertility, cover crops are incorporated to build soil structure, control weeds, build organic matter, and increase soil biodiversity. The roots of the cover crops hold soil securely in place, and help to permeate any hardpans below the surface. Weed control is another benefit of cover cropping. They have observed a decrease in weed pressure in vegetable fields that were previously in one or more cover crops. Tom explains how cover crops work for weed control:

You are able to deplete the weeds in that area—either the cover crops are inhibiting the weed seed germination, with the chemicals in their roots (like rye and buckwheat) or the weeds are germinating and growing with the cover crop but they are not setting seed or flowering, and you can mow it down before it can set seed.

When the cover crops are mowed and incorporated into the soil, they increase the amount of soil organic matter. Increased organic matter content is one of the primary ecological objectives of the farm. Where a cover crop is growing, whether it is rye, vetch, cowpeas, buckwheat, or sudan grass, there is a more ideal situation for soil life. “There is more shade, a lot more stuff alive than in a row of vegetables,” in Tom’s words. Soil flora and fauna thrive in blocks of cover crops. Additionally, many cover crops provide good bee forage, like buckwheat.

As an organic farm, Flying Plow manages pests, weeds, diseases and fungi using several different types of controls: cultural, physical biological and chemical. Cultural, physical and biological controls are used first, while chemical controls are used only when necessary. To control pests using cultural controls, Sarah and Tom hand-pick some types of bugs off the plants, including Colorado potato beetles and Harlequin bugs. For other bugs, like flea beetles and squash bugs, they use floating row covers over the plants. Flea beetles attack brassicas and other leafy greens, but their distinctive damage of holes in leaves can be minimized with assiduous row cover use. Row covers can also limit squash bug damage by preventing egg-laying access to plants early in the season, before the plants flower. Once they flower, however, the covers must be removed to allow for sufficient pollination.

Altering the timing of some groups of plants is also an important cultural mechanism:

For harlequin bugs on brassicas, we do a timing thing—the end of June to July there are no brassicas, which disrupts their lifecycle…We don’t grow spring spinach, broccoli, or cabbage…it’s been getting too hot too quick. We stopped doing such a large brassica load in the spring…we grow more for the fall and
winter; we focus more on the fall and winter than we do on getting an early spring start. There’s a lot less pest pressure in the fall for brassicas. And there’s slightly less weed pressure.

Figure 9. Winterbor kale, one of the brassicas.

For disease control, cultural methods can be very advantageous. The farmers will often choose varieties that are particularly susceptible to disease: “We grow mainly hybrid tomatoes for their disease resistance,” explained Tom. Seedlings are planted farther apart than is typically recommended in order for greater air flow between plants, lessening the rate at which disease can spread.

Physical controls are used for weeds, including hand-pulling and hoeing. There are several tools that Sarah, Tom and their crew use for weeding: hand hoe, stirrup hoe, and wheel hoe. These tools physically cut off the weeds from their roots, or remove weeds and roots completely from the ground. Weeds are the one nuisance at Flying Plow Farm manages only using physical controls. There are no suitable biological techniques for weed control, and the use of herbicides is not permitted on organic farms.

In the past, though not every season, Sarah and Tom have employed the help of biological controls. They have successfully used parasitic wasps for Mexican bean beetles, which eat their bush beans. There are parasitic wasps for the tomato horn worms that are native to the
region; they are naturally occurring. Consequently, they do not spray for horn worms, and Tom said “I’ll squish ‘em by hand but if I see any with the wasp eggs than I just leave them alone”.

When these methods are not enough, they will use chemicals to control unwanted pests—
insects, fungi and diseases. As a Certified Organic farm, Flying Plow only uses pesticides on the USDA organic-approved list. They sometimes use Dipel, a bacteria based on the naturally occurring *Bacillus thuringiensis*, When plants sprayed with Dipel are eaten by insect larvae, they die. Kaolin clay, a mild clay that is essentially kaolinite, is sprayed to prevent insects from feeding on leaves of eggplant, squash, zucchini, pumpkins and cucumbers. According to Tom, application depends on the year: “Some years I’m really into it and I use it and then other years I don’t.”

Pyganic is a more powerful, pyrethrum-based, broad-spectrum insecticide used sparingly at Flying Plow.

It is an extract of the Chrysanthemum. It kills anything in its path. I use it only in emergencies, very sparingly. I use it on transplants, in flats, or right after transplanting. I don’t like to use it when things are very big. There’s lots of life around like beneficials that I don’t necessarily want to kill.

Tom and Sarah try to minimize their reliance on fossil fuels and petroleum-based products as much as possible. “We recycle, we don’t use black plastic mulch, we try to reuse drip tape and greenhouse plastic as many times as we can, we’re trying to use less bagged fertilizer…” Tom went on. They try to use horse power for field work as much as they can, lessening their reliance on tractors. Although working with the horses has inputs—hay, veterinary bills, and time—these inputs are minimal compared to the tractor. Tractors require diesel fuel to operate, which is a nonrenewable resource.

**Social: Interview Responses**

For Tom and Sarah, building healthy, strong communities is one of the defining characteristics of sustainable farming. Individuals, families, organizations and other groups within a community must collaborate, offer support, and share knowledge and resources in order for a community to be sustainable. They believe that communities should be designed around food production; food should be produced in the same region in which people live. Having a community is not only valuable, but it is necessary in order for an individual farm to thrive.
Historically an agricultural county, Harford County is a unique and oddly challenging setting for new organic farmers like Tom and Sarah. Based on data in the 2012 Harford County Land Use Report, 55 percent of primary land use in the county is classified as agricultural. According to the Census of Agriculture, corn was the largest single agricultural product by sales volume in 2007 (USDA, 2007). The corn grown in Harford County is exclusively conventional feed for livestock. With only eight organic farms currently in Harford County, organic farmers are few and far between.

When asked about farming in Harford County, Tom explains, “It just feels like 1980’s farming. I don’t know if it’s the same thing in Montgomery or Baltimore [County]…” Tom is referring to the way Harford County has changed in recent years. In the 1980’s, many vegetable farms used conventional, not organic, growing methods. Instead of using the CSA model, traditionally these farms would sell their produce at farm stands. Tom and Sarah talk about Harford County:

“If you have vegetables, you have to have a farm stand,” says Tom. Sarah offers, “It is kind of weird. I think part of the problem is how it’s grown…It’s gone from being a rural place to being so, so suburban. I feel like Harford County has just missed a few steps.” Nodding, Tom adds, “There’s always that older person that’s going to ask you where the farmstand is…that’s what I’m thinking of.”

In Flying Plow’s case, Community Supported Agriculture is an accurate description of the venture. Tom and Sarah both agreed that their primary connection to most people in Harford County is the CSA. Because they see their members every week at the share pick-ups, they have a stronger connection to them than most market shoppers, who visit the farmers intermittently. Sarah explains their relationship:

We certainly have a community around our CSA members. It’s not like we have a connection with every single member, but definitely a relationship with a percentage of them, so if we needed something we can ask.

Every week, Sarah sends out a farm note to the CSA members, telling them about what’s going on at the farm and what they are thinking about that week:

I mean even things like the farm notes…I have certain things that I’ll talk about with the CSA members, like a more in-depth conversation. I don’t think we necessarily sit out on our soapbox and talk about what we’re doing. Because I feel like a lot of times most of its just going to right through people, like they’re not
going to know. But our CSA members are more interested in those issues about farming, food and health I feel like our members too tend to be more like-minded.

Within Harford County, the CSA members make up Flying Plow’s closest community. They help to connect the farm with other things going on in the town, state and region.

Contradictory with these statements, when first asked about what makes up their community, Sarah admits, “We’re not really sure. That’s the only thing we think about. We don’t know.” After I tried to get them to brainstorm a list of groups that make up their community, Sarah confessed, “It’s kind of a short list, that’s the sad part.” Tom attempts, “There’s people who help us, our neighbors. People who help us with hay and other things…” One of their main goals is increase the number of people connected to the farm, thereby expanding their community. They want to bring more people to the farm. “We definitely want to have more community type events around food or films or music,” says Tom. Ideally, they would like to be closer to their farming peers. Jokingly, Sarah says they will “guilt their friends into the fact that they really should be farming Harford County”.

The place-based knowledge and rich history of Nanasau Farm is vital to building a strong community. Prior to the farmers’ markets, Tom and Sarah sold their vegetables at a farm stand in the Historic Jerusalem Village, where locals would come often. They knew about the property long before Flying Plow began, and would ask Tom and Sarah about the farm and tell them stories about the past. According to Sarah, “Even if they aren’t associated with us they are associated with the land in some way, so they are interested in what we’re doing here. That always seems nice.” People who lived there for decades would tell them what has happened before on the land and about other farms nearby. Through these narratives, Tom and Sarah have learned about the history of the land, which has helped them to understand how to better manage it.

Educating and informing others is another critical aspect of social sustainability, which was evident in their responses. On the topic of urban agriculture and growing food in cities, Tom and Sarah view it as an educational tool, or awareness building method. It can be used as a way to reconnect people with their food. They believe in agriculture as a method of education. In the Baltimore area, they continually find people who don’t know what a CSA is or what different unusual vegetables are, like tat soi or kohlrabi. In that regard, they find themselves constantly
educating people on the mission, model and daily workings of Flying Plow Farm. Sarah expounds,

Because there aren’t other farms like us, we are still having to do a lot of education. And it’s still kind of surprising, the amount of education that we have to do. I guess that’s a good thing.

One aspect of fostering community is that it takes a significant amount of time. Sarah says, “I feel like it’s also a timing thing. We’re still pretty young, and the CSA is young…” Tom agrees, “And we haven’t lived here very long either. It takes time, too.” It takes years and years to build a supportive, robust community; it does not happen overnight.

The discussion we had around food equity and food access falls under the social category. Sarah was not present for this interview because she had a meeting, so I only got responses from Tom. I began by asking him about his perception of food equity in the Bel Air community. Tom paused for a while before beginning to speak. After hesitating, he launches in:

First off you have to say that the prices that people are paying for food and the prices that we charge for food are coming from two different food systems, or two different perspectives. So, just thinking about processed food versus whole food, I think it’s safe to say that processed food is subsidized twice: by food commodities, like corn and soybeans, and I think it is subsidized after you get sick, through employers’ health insurance, your health insurance, or through government coverage.

