The Ohio State University
Campus as a Living Laboratory

Local Foods in the OSU RPAC

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Executive Summary

One of the goals of the Ohio State University's Framework Plan is to concentrate academic activity in the academic core. The academic core is the condensed central area of the university, where the majority of academic studies are located. One of the goals of the Framework Plan is to revitalize campus as a "Living Laboratory". In order to do so, use of multidisciplinary study in the academic core will become more necessary than ever.

The current involvement of agricultural and environmental disciplines in the academic core is virtually nonexistent. Meanwhile, the increasing popularity and cultural relevance of local foods systems