Tom then explains that when people in the Bel Air area tell him that they cannot afford the food that he offers, he does not believe them. He does not feel that it is an issue of being able to afford healthy food, but rather an issue of not prioritizing healthy food. Tom admits,

I’m sure that there’s people around here who are hungry and poor and truly can’t afford it, but I think that the majority of people who say it’s too expensive…they have prioritized a smart phone, a television and car payments and new shoes and cable TV…they’ve prioritized a lot of other stuff…they’ve prioritized entertainment, essentially, over good food.

Tom made it clear that is what they find in this community, but acknowledged that it is very different in other communities, particularly in inner cities. Overall, he said that he and Sarah do not address the issue right now. Because the farm is just in its fourth season this year, they are doing their best to simply survive as a business.
Although they do not actively address food equality and access, several of their actions speak to these issues. In their first two years, they donated a lot of extra food to the Community Action Agency Food Pantry in Edgewood, Maryland. However, they have not donated as much food this year. They have recently been feeding extra food to Sally and composting it, as an effort to improve their composting system. Tom mentioned that they accept Women, Infants and Children (WIC) coupons at the farmers’ markets, in addition to Maryland Farmers’ Market Nutrition Program (MDFMNP) vouchers. The MDFMNP vouchers are similar to food stamps, but they can only be used at farmers’ markets to purchase fruits and vegetables. They also consider work shares, which is a share option in which people pay half of a share and work on the farm to pay the other half. This share option makes it more affordable for families, although requires a greater time commitment than the traditional share.

Another topic that came up in the food equity conversation was education, which we talked about earlier in the interview process. Tom stated that getting people interested in their food to the point that they prioritize it over other expensive things, like entertainment, is not something you can force on people. They have to decide for themselves. Tom conceded, “And I guess it is privileged, because if you have the leisure time to worry about how your food is grown…” Tom struggled with this, saying that people have to really be interested in buying this type of food, with a desire to know how their food is grown, but at the same time it is a privileged quest. He felt very conflicted about the food equity issue, particularly about donations and subsidized healthy food. Tom posed the question of whether or not it is an effective way to address the underlying issues causing food inequality in the first place.

**Economic: Interview Responses**

Tom and Sarah talked about why they chose to start a small CSA farm from an economic perspective. According to Tom, a farm with five acres in vegetable cultivation means that they are small enough that they do not need a large crew of people or a lot of specialized equipment. They are able to run the farm with a couple of interns and a few basic pieces of equipment. The CSA program is a beneficial business model because it allows Tom and Sarah to receive customers’ payment before the season begins. Sarah explains: “We chose to do a CSA because that’s what we knew, we like the idea of it, we like the people involved, and our first season we had no money so we needed the money upfront.”
When talking about economic sustainability, we also used the term financial viability. When asked what financial viability means to them, Sarah had two overarching criteria: meeting set financial goals and increasing net worth every year. Sarah explains what net worth means to them:

Your net worth is the value of everything that you do. And everything that you own, and all the money that you owe to other people. All of your assets and your liabilities. You take all the stuff that you own and then you subtract out all the stuff that you owe other people.

Within meeting their financial goals, buying land is their top priority. Tom explains, “The big thing for us right now is having our own land. A long-term land situation. Because we can’t have any kind of sustainability without that.” Sarah elaborates:

[On rented land] you can’t plan for anything and you can’t make accurate goals…you don’t know where are you going to be, how much you can grow, what the land can carry, what the market is. All of your variables are just so unknown. I feel like we are making a bad investment here…in the name of long-term sustainability, growth, soil health and ecological health and all of these things. We’re not going to get any of that back. It’s like practice, we’re getting all of these things in order so when we’re actually on land we’ll be ready to go. Moving and starting over is very expensive in so many ways, and you can’t do that too many times.

When asked if they think about economic resiliency, Tom says, “We don’t think about it really. We do but not seriously. But I think our vision of farming has resiliency built into it.” He went on to explain how producing your own food and fuel buffers you from market fluctuations that affect the price of things needed on a farm. For example, recently the price of straw went up in central Pennsylvania because of fracking. As a result of a fracking mishap, big straw bales were being used to divert water, and the price of straw skyrocketed. In Tom’s words, “if you have your own straw, you don’t have to pay that market price.” Producing their own hay and straw for their animals is an important part of the operation. Tom mentioned that the more important question to ask is not is the farm resilient, but is the community resilient. If the community is prepared, they can help each other out in the face of potential disasters.

Another major financial goal of Tom and Sarah’s is to begin saving money each year. Originally they planned to save money after their fifth year in business, but they started putting small amounts aside a couple years ago. Like many small businesses, they cited having enough
time, capital and money as continuously limiting factors. Tom described the careful balance of producing a product, pricing it, and then selling it on the market: “We have to look at our market and the demographics and the food we are trying to sell. If the cost of producing it is high, and the cost of selling it is high, then will they pay that price?” In order to grow food the way they want, food has to be a certain cost in order to make money, and they must make sure their surrounding community is willing to pay that price.

Right now, Flying Plow’s income minus expenses is pretty close to zero; they are not making much money. Tom and Sarah do not pay themselves an hourly wage or salary, but they do account for their needs within the farm budget. Sarah describes,

The farm pays for everything we need. We think of ourselves as just like any other livestock on the place. We take care of our needs and not a whole lot else…that’s how the whole thing works. I think that’s why it’s sometimes easier because Tom and I are both here and we both do this, so our whole family does this, so it makes the whole logistic a lot easier.

Toward the end of the interview, I asked them if they thought Flying Plow was financially viable right now. Sarah was quick to reply: “No.” I asked her why not, and she answered,

Our net worth is increasing, but I don’t know. I think it’s too soon to tell. I think financial viability is like sustainability. You have to be further down the line. And we’re in our infancy. Our business is in its infancy. The criteria are different, in your first five years of business. Your perspective on financial viability is just staying alive. And once you graduate to being a teenager of a business, 5-15 years old, the goals are different.

I asked Tom and Sarah how much financial stress they experience on a regular basis. Sarah answered for both of them, “Tom stresses a lot. I don’t stress at all…I shouldn’t say that. Tom stresses a lot, I stress a little. People’s relationships to money can be very different. It is very personal; it’s how you are built.”

**The Farmer’s Wellbeing: Interview Responses**

During this interview, Tom and Sarah discussed their perception of their current quality of life and their ability to continue farming into the future. Sarah said that she and Tom had been discussing the idea of hiring more people to make their workload easier. Sarah explains,
We think it’s like the maturity of us and maturity of our business. We know that we can’t work this much, at this rate, forever. We kind of know that. But you know that you do have to work this much maybe the first five years or so. I think if we were ten years younger, I could say that I could work like this for the rest of my life, but now…it’s not about if I could or if I want to…it just kind of makes sense that we would be able to incorporate more people so that it’s certainly more sustainable for everybody, just physically and mentally.

Sarah went on to say that she does not think Flying Plow is quite ready for that yet, because the business is so young. They are still forming the foundation of the farm and business, and until that is set, it is difficult to incorporate other people. Both her and Tom agreed that it is a very hard thing for farmers to step away from the farm tasks they are so used to doing all the time, like mowing, hoeing and planting. Tom said that he feels guilty asking other people to do it when he then goes to do something else.

Tom feels that they must make time for leisure, usually at night and on the weekend. He explained:

Having leisure time means that other things suffer, like our house is dirty and our dishes don’t get washed and the laundry doesn’t get done and things don’t get cleaned because it’s either like work on the farm or relax for a second. It’s hard to be working and then go home and sweep and do dishes. It’s one or the other this time of year so we don’t clean anything.

Tom feels that Sarah is better at treating chores as leisure time. He explains that sometimes he just needs to do something unrelated to farming, like watching movies or reading.

Sarah explains that part of it is figuring out the help that they could use and how to incorporate it. She explains that they could hire someone during the peak times, like the busy month of June:

Maybe that’s where we could also hire people to help, on some of the personal things…because the thing is the better our life works, the better our house is organized and we’re actually eating real meals, we do work a lot better. So I’m not sure why we can’t put it all together all the time. Because there are times of the year when we have a clean house and we eat regular meals and sit down at the table but it’s just hard to keep that up during the busiest time.

When asked about their quality of life, Tom and Sarah agreed that although they have stress, it is good. Tom admitted that he has more stress than Sarah, due to finances in particular. He also said that he would like to spend more time with his friends and family, but otherwise
does not have many complaints. Sarah expressed that she wishes she could get into the habit of doing yoga on a regular basis, because it makes her feel so much better. Tom went on, “I think we are pretty healthy. But I think stress is the biggest thing that makes us unhealthy.”

Tom and Sarah concurred that although it is ironic, they could eat better, but they just do not make the time. Sarah explained this further:

We could actually eat real meals instead of just throwing things together at 9:30 at night and then going to sleep. These kind of things too, I think in the big picture come back to the community aspect…I mean ideally if we lived near family members or close friends, I could see in the busy months we could have a family member help us cook or help us with some of this other stuff…I’ve been at CSAs that have members who are yoga teachers and they come teach once or twice a week. So there are certainly ways to rely on the community for this aspect of it too—the health and well-being aspect.

Tom and Sarah talked about their lives in the winter, when they are able to have some vacation time. This past winter of 2012, they were a bit more structured than they have been in past seasons. For two weeks, they put their email on auto-respond and turned off their cell phones, and worked as little as possible, only doing chores. Sarah felt that decision was very helpful for them at the end of a busy, exhausting season. She explained that those are some of the challenges of having your business where you live; it is often very difficult to separate yourself from your home business. Sarah noted, “We also structured our work through the winter a bit more to make sure we were getting everything done…we were really harvesting until the end of January, and then we started seeding in the greenhouse at the end of February. So it’s really just a few weeks [of vacation].”
Figure 10. Winter planning spreadsheets.

Sarah mentioned that Tom likes to go away, to get off the farm sometimes for his vacation. She commented, “I don’t really want to, because I feel like it’s too stressful to go away. I’d prefer to just stay on the farm and just have a quiet couple of weeks.” During the winter, when they are not taking their vacation time, Tom and Sarah spend their days planning and organizing for next season. Their hoop houses allow them to continue harvesting many hardy crops through the winter, Sarah explained:

Even harvesting in December, that’s still a pretty big ordeal. We’re pretty tired and all our help has left. And it’s just the two of us. We had our best market day
two days before Christmas. We sold over a thousand dollars’ worth of stuff. That’s still a lot of harvesting.

Both Tom and Sarah agreed that they generally get plenty of sleep, both during the summer and winter seasons. Though they get an adequate amount of sleep for the strenuous work they do, the level of physical exhaustion varies depending on the time of year. Sarah explained, “Every year you go through this, you get almost more accustomed…this is what it feels like in April. And then in August it’s like a different level of fatigue.” Tom exclaimed in response, “Well yeah, because all the hope is gone!” Sarah laughed, “All the hope is gone?!” Tom went on, sounding more exhausted as he spoke, “It is! Because it’s like in the spring, everything is going to be great! And then in August it’s like it either worked out or it didn’t. Gotta go harvest again. Okay. Gotta go do this again. Gotta go to market. Only three more months.” Sarah responded, “Yeah well, August is the first time you start thinking, how many more weeks I gotta do this?”

Meditation and relaxation were two final themes that came up in this interview. Sarah explained that it goes back to one of their original problems: the ability to designate tasks to their hired help.

We tend to give up the non-thinking jobs that are kind of like our mental space. That’s how I felt about cleaning the barn over there…cleaning stalls was like my one hour a day that I could just do something where I didn’t have to think and I could just gently think about all the things that I have to think about…so we give those away and then I think, why am I so stressed out? It’s because I haven’t had my like one hour of total meditation day.

“Non-thinking” jobs like mucking stalls, mowing the lawn, and weed-whacking are valuable meditation opportunities for Tom and Sarah. When they give the tasks out to interns and apprentices, they are left with jobs that require more brain power and processing, adding to their stress level.

Observations

While I was working at Flying Plow and conducting interviews, I was also recording my own observations each day. I kept a journal with a summary of what we did, comments made by workers at the farm, and anything that Tom and Sarah talked about outside of the structured interviews. I also attended two farmers’ markets over the month: one in Havre de Grace and one
in Bel Air. At the markets, I recorded any significant comments made by customers or striking observations that I had.

A Day on the Farm

Generally, the weeks that I spent at the farm followed a specific structure: harvest for the CSA pickup on Tuesdays and Fridays, field work on Mondays, Wednesdays and Thursdays, and markets on Saturday. Sunday is an off day for all apprentices; Tom and Sarah take care of the chores. Other than daily animal chores, they try to take the day off too. On harvest days, we would aim to be finished harvesting, washing the vegetables and setting up the pickup shed by one o’clock. In the afternoons we would do ‘maintenance hoeing’, which is done after harvesting the beds, in between rows of crops. According to Tom, it is “a way of keeping up with the weeds in a systematic way”. Depending on how much time hoeing required, we would do any other vegetable work that needed to be done, like transplanting or greenhouse seeding.

![Figure 11. Greenhouse Seedlings.](image)

We began each day promptly at seven, although some harvest days we started at six-thirty. Upon arriving at the farm, I helped Taylor and Tamara fill up giant wash tubs with cold water for washing in the pick-up shed. Cecelia counted rubber bands and put them into bunches for increased harvest efficiency. Inside the pick-up shed, Sarah and Tom deliberated over the harvest list for the day, finalizing which vegetables we would pick for the CSA share and how much of each. We all loaded up the truck with plastic crates and gathered harvesting supplies: knives, clippers, and digging forks.
In the field, Tom did not waste any time designating tasks. Within minutes, Tom, the apprentices and I walked to our separate rows of vegetables, armed with crates and knives. We were sent to vegetables that we had been taught how to harvest prior, or else received a quick lesson before beginning the job. The first harvest I did this summer was on June 4, only the second week of the CSA pickup, so we harvested early season crops, and mostly greens: turnips, kale, kohlrabi, arugula, head lettuce, lettuce mix, mustards, tat soi, boc choi, scallions and radishes. Sarah remained at the pick-up shed while we were in the field: she was the self-elected veggie-washer. Having one person stay and wash while others harvest makes the process go more smoothly.

Each crop has its own precise harvesting procedure. Some, like turnips, kale and scallions, are bunched right in the field. Others, like tomatoes, peppers and eggplants, are counted and put into buckets singly. Still others, including lettuce mix, mustards and arugula, are cut and weighed by the crateful and then divided up into shares. Back at the pickup shed, all greens and root crops must be washed. ‘Fruit’ crops, like tomatoes, cucumbers and summer squash, remain unwashed. Tom is very particular about harvesting techniques:

- For lettuce mix…use a red knife and make clean cuts. Do not cut below the growing point, so we can cut it again. I do want you to do this quickly, but I don’t want to see this (points at broken and twice cut leaves). I don’t want to see weeds. Be aware of weeds if you cut them with bunches of lettuce and take them out.

Tom explains how harvesting is different depending on where the vegetables are going to be sold. When collecting Swiss chard for the market, blemishes like holes, wilt spots, or disease-afflicted leaves are undesirable and should be minimized. Additionally, the largest leaves on the plant are preferred. For the shares, much more chard will need to be harvested and one cannot afford to be so choosy. Smaller, imperfect leaves are more acceptable for the CSA rather than the farmers’ market, Tom explained, because market shoppers are affected by vegetable aesthetics much more than CSA shareholders. Attractive presentation at the market is essential.

After the harvest, Sarah finished setting up the CSA shed while Tom and the rest of us went to take care of lunch chores. We moved the meat birds’ pens to fresh pasture, replenished their water and topped off their feeders with grain. Then it was off to the hens to collect eggs and bring them back to the house for washing. At that point, it was a little after one o’clock in the afternoon and it was time for lunch. The crew and I sat around a table outside and ate lunches
that we brought with us, while Tom went inside and cooked. A few minutes later, Sarah was back from the shed to grab some food too. By two thirty, Tom was going over the list of activities for the rest of the day, which included transplanting several beds of tomatoes, rolling up some row covers, and of course, maintenance hoeing of the crops we harvested that morning.

For transplanting tomatoes, the bed must be marked using the row marker, which is a heavy metal tool that Tom made, with three round metal pieces. It is dragged down a prepped bed in the field to mark where the seedlings will be planted. Then, the fertilizer needed is put down using a fertilizer spreader, finishing the bed preparation. One person becomes the ‘dropper’: she drops the seedlings on the ground while walking down the bed, attempting to drop them as equidistant from each other as possible. The rest of the crew plants using hand trowels, planting the tomatoes as deep as possible. Efficiency is important because there are often lots of seedlings to transplant, but keeping the line of plants straight is also essential. A straight bed makes cultivating with the horses or tractor much easier.

Figure 12. Transplanting in Action.

While we transplanted and hoed, Tom was busy getting the horses ready to work in the field. Earlier that day, we had moved drip tape from a few beds to make room for Tom to cultivate. With the horses, Tom cultivated the peppers and some of the lettuce, and then disked some of the field for summer squash, zucchinis and lettuce that will be planted the following day. When he was finished, it was nearly six o’clock, and we were almost finished hoeing and re-
covering the kale. The day was over for the apprentices, but not for Tom and Sarah. Because the pick-up goes until seven o’clock, they would have to wait until then in order to clean up the crates and any leftover veggies. By the time they cleaned up the shed, it would be eight thirty or later.

Day-to-Day Musings

Most days, as long as we were not scrambling to finish harvesting, we talked to each other as we worked. One week I noticed that we were talking about chickens extensively; they seemed to be on Tom’s mind quite often. We brainstormed chicken marketing ideas because they were not selling as well as Tom and Sarah hoped they would. Tom admitted, “I’d rather not sell them to any more restaurants because we get less money, only $3.50 per pound compared to $4.89.” Four eighty nine is the direct-marketing price that they charge CSA members and market customers. Several ideas came up, including grilling chicken at the market, selling sandwiches at other venues, and selling to more CSA members.

The primary function of chickens on the farm besides food is as fertilizer for the hayfields. Tom had a debate aloud about whether or not it makes more sense to buy feed from off the farm or grow it themselves. Currently, they purchase feed that comes from off the farm and give it to the chickens, which fertilize the fields. In the latter scenario, which they have yet to do, they would grow their own feed for the chickens. Growing the corn successfully would require purchasing fertilizer from off the farm. In both situations, something must be purchased from off the farm. Listening to this, Sarah shrugs, saying “There’s got to be inputs somewhere—eventually you’ll have a complete system, but it takes time.” Regardless of this, the less feed that is needed, the better, Tom clarified: “We move the chickens two times a day for two reasons—so they’ll eat more clover, which will mean they eat less feed, which will save money, and they will taste better.”

Tom and Sarah’s Sustainability Ratings

I gave Tom and Sarah the indicators along with instructions for evaluating themselves and a short, one-sentence description following each of the indicators (see Appendix I). After they gave themselves a rating on the 1-5 scale, I analyzed their ratings and compared them to my findings during my interviews and observations. I organized the scores side-by-side to compare them more easily.
Figure 13. Tom and Sarah’s Ratings of Sustainability.

<table>
<thead>
<tr>
<th>Sustainability Indicator</th>
<th>Tom</th>
<th>Sarah</th>
</tr>
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<tbody>
<tr>
<td>Organic matter</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Soil life</td>
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<td>4</td>
</tr>
<tr>
<td>Soil structure</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Cover crops</td>
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<td>4</td>
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<tr>
<td>Farm-generated compost</td>
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<td>4</td>
</tr>
<tr>
<td>Diversity of plants &amp; animals</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Multiple species synergies</td>
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<td>4</td>
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<tr>
<td>Nutrient cycling</td>
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<td>4</td>
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<tr>
<td>Closed loops</td>
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<td>Biological controls</td>
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<td>Draft power</td>
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<tr>
<td>Hay production (env)</td>
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<td>3</td>
</tr>
<tr>
<td>Food production (env)</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Minimize oil-based supplies</td>
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<td>3</td>
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<tr>
<td>Land ownership</td>
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<td>4</td>
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<td>Savings</td>
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<td>Increasing net worth</td>
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<tr>
<td>Community supported agriculture</td>
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<tr>
<td>Farmers’ markets</td>
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<tr>
<td>Quality products</td>
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<td>4</td>
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<tr>
<td>Yield</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Long-term investments</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Land security</td>
<td>2</td>
<td>2</td>
</tr>
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</table>

**KEY**
- **Green** = ecological
- **Drk blue** = economic
- **Purple** = social
- **Aqua** = farmer well-being
- **= n/a**
- **= same for both**
- **= differ by 1**
- **= differ by 2 or more**

Total: 52
<table>
<thead>
<tr>
<th>Activity</th>
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<th>Serenity</th>
<th>Health</th>
<th>Well-being</th>
<th>Farmer Well-being</th>
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<tr>
<td>Hay production (econ)</td>
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<td>Food production (econ)</td>
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<td>3</td>
<td>6</td>
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<td>3</td>
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<td>6</td>
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<td>5</td>
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<td>Work-share opportunities</td>
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<td>Donations</td>
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<td>Physical exertion</td>
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<td>* difference in interpretation of the indicator</td>
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<td>Sleep</td>
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<td>Household cleanliness and organization</td>
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<td>-1</td>
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In addition, I asked Tom and Sarah to rank the four categories—economic, social, farmer well-being and ecological—in descending order of how they prioritize them on the farm. Tom’s rankings were: ecological, economic, farmer well-being, and then social. Sarah’s were slightly different than Tom’s; she listed her priorities as first economic, ecological, farmer well-being and then social. These rankings provide a perfect summary of the interview data that I collected and the ratings above, for each of the indicators. Sarah was distinctly more economically focused than Tom, consistently expressing the importance of the viability of the farm business. Tom’s responses tipped more in the direction of the farm’s environmental stewardship goals.
DISCUSSION

Assessing agricultural sustainability is an arduous but vitally necessary undertaking. It enables us to measure the social, economic and environmental implications of agriculture (University of Reading, 2013). There are many methods used to assess the “question of sustainability” (Ikerd, 2008) on farms; some are quantitative, others are qualitative; some are objective and others are subjective (Reganold, 2001 & Shreck et al., 2006). One approach to assessing farm sustainability is to explore the individual farmers’ perceptions of the sustainability of their operation (Goldberger, 2011). Organic, diversified or integrated farms cannot be considered inherently sustainable—they require some method of evaluation of their sustainability practices and goals.

In analyzing my interviews and observations during my time at Flying Plow Farm, I was able to extract several major, recurring themes about Tom and Sarah’s perceptions of sustainability. My discoveries were twofold. First, I analyzed the major themes in effort to understand the extent to which they influence and limit the others and how they are prioritized in daily farm operations. Second, using Tom and Sarah’s responses, my own observations and the literature, I compiled a list of sustainability indicators as a tool for measuring the sustainability of FPF. I then asked Tom and Sarah to rate the status of their farm on each of the indicators, using a one to five scale.

Conditions for Sustainability at Flying Plow Farm

Fostering Community

Building community is an essential pursuit of sustainable agriculture in the literature, and likewise a persistent theme throughout my time with the farmers. Tom and Sarah’s beliefs strongly support Lyson’s (2004) ‘civic agriculture’: individuals should participate in the local, community-based food system by supporting nearby farms. According to Lyson (2004) and Grubinger (2004), in order to be most sustainable, farms must have a close connection to their surrounding community. A farm needs to rely on neighboring farms for assistance and support. This quality affects the health and well-being of not only individuals in the community but the farm and farmers as well.
Customer relationships

Much of my research on the social aspect of sustainable agriculture focuses on the farmer-customer relationship (Kloppenburg et al., 1996; Goldberger, 2011; Brodt et al., 2006). Close linkages between producers and customers have many benefits, including increased stability of regional markets, increased farmer understanding of community needs and greater consumer knowledge of agricultural issues. Seldom in my research did I find sources that communicated the importance of farmer values in the way that Tom and Sarah did during the interviews. Though they strongly believed in cultivating a relationship with their customers, they had even more extreme central beliefs that went beyond those I explored.

When Tom and Sarah started the farm four years ago, they were driven largely by core values they shared. From the beginning they had a philosophy of authenticity and openness; they want to show people what a ‘real farm’ is. They are very open about what inputs they use on the fields, what practices they employ and why. They explicitly communicate that they keep animals on the farm and slaughter them humanely for meat. Not only are CSA members encouraged to visit the farm, but new members have a mandatory farm tour at the beginning of the season. Throughout the season, they have social events at the farm, including monthly cooking demonstrations and a harvest festival in the fall. Their openness and hunger for the ‘genuine farm’ builds trust, which is essential to a strengthening their relationship with their customers.

USDA Organic Certification is frequently a part of the sustainable agriculture discussion (Brodt et al., 2006; Goldberger, 2011; Rigby & Cáceres, 2001). Many people argue that organic farming and sustainable agriculture are synonymous, others say that they are different concepts and should be thought of as such (Rigby & Cáceres, 2001). The relationship between the two is still rather uncertain; some certified organic farms could be considered ‘unsustainable’ while non-certified farms might run ‘sustainable’ operations. To Tom and Sarah, being a sustainable farm is not about being certified organic by the USDA. In fact, when they began the farm they thought they did not want to be certified, but chose to be later due to market advantage of certification in their particular community. Their philosophy of integrity and openness allows for the relationship with their customers, which builds trust. In Tom’s view, their customers’ trust is the true “certifying force”, not the organic label.
Community Resilience

Resiliency in agricultural systems is a concept that I encountered frequently in the literature. The majority of what I found focused on resiliency as the ability of the agroecosystem to recover from and adapt to regular disturbance over time (Rodale, 1984; Berardi et al., 2011; Magis, 2010; Gliessman, 2001). When I asked Tom and Sarah about how they think about resiliency, they had a different interpretation. They were coming from an economic perspective rather than an ecological one, which I had not anticipated, perhaps due to my prior research. I was thinking about resilience in terms of the ecosystem’s capacity to adapt to cultivation, harvesting, and organic treatments (i.e. pesticides) (Gliessman, 2001). Tom explained that although they do not think about it explicitly, their vision of farming has resiliency “built in”. On-farm production of food, farm supplies (i.e. hay and straw) fertility (compost and cover crops) provides a buffer from market fluctuations caused by climate change or other environmental disruptions. From this production perspective, they believe that because one farm cannot be entirely self-sufficient, the community must be resilient. Groups with different ventures and missions who are able to cooperate effectively can create an economically resilient community. This type of resiliency allows them to be more independent from the traditional marketplace.

Education

It is evident that education is a critical part of sustainable agriculture, based upon the definition of sustainability itself: to continue into the future. Education of young farmers is necessary to carry on traditional knowledge, skills and practices of sustainable agriculture (Lasley et al., 1993; Lass et al., 2001; Brodt et al., 2006). My data resonated strongly with this concept; at Flying Plow there is a strong belief in the responsibility of experienced farmers to teach the next generation of farmers. Tom and Sarah have embraced this responsibility; they invest an extensive amount of their time and energy in educating their apprentices. Over the past couple years they have developed a curriculum for them (see Appendix C) During the season, they have ‘classroom sessions’ in which Tom and Sarah give a talk about one of the topics in the curriculum. While I was at the farm, they gave a lecture on soil science; I got the impression that making the apprenticeship an educational experience was very important to the farmers. They held check-ins each month for the apprentices, and gave them individual responsibilities—each
member of the crew was in charge of managing the production of a few crops, from seed to harvest (see Appendix H).

Brodt et al. (2006) refer to the importance of educated consumers to maintain the viability of sustainable agriculture. Tom and Sarah also believe that educating their community is essential to the sustainability of their business. For instance, informing people about the close relationship between food and health care costs is important from an economic perspective. Although there is an upfront cost to eating an organic, minimally-processed, whole-food diet, it has been shown to improve health and lessen obesity-related diseases. This will consequently save individuals on health care costs in the long term. There is an extensive amount of education necessary around many agricultural issues, particularly in suburban areas of Maryland. Many people are not familiar with the CSA model, organic food, the environmental benefits of choosing local produce, or some basic ‘vegetable identification’. Sarah expressed that they frequently encounter people who do not know radishes from turnips or kohlrabi from parsnips.

They are attempting to educate consumers in several ways. At farmers’ markets, without making a deliberate effort, Tom and Sarah are educating shoppers. People come up to their table and ask questions about the vegetables they are selling and how they run the farm. They ask about certified organic practices and the purpose of animals at FPF. As mentioned previously, the farmers open up their farm to community members in an effort to teach more about growing food. Flying Plow’s aspiration to educate others, although initially perceived as a social component, is related to economic goals, as seen in the literature. Education helps to build a market for the food they produce, which is essential to preserve the viability of FPF.

Land Ownership

Perhaps the most essential condition for sustainability at Flying Plow was land ownership, reappearing in nearly every interview of the month. Owning farmland, as opposed to leasing it, was not something that I researched specifically because I had not anticipated it as a basic component of sustainability. Additionally, it was not something that directly emerged from the literature I studied. Certainly, owning land was not a criterion in any of the definitions of sustainable agriculture. But for Tom and Sarah, owning land was so critical to the sustainability of their farm that they described it as “everything”, saying that they “couldn’t have any kind of
Renting land on a short-term lease like Tom and Sarah do has a ripple effect on almost every decision they make.

From an ecological perspective, when the farmers are trying to decide how to use a plot of land, the fact that they do not own the land ultimately makes a huge difference on their decision. They knew at the time of my research that they would be leaving the land within the next year. This is significant because it changed what they planted this season. For instance, instead of “maximizing cover cropping”, they maximized vegetable production by “double-cropping” some sections with vegetables in order to increase their income. Ideally, they would like to increase the amount of land in cover crop, which improves the health and fertility of the soil (Gliessman, 2001; Rodale, 1984). When they own their land, they will be able to focus more on achieving those “long-term benefits” of ecological practices, like increased organic matter content, farm-generated soil fertility, and better weed control.

Economically, owning land—or at least being in a lease-to-own agreement—is critical for the viability of a farm business. When the farmers are positive that they will be on the same land, year after year, they are able to make smarter monetary investments. They will have the opportunity to improve on the operation from year to year, using the same restraints of the same piece of land. Moving an entire farm is an extremely expensive undertaking and cannot be done many times without hurting the business as a whole. Additionally, once farmers have successfully refined their business, fulfilling their ecological sustainability goals will also reap economic benefits. For example, they will be able to improve cover cropping techniques over time, which will increase soil fertility and save them money on fertilizers.

**Fertility**

Building soil fertility through several different means, was one of the main focuses of our conversations. Like land ownership, I had not researched it specifically; I did not anticipate it as one of the core objectives for sustainability. Ecological practices to build soil fertility include cover cropping, composting, and on-farm animal integration (Gliessman, 2001; Rodale, 1984). Although they are recognized to “maximize productivity” (Gliessman, 2001), their economic significance is severely overlooked, according to FPF’s perspective. For Tom and Sarah, building soil fertility is not only an ecological benefit to maintain soil health, but also critical for reaching their economic goals. They need a high level of productivity to achieve the yield that
they need to survive as a business. For the 2013 season, they increased their number of shareholders from 102 to 122, which required a higher yield than previous years. In order to be more economically viable, they needed the income from the increase in shares.

Tom and Sarah needed to produce 20 percent more food on the same acreage, about four and a half acres. In order to do this, relying on nutrient cycling processes like biological nitrogen fixation and mycorrhizal relationships was simply not adequate in the short term; using these methods to build soil fertility takes a long time. Although they were still making as much of their own compost as possible and cover cropped the vegetable fields for the winter, this was not enough. They had to apply organic fertilizers. Applying fertilizers purchased from off the farm is certainly not their preferred method of increasing fertility, but was necessary due to economic constraints.

Understanding Connections

One characteristic of the literature that I quickly noticed in my research was the amount of data available on ecological sustainability compared to social and economic sources. Many researchers studying sustainability in agriculture seem to be studying it from the ‘numbers’ standpoint; they are looking for quantitative measures of sustainability. This is not to say that qualitative studies are not available, just not nearly as prevalent as quantitative ones. I felt as though Tom was speaking to this fact when he expressed his feeling that environmental practices are easier to talk about than social and economic ones. They are the cut-and-dry, plain and simple techniques for improving the environmental health of the agroecosystem, like cover cropping and using cultural controls for pests rather than chemical ones. Social and economic concerns are more ambiguous and harder to quantify. Social features of sustainability are difficult to assign specific values for measurement purposes. Economic sustainability could be measured through quantities, but its parameters are different for every farm, making it less generalizable.

Using the draft horses versus tractors when doing field cultivation proved to be an interesting debate throughout the interviews. Though they try to incorporate the horses as much as possible, there are tradeoffs for each decision. Tractor use requires paying for the fuel and maintenance costs for fixing them, while horses require feed and veterinary bills. From an environmental standpoint, horses do not emit nearly as much carbon dioxide into the atmosphere
as tractors do. Horses do not directly consume fossil fuels for their use, although some fuel is necessary in the production and transport of hay or straw for their feed. The horses provide social benefits to the farmers; working them presents “intangibles that they do not get on the tractor”.

There are other trade-offs in daily farm decision-making. Tom and Sarah have to choose between efficiency and customer service sometimes when they choose whether or not to bag a share for a member who missed the pick-up. It is very time-consuming to harvest a share and put it together for a single customer. On the other hand, doing so could gain that customer’s loyalty for years into the future. Much of the extra food leftover from pick-ups and markets used to be donated to the food shelf, until they started their own compost with Sally. A perceived social benefit of food donation was exchanged with an ecological one; they were able to recycle the nutrients on the farm, rather than send them off the farm to the food shelf.

Levels of Sustainability

According to Allen et al. (1991) and Riley (1992), the scale of analysis has a significant effect on how one thinks about sustainability. Riley’s (1992) levels of sustainability emerged from Tom and Sarah’s responses. They talked about the sustainability of their farm from the field level to the global level. This is an area that I found complex and tremendously difficult to reconcile after reading about it in the literature. There is no single right way to approaching sustainability; how it is understood directly depends on the level of analysis. Without a clear understanding of the level to be used in measuring sustainability, it quickly becomes overwhelming and unmanageable. It was clear during the interviews that Tom and Sarah struggled with defining the term; they did not know how narrow (farm-level) or broad (global-level) they should make their definition. After researching and conducting my interviews it was evident that clarification of the level of sustainability is necessary for effective analysis.

In a Perfect World...

I found that the idea of sustainability as a process, rather than an end in itself, is shared by many (Ikerd, 1997; Rigby & Cáceres, 2001; Harwood, 1990). Ikerd’s (2008) comparison of the journey of sustainability to a ship at sea kept coming to mind as I listened to Tom and Sarah during the interviews. They frequently mentioned aspects of the farm that they would like to be doing differently and plan on changing in the future. Their aspirations for the farm resonated strongly with my prior research. Tom consistently reiterated that the fertilizers they buy from off
the farm are “stop-gaps”; ideally they would like to eliminate them completely. However, this requires many years of assiduous fertility management, including an effective cover cropping scheme. Similarly with organic pesticides and fungicides, in the future they would like to have healthy plants that “have strong enough immune systems that they can take care of themselves”.

Ultimately, they would like to maximize the amount of land they have in cover crop on the farm. Currently they are restrained from doing this because they are renting a small amount of land and their markets demand a particular yield. FPF is an animal-tractor hybrid farm, but is trying to move in the direction of entirely horse-powered. They perceive sustainable cultivation techniques as part of their journey rather than a destination to sustainability. In a perfect world, they would also have more social events at the farm. Because they are such a young farm, they are more focused on surviving as a business than pursuing social goals, though they nonetheless see them as an essential component of true sustainability.

**Tom and Sarah’s Perceptions and Contradictions**

An obstacle that I did not foresee (though in retrospect, I should have) was the confusion around the definition of sustainability. Of course, nearly everything I read forewarned me; extreme perplexity of both academics and practitioners surrounds the word (White, 2013; Suvedi et al., 2003; Gatto, 1995). When I asked Tom and Sarah how they perceive sustainability, they struggled trying to articulate how they feel about it. Asking them how they think about the word, rather than providing a definition at the beginning, created an interesting dialogue between them. This gave them an opportunity to verbally grapple with their inner tensions. Tom’s tendency was toward global, purely ecological sustainability; he was primarily thinking in terms of fossil fuel use Riley (1992). From his perspective, a farm using fossil fuels or other non-renewables is engaging in a practice that cannot be continued indefinitely and therefore that farm is unsustainable.

Oppositely, Sarah thought about sustainability in the most literal sense: to continue into the future. Her view is significantly different than Tom’s; she believes that if a farm for some reason cannot continue into the future, than it is unsustainable. The reasons could be many: lack of economic feasibility, no access to land, loss of a market, or any other prohibitive factor. Allen et al. (1991) speaks to this idea of “sustainability through time”, affirming that time is a critical factor in determining whether or not a system is sustainable. She believes that if the farm is
unable to exist for whatever reason, than ecological, social and economic practices that the farm plans to employ become irrelevant to whether or not it is sustainable.

These differing views, which often reveal themselves in the literature, offer ample fodder for discussion. Using Tom’s lens, it is difficult—indeed near impossible—for a farm to be truly sustainable. When he used this lens as his reference point, moving on from there was quite a struggle. He quickly concluded that it is very challenging for a farm (with the exception of small, self-sufficient homesteads) to be sustainable. A farm can be somewhere on the spectrum of sustainability, but will not ever reach this “goal” if it uses fossil fuels. Saying that there are virtually no sustainable farms is a powerful statement; it essentially declares that sustainable agriculture is a fallacy. This follows the assumption that nearly all farms in existence today are using fossil fuels in one form or another.

Sarah’s sustainability paradigm at first appears much more straightforward: if a farm is continuing to survive into the future, than it is, by definition of the word, sustainable. Of course, there is one critical element—time. As the old adage goes, “only time will tell”. Sarah’s definition is fascinating to me because it disregards the stewardship principles and social responsibilities that are characteristic of sustainable agriculture (U.S. Congress, 1996; De Groot, 1992; Allen et al., 1991; Suvedi et al., 2003). Importantly, it also does not necessitate the use of organic practices in a ‘sustainable’ operation. This is significant due to the present debate on whether or not ‘organic’ and ‘sustainable are synonymous (Rigby & Cáceres, 2001; Shreck et al., 2006; Goldberger, 2011). In Sarah’s view, a farm that uses conventional practices can still be considered sustainable.

One observation I had early on during the interviews was how Tom and Sarah felt very differently about many topics, not just the definition of sustainability. Sometimes their evaluations corresponded with this observation but other times they did not. During the interview on economics, it was evident that they think about finances and cope with financial stress in separate ways. Based on their responses during the interview, I was surprised to see that Tom ranked the farm the same as or higher than Sarah did in most instances. Tom admitted to experiencing excessive stress from finances, while Sarah said she did not feel as stressed. Sarah seemed that she was less stressed about the farm than Tom in general.
The indicators themselves differ very little from those in studies that I examined. Zahm et al.’s IDEA method (2008) consists of more specific topics, such as ‘atmosphere’ and ‘animal well-being’, but they generally encompass the ones on my list. Goldberger (2011) presents a long inventory of sustainable agriculture goals that overlap with FPF’s list significantly, including ‘preserve traditional knowledge’ and ‘teach children about farming’. Although they are not verbatim with my indicators, they are very similar and speak to Tom and Sarah’s aspirations. Tom and Sarah’s ratings of the indicators were generally how I expected they would be, based upon my previous knowledge and my time spent on the farm this summer. Overall, I would say that in comparison to the studies I found, the farmers seem more critical of themselves than researchers would be in evaluating them.
CONCLUSION

After reflecting on my time at the farm and the results I obtained from the research, I have identified several concluding thoughts. Many of these ideas have kindled further questions for me, indicating new opportunities for research. In the beginning, I sought to study sustainability explicitly from the farmer’s perspective. The overarching goal of my study was to hear farmers express how they understand sustainability and to what extent they are able to implement the practices that they have identified as sustainable. I wanted to absorb what factors restrict their ability to meet goals of sustainability in everyday farm life. I studied the farmers’ decision-making processes to learn how they cope with restraints in order to be more sustainable. As a participant in daily farm work, I got a raw, authentic look at the operation, deepening my understanding. As the project progressed I adopted another critical purpose: to create a framework that could be used to help small farmers assess their own sustainability in their specific place.

Take-Home Points

There are a couple broad conclusions about sustainability that emerged from my study. Even two like-minded farmers, who work together every day on the same farm, cannot agree on a single definition of the term. It was evident that it does indeed depend on the scale of analysis. When asked if they thought FPF was sustainable, Tom and Sarah were using two different scales of analysis. Sarah thought about it at the farm level, with primarily economic concerns. She posed the question of whether or not the farm will exist into the future (the definition of absolute sustainability) and if it can support itself financially. Tom considered the global level of sustainability, indicating that the use of non-renewable resources (fossil fuels) denotes that a farm is unsustainable. Although they have very different conditions, both definitions could be considered valid in different contexts. Depending on what scale of analysis one chooses, the same farm could be deemed both sustainable and unsustainable. In the bigger picture of sustainability, this notion confirms the trouble with applying one universal definition to every operation.

I propose that sustainability also depends on the context within which the farm exists. Notions of sustainability can vary wildly depending on time, location, economic circumstances, environmental factors, individual relationships and the surrounding community. It is both
impractical and unreasonable to attempt to apply the same definition to every farm. A system that one farm uses to improve its viability may not be relevant to other farms. Consequently, farms must determine their own definitions of sustainability on a case-by-case basis, considering the contextual influences.

Qualitative methods play an essential, yet frequently underestimated, role in the continual research on sustainability. I encountered quantitative, highly scientific studies so often in the literature that apply an established definition or criteria of sustainability to farms and evaluate them accordingly. Quantitative research excels particularly in the environmental and economic spheres. Quantitative data allow for a detailed look at field practices in order to assess a farm’s environmental impact. Assessment is done with measures like soil tests, water quality examinations and biodiversity indexes. It is also particularly conducive to the economic domain. Financial viability can be tangibly measured overtime using quantitative data. Although quantitative research certainly warrants a distinct role in future study, I feel that qualitative methods are most useful when considering all the factors (environmental, economic, social) within sustainability together. I felt that the multidimensional topic of sustainability posed questions that would be best addressed through narratives and personal anecdotal information. Using a grounded theory approach and conducting interviews made it possible to understand the farmers’ experiences and perceptions.

Further, to my understanding, quantitative analyses of sustainability have a tendency of separating the economic, social and environmental components. There are many studies that measure environmental practices, just as there are studies that analyze broader societal engagement by farmers within their local communities. Yet seldom did I encounter the paper that joined the two, much less all three, components. As previously mentioned, this is valuable in measuring the tangible impacts of a farm’s practices and answering questions of sustainability over time. In devising my interview schedule, I followed suit; each interview covered a separate topic on different days. I decided to divide them because it seemed the easiest way to keep the concepts straight. However, in doing the interviews I repeatedly observed the connectedness of the topics. Each of them has effects on the others and it is impossible to fully separate them. The financial circumstances have an impact on environmental practices, which have an effect on social interactions. They should not be isolated in sustainable agriculture research simply because they are not isolated in practice.
The use of qualitative methods allowed me to delve deep into the farmers’ perceptions, rather than using my own or those I found in the literature. The importance of farmer perceptions, which I wanted to use from the beginning, proved to be one of the most significant elements of my research. I believe that farmers’ perceptions are so vital because farmers are the only ones who live the intricate realities of the farm every day. They are the ones who have the best sense for their place and conditions under which they farm. Researchers who come onto the land with limited prior knowledge about it do not have the same ability to consider all the factors of sustainability. Outsiders are more disposed to put them into separate silos or disregard whole sections all together. As an outsider, I exemplified this notion perfectly, with my method of conducting interviews and my pre-established components for sustainability. Using farmer perceptions in conjunction with other methods adds a deeper dimension to sustainability research that could not be achieved otherwise.

One of my major conclusions about the everyday realities of farming that I feel is often overlooked is that of farmer well-being. After conducting a few interviews, I recognized it as a fundamental factor when striving for true sustainability. The farmer is an essential being in the “farm organism”, as Tom described in an interview. Without attentive orchestration on the farmer’s part, there would be no way of perpetuating sustainable systems and structures. In order for the farm to flourish, the farmers must be healthy, well-rested, well-fed and mentally focused. If the farmers are not in their best shape, than the farm as a whole will suffer.

Talking with Tom and Sarah and hearing what is at the front of their minds has helped me understand the importance of land ownership on small, diversified farms. I have witnessed how drastically it affects every aspect of their operation. Land ownership is essential to long-term investments in the ecological health of the land. Farmers are motivated with the idea that they will be on the same land ten years into the future; there is no uncertainty about whether their decisions will affect them later or not. They get the chance to see effects of their practices, like planting cover crops, on the soil over time. It is also critical to the survival of the farm as a business. Stability, which can only be achieved through a long-term land arrangement (i.e. outright ownership or lease-to-own) was an identified criterion for economic viability. The knowledge that every decision that farmers make affects their land, where they will be indefinitely, gives them a sense of empowerment.
One of the initial hypotheses I made after choosing to do this study was the difficulty in balancing all four factors of sustainability. The interview data and farmers’ ratings confirmed this hypothesis; it is extremely difficult to consider them equally in daily farm prioritizing. Overall, Tom and Sarah give preference to economic and ecological factors over social and farmer-wellbeing ones. This notion is indicative of the idea of sustainability in time. In their fourth year of business, Flying Plow is a very young farm. When young farmers are starting out and do not have much money, they need a substantial income and are subsequently pressured to focus on their economic bottom-line before other things. However, often these farmers begin with strong land stewardship convictions, which remain central to their mission. They must continually strive to balance their environmental objectives with their business-oriented goals. The factors cannot be perfectly balanced at any time; there is a give-and-take between them. If one area does exceptionally well one year, it is likely that another will suffer.

As they progress and grow within their community, other aspects of sustainability will develop in time. Focusing on growing their business by gaining more customers now will in turn expand their community and give them the opportunity to educate more people. As they continue taking care of the land, they will receive financial and social support from people who hold the same values and believe in the work they are doing, contributing to the viability of the business. Relationships that form in this way over time will foster the social sustainability piece that is currently lacking. As they become more financially stable, they will have more freedom to focus on community-building and improving their own health and well-being. Their ability to do physical labor at the present rate will decrease as they get older, which might give farmer well-being more priority in their later years.

As farms develop and streamline their methods and systems, they are able to move forward on the path to sustainability. There is no one perfect and final “sustainability destination” for farmers, but like Ikerd (2008) affirms, it is instead a journey. With time, farms will eternally continue to evolve and flourish, becoming more sustainable, but never fully achieving sustainability.

**Limitations and Further Research**

Although the most appropriate method for my research question, there are definite limitations to case studies. As previously mentioned, the generalizability of case studies is one of
the most debated shortcomings. As the researcher, I chose Flying Plow based upon my own research question and intentions. Therefore it can be argued that my results may only be significant to the subjects in this individual case (Hsieh, n.d.). I also had a very small number of subjects, just two farmers on a single farm. Firestone (1993) suggests that the most useful generalizations to be made from qualitative studies are “analytic and not sample-to-population”. I feel that my analysis is useful for application to future research and evaluation, rather than as applied to a large population of similar small farms.

Using farmers’ perceptions exclusively to determine the sustainability indicators for the purpose of evaluating their farm also poses some significant questions. Certainly, the possibility exists that the farmers may under- or overestimate their current progress in achieving their sustainability goals. Or, perhaps one could argue that their goals are not working toward true sustainability, even though they might perceive them to be. Evaluating sustainability is entirely subjective and case-dependent and consequently these notions must be accepted at the outset of any sustainability assessment.

Despite these limitations, I believe that this study generated a useful framework that can be applied to other farms attempting to measure and evaluate sustainability. Performing qualitative analysis to directly inform sustainability indicators can serve as a valuable tool for farmers. Because they were developed by the farmers themselves, they are relevant and meaningful to their operation. The list can be amended as needed. Farmers can use the list to continue to evaluate their progress on the perpetual path to sustainability. Though individual indicators cannot be applied to all farms, the framework can be.

Looking toward the future of sustainability in agriculture, there is ample opportunity for research. I think that in much of the literature there is a disconnect between practices that farmers choose to employ and the context in which they choose them. More studies should be done that examine farmer practices in light of contextual restrictions, including financial aspects and socially-oriented objectives. Additionally, most of the literature I studied lacks the holistic approach necessary when considering true sustainability. Perhaps complexity and impracticality prevent researchers from looking at all of the components together, but I strongly believe that this is necessary for real-life application. Finally, I feel that more qualitative methods, including
case studies, should be utilized in the future of sustainability studies. They are valuable for grappling with the many dimensions that make up sustainability.
PERSONAL REFLECTION

As I was developing my research question, I knew that I wanted to do a case study of Flying Plow Farm, largely because I already had extensive knowledge of the farm. I had learned many of Tom and Sarah’s goals and sustainability ideals when I worked for them during the summer of 2011. This definitely had an effect on the interview process. It was difficult to transition from being their friend and colleague to an objective researcher. I had to consciously think about how I was phrasing the questions and how I was responding to what they said. I also found myself asking questions that I already knew the answer to, for the purpose of systematic data collection. For instance, I asked them about why they chose the CSA model, which I thought I already knew from my previous time at the farm. However, in this situation I often ended up learning a lot more than I thought I would; they revealed details that I did not know. After that I was very aware of the importance of asking all of my questions in full in order to get all of the information I needed.

At the beginning of the month I spent at FPF, I felt more like an employee than a researcher. I had to consciously remind myself when we were in the field of my role there. I wanted to be sure I was always attentive to what was happening around me, even more so than when I was just working there. As I assumed the role of the researcher, I felt my perspective change immensely. Not only was I more aware of what was going on around me, but I was more critical of it. Instead of simply accepting all the things we did, I questioned them. This was extremely valuable for me because I was able to look at the operation through a different lens than before, which helped me learn more about FPF.

I was not able to conduct as many interviews as I had hoped in the beginning. I wanted to do three interviews each week, for a total of 12 interviews, but ended up only doing seven. Tom and Sarah were extremely busy during the month of June and were under time constraints. Although I did obtain plenty of information from the interviews that I was able to do, I feel I would have achieved a more comprehensive understanding of the farm with more interviews. With more time, I would have also liked to do interviews of CSA customers and market shoppers, which in the beginning I had planned as part of the study.

I have been reflecting on this experience extensively the past few months, particularly how it will affect my life in the future. Upon graduating in a couple of weeks, I will be farming
with Tom and Sarah. I hope to have my own farm someday. I believe that my research will affect how I think about sustainable farming in the future. I view sustainability differently than I did before; I believe that it encompasses more dimensions and is more complicated than I previously thought. I think that critically observing Tom and Sarah make decisions will be beneficial to me when I am faced with my own challenging questions of farm sustainability.

I truly feel that doing this research has changed how I view the world, even outside of sustainability and agriculture. Over the past few months, I have found myself confronted with the elements I studied (environmental, social, economic, and even more) in many conversations. It seems that people are constantly attempting to balance these things in their academic and work environments. After spending the amount of time that I have analyzing and discussing my data, I feel that I am more conscious of this and can reflect on it more deeply than before. Without pursuing my initial question, I do not think that my eyes would be open to it now. I hope that I can continue to view my surroundings through this lens, and that I will continue to challenge embedded sustainability paradigms in no matter what field I ultimately find myself.
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APPENDICES

Appendix A. List of interview topics and questions by date.

June 6, 2013: Farm History

1. Can you give a brief history of the land you farm?
2. What is the history of Flying Plow Farm—when and how it began?
3. Tom, can you describe your farming background/experience prior to FPF?
4. Sarah, can you describe your background/experience prior to FPF?
5. What is FPF’s overarching mission? Can you identify some core goals/objectives of the farm?
6. What do you look for when you’re hiring interns and apprentices? What qualities are important? What are their responsibilities on the farm and what is required of them as part of their intern/apprenticeship?

June 10, 2013: Perceptions of Sustainability

1. In terms of agriculture, what is your perception of sustainability? (Be as general/specific as you see fit; just describe what sustainability means to you)
2. Describe what a truly sustainable farm looks like (practices, philosophies, guiding principles, etc)
3. What measures/practices/techniques do you implement in order to support the sustainability of the farm? (Again, you can be as specific or general as you want—mention anything that you think about or consider in terms of the sustainability/viability of the farm)
4. Looking to the future, what other measures do you plan (or hope) to adopt, to improve FPF’s sustainability?
5. What factors or outside influences (pros/cons, advantages/disadvantages, etc) do you consider when you are determining whether or not you will implement these practices?

June 13, 2013: Ecological Sustainability

Instead of coming up with particular questions to ask, I gave them a list of points that came up during our last interview:

- Nutrient cycling
- Closing the loop
- On-farm fertility=sustainability
- Long term land tenure, ownership, security
- Prioritizing ecological over economic
- Increase diversity, each crop/animal supports the others
• Farms must be part of a community/larger society

Along with these, I also gave them a brief description to frame our discussion:

I am looking for the extent to which principles of ecological sustainability factor into your decision-making processes when you are planning the season. Also, I’m wondering about basic principles of organic agriculture, like crop rotation, cover cropping, cultural/biological controls that you use, even though they might seem obvious. I’d like to talk about them with a focus on how they’ve changed over time, and how they might change looking toward the future. For example, how has your cover cropping evolved based upon what you have learned and observed on this particular land? What have you observed about crop rotation patterns and what impact has it had on the farm? What fertilizers do you choose and why? How has what you’ve chosen to grow/raise changed since you began? What benefits/drawbacks have you observed from these practices?

June 17, 2013: Economic Sustainability

1. What does “small-scale” mean to you? Why (or why not) is this important to FPF? Economically, what do you perceive is the ideal size for your farm and why (based upon the farm’s income)?

2. Still thinking about ecological sustainability, what does resiliency mean in sustainable ag operations, in general? Does the idea of increasing resiliency play a role when making decisions about the farm?

3. How do you perceive economic sustainability/viability? (Basically being able to continue to maintain the farm as a business into the future.) What is important to being economically sustainable?

4. Where do you feel FPF falls of the spectrum of economic sustainability, right now? How financially viable is FPF?

5. How have your expenses, income and overall budget changed since you began farming? (Do you allocate funds differently for expenses, spend money on different things, how has your income changed over time?)

6. What are advantages/disadvantages of the CSA model? Why did you choose it? What are the benefits/drawbacks of farmers’ markets? Selling to restaurants?

7. To what degree do you stress/worry about finances? Do you feel you are overly stressed by economic pressures? How has this changed from when you began?

June 19, 2013: Social Sustainability

1. Describe what community means to you. What/who do you consider FP’s community? What groups or types of groups make up this community? What is Flying Plow’s role in this community currently?

2. What connections do you have to your surrounding community? In what ways and to what extent does FPF connect with individuals/families in Harford and surrounding counties?
3. A concept deeply embedded in sustainable agriculture principles is the idea that consumers have a relationship (that goes beyond superficial market interactions) with producers of food, or farmers. Do you feel that you have a relationship with your customers, particularly CSA members? How do you feel about this relationship? Why is this important to your operation?

4. To FP, how important is it that community members engage with farmers/apprentices on the farm and is it important to educate the community about the issues farmers face?

5. The idea of civic engagement is one considered central to social integration, which includes deliberate and action-oriented participation in civic life. Civic agriculture has specific criteria; (1) local markets that serve local consumers; (2) agriculture embedded in rural communities; (3) farmers concerned with high quality and value-added products; (4) small-scale, labor-intensive, and land-intensive production; (5) reliance on local knowledge; and (6) direct market linkages between products and consumers.

June 20, 2013: Food Equity

1. The majority of people who are purchasing food from FP (either CSA or at the farmers’ market) are __________ (insert race, gender, age range, socioeconomic status). Or maybe there is no clear majority; if so, describe some common demographics.

2. An inadvertent social outcome of “sustainable” or “organic” food has been that people with low incomes often cannot afford it. Describe how you perceive/understand food equity or food equality (access, security, distribution, and affordability) in this community. How, or to what extent, does FP think about addressing the issue of food inequality? Feasibility? Challenges? How prevalent is food inequality in this area? Do you think most people have access to fresh, healthy organic food?

3. How do you begin to address these deeper issues of class privilege and inequality? Incorporating a diverse group of people can be challenging due to income, education or occupation. Or maybe some groups of people are simply not interested in this type of food?

4. Are there ways that you are trying to increase food access/affordability in the community? What things, however small they might seem, can you do now or in the future to help increase food equality? What would it take to implement them?

June 24, 2013: Farmer Quality of Life

1. Describe your perception of the life of an organic farmer, as far as amount of time spent working, leisure time, etc. Do you feel that your current work load is consistent with this ideal? Do you feel you should be working less than you are now? Is that something that you are aiming for in the future or not something you have thought about?

2. At this moment, how do you feel about your quality of life? How do you feel about your health and state of well-being? What factors of health/well-being (sleep, eating habits, amount of physical exertion, level of fatigue, leisure time, time spent with family/friends, stress level) are most important to you right now AND/OR that you feel could use improvement in your life?
3. How much sleep do you get, on average each night? Do you feel that you usually get enough sleep? Do you feel you have a reasonable level of fatigue on a regular basis (you aren’t exhausted all the time)?

4. How much leisure time do you have in a typical week (time spent away from farm work, personal time)? How much do you feel you should have? (I’m sure this varies quite a bit depending on the time of year, so explain the differences between the seasons)

5. What, if any, methods/practices do you use in order to maintain a healthy physical/emotional state? This could be anything: exercises (stretching), eating/drinking certain things, reading, taking time off, etc.

Appendix B. Flying Plow Farm Quick Facts

- Located in Joppa, Maryland
- 2013 was the fourth year
- 122 person vegetable CSA for 26 weeks
- Draft horse and tractor hybrid operation
- 4 ½ acres in cultivation
- USDA Certified Organic
- Beef cows, chickens, horses and a pig

Appendix C. Apprentice Curriculum

Appendix D. Income by Year

Appendix E. Harvest Calendar

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<th>Fall</th>
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<td>Onions</td>
<td>Radish</td>
</tr>
<tr>
<td>Scallions</td>
<td>Parsley</td>
<td>Spinach</td>
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<tr>
<td>Spinach</td>
<td>Peppers</td>
<td>Turnips</td>
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<tr>
<td>Swiss Chard</td>
<td>Hot Peppers</td>
<td>Winter Squash</td>
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<tr>
<td>Turnips</td>
<td>Summer Squash</td>
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<td></td>
<td>Swiss Chard</td>
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<td>Watermelons</td>
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</tr>
<tr>
<td></td>
<td>Zucchini</td>
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Appendix F. What’s in a Share? Weekly Harvest List 2010

Appendix G. What’s in a Share? Weekly Harvest List 2011

Appendix H. Apprentice Field Responsibilities 2013

Appendix I. Sustainability Rating Instructions for Tom and Sarah

Flying Plow Sustainability Indicators

T & S: Please rate your current perception of how you are doing on each of the following indicators. Please each fill out your own sheet, individually. I added a short description of each one, but please let me know if you have any questions about them. Use this scale:

0=We have never thought of this idea/concept before and do not include it in our farm plans/practices.

1= We have started to think about this, but just barely; it is not at the top of our priorities list.

2=We recently began to incorporate this idea/concept but we have a long way to go.
3= We are conscious of this idea/concept and incorporate it into our plans/practices; it is a significant part of our farm.

4= We consider this idea/concept to be one of our core principles and feel confident about our ability to carry it out on the farm but recognize that there is room for improvement.

5= We excel at this idea/concept; it is an essential part of our farm and one of our strongest areas.

Just type in the number that best fits each concept on the lines next to them. Also, PLEASE add anything that you feel is missing from the list! It does not need to fall under a specific concept—you can just put it at the end of the list and I will find a place.

Appendix J. Sarah’s Sustainability Indicators

Scale 1: Environmental/Ecological

Concept 1: Soil health as foundation

- **Organic matter** 4
  Increasing organic matter content (expressed as a percent in soil tests) of the soil is critical to increasing overall soil health.

- **Soil life** 4
  Soil biota, the organisms that live in the soil, are important to overall soil health.

- **Soil structure** 4
  The arrangement of the soil particles (aggregates) and pore space affects the health of plants growing in the soil.

Concept 2: Fertility as sustainability

- **Cover crops** 4
  Cover crops are grown for several reasons (build soil structure, control weeds, encourage diversity, and increase fertility), but adding fertility to the soil is their primary function on the farm.

- **Farm-generated compost** 4
  Compost is made on the farm from products produced/consumed on the farm (manure, old hay/straw, food scraps, etc) and then applied to fields in order to increase fertility of the soil.

Concept 3: Diversity

- **Plants and animals** 3
  Plants (vegetables, herbs, flowers, cover crops) and animals on the farm are meant to be incorporated together, both working and producing at the same time.

- **Multiple species synergies** 4
  Multiple species of both plants and animals work together, providing fertility and food for one another. All species are important to the whole.
Concept 4: Cyclical systems

- **Nutrient cycling**
  Nutrients are cycled through a loop, which is critical to the function of the farm.

- **Closed loops**
  Nutrient, energy and materials loops are as circular and closed as possible.

Concept 5: Organic methods

- **Physical controls**
  Physical controls include hand-picking, choosing particular varieties, timing of plantings, and the use of row covers on certain crops.

- **Biological controls**
  Biological controls include parasitic wasps and the use of some select organic pesticides derived from bacteria, among others.

Concept 6: Transition to on-farm energy

- **Draft power**
  Draft horses are used on the farm when possible, in order to decrease the farm’s dependence on fossil fuels for cultivation and tillage.

- **Hay production**
  Hay is produced on the farm, in order to decrease the farm’s dependence on fossil fuels needed to get the hay from off the farm.

- **Food production**
  Food is produced on the farm, in order to decrease the farm’s dependence on fossil fuels needed to get food from elsewhere.

- **Minimize oil-based supplies**
  Plastics are minimized on the farm wherever possible, including black plastic used for weed control.

Scale 2: Economic

Concept 1: Reach financial goals

- **Land ownership**
  Owning land, or at least entering a long-term land situation (lease to own), is critical to running a financially viable farm.

- **Savings**
  Saving money is important in order to pay off what is owed to others (land situation) and keep the business running.

- **Increasing net worth**
  Every year, the net worth (the sum of the farm’s assets minus what is owed to others) of the farm should be increasing.

Concept 2: Local markets
• **Community supported agriculture** 4
  The CSA model is used as a key part of a financially viable business: money is received upfront, is not dependent on weather, and is a reliable source of income.

• **Farmers’ markets** 4
  Farmers’ markets are used to supplement income from the CSA.

**Concept 3: Farm as a business**

• **Quality product** 4
  Producing high quality, nutritious food is important to running a successful business.

• **Yield** 3
  A high yield for the number of CSA members and extra for farmers’ markets is necessary to keep customers fed and happy with the food.

**Concept 4: Stability**

• **Long-term investments** 2
  The ability to make long-term investments in the land is critical and depends directly on the stability of the farm business. If the business is unstable, than good long-term investments cannot be accurately determined.

• **Land security** 2
  Land security is a fundamental piece of the stability of the farm business.

**Concept 5: Resiliency against market fluctuations**

• **Hay production** 2
  Producing hay on the farm means that it is not dependent on market prices.

• **Food production** 3
  Producing food on the farm means that it is not dependent on market prices.

**Concept 6: Unsubsidized operation**

• **Farm finances itself** 3
  The farm runs by its own means; it is not funded by an outside source (inheritance, a non-farm job, government subsidies, others).

• **Health care savings** 3
  The farm produces food that is unsubsidized in terms of health care; in theory, it will save consumers money on health care bills in the long-term. The costs are built into the price of the food up front, they don’t show up later in the form of health care costs.

**Scale 3: Social**

**Concept 1: Community**

• **Farm’s place** 2
  The farm has a place in the community, region, and the world.

• **Relationship with neighbors** 3
The farm’s relationship with their neighbors is important; they are able to help each other and offer support in times of need.

- **Community resiliency** 2
  Each family unit in the community is able to fill a need, increasing the resiliency of the entire community to outside disturbances.

- **Support for health and well-being** 2
  The surrounding community of the farm is able to support its health and well-being, including the health of the farmers.

- **Local knowledge and history** 3
  The local knowledge of people and the history of the place are valuable and vibrant parts of the community in which the farm exists.

**Concept 2: Education**

- **Curriculum for apprentices** 3
  Farmers develop and implement an educational curriculum for apprentices who work at the farm.

- **Teaching consumers** 3
  Farmers consider educating consumers about the impacts of their food choices to be a significant part of their work.

- **Training new farmers** 3
  Hands-on, in-depth training in various areas is provided for apprentices who work at the farm.

**Concept 3: Exposure and Experience**

- **Farm events (i.e. tours, parties, dinners)** 2
  Farm events such as tours, parties and dinners are held in order to give CSA customers and community members a chance to see and experience the farm.

- **On-farm cooking demonstrations** 2
  Cooking demos using the produce of the time of year are held at the farm as both a social and educational event.

- **Media presence** 3
  Social media (Facebook, Twitter, blog sites) are used to reach out to more members of the community and increase awareness of the farm.

- **Volunteer opportunities** 2
  Community members are given the opportunity to volunteer regularly on the farm to learn about and get involved in food production.

**Concept 4: Access and Affordability**

- **Low-income programs** 3
  WIC (Women, Infants, Children), the MDFMNP (The MD Farmers’ Market Nutrition Program) and other low-income programs are accepted at the farmers’ market.

- **Work share opportunities** 2
Work shares are considered if people who would like a share cannot afford to pay the full price.

- **Donations** 2
  When there is extra food, it is donated to the local food shelf.

**Scale 4: Farmer Well-being**

**Concept 1: Labor**

- **Physical exertion** 2
  The physical exertion is the amount of physical work done by the farmer on a weekly basis, including all farm chores and extra exercise (stretching, sports).

- **Ability to continue rate of work** 2
  The farmer’s perception of their ability to continue farming in the same way that they do today.

**Concept 2: Leisure and Vacation**

- **Home-business separation** 2
  The ability to separate the farm business from home life, including emails, phone calls and miscellaneous work tasks.

- **Meditation activities** 2
  Meditation activities include anything done in leisure time to promote relaxation, rest and rejuvenation (yoga, sports, etc)

**Concept 3: Home and Living**

- **Sleep** 3
  The amount of sleep obtained on a regular basis affects wellbeing.

- **Eating habits** 3
  The quality of meals that farmers eat throughout the season affects wellbeing.

- **Household cleanliness and organization** 3
  The farmer’s ability to maintain an organized, clean and efficient household throughout the season affects wellbeing.

**Concept 4: Stress and Farm Responsibilities**

- **Financial stress** 3
  To what extent the farmer is stressed by finances on a regular basis affects wellbeing.

- **Letting go of farm tasks to others** 2
  The farmer’s ability to designate farm tasks to others contributes to overall wellbeing.

**What’s missing? Comments, questions, suggestions?**

- Not sure how to rate financial stress on your 1-5 scale…maybe needs to be asked in the positive so it is congruent with the other questions…”ability to cope, or not feel over burdened, by financial stress” My answer would be 4.
Appendix K. Tom’s Sustainability Indicators

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Concept 1: Soil health as foundation

- **Organic matter** 4
  Increasing organic matter content (expressed as a percent in soil tests) of the soil is critical to increasing overall soil health.

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  Cover crops are grown for several reasons (build soil structure, control weeds, encourage diversity, and increase fertility), but adding fertility to the soil is their primary function on the farm.

- **Farm-generated compost** 4
  Compost is made on the farm from products produced/consumed on the farm (manure, old hay/straw, food scraps, etc) and then applied to fields in order to increase fertility of the soil.

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- **Plants and animals** 4
  Plants (vegetables, herbs, flowers, cover crops) and animals on the farm are meant to be incorporated together, both working and producing at the same time.

- **Multiple species synergies** 3
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  Physical controls include hand-picking, choosing particular varieties, timing of plantings, and the use of row covers on certain crops.
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Hay is produced on the farm, in order to decrease the farm’s dependence on fossil fuels needed to get the hay from off the farm.

• **Food production** 5  
Food is produced on the farm, in order to decrease the farm’s dependence on fossil fuels needed to get food from elsewhere.

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Plastics are minimized on the farm wherever possible, including black plastic used for weed control.

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Owning land, or at least entering a long-term land situation (lease to own), is critical to running a financially viable farm.

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• Physical exertion 5
  The physical exertion is the amount of physical work done by the farmer on a weekly basis, including all farm chores and extra exercise (stretching, sports).

• Ability to continue rate of work 4 or 2, depending when you ask me, so 3?
  The farmer’s perception of their ability to continue farming in the same way that they do today.

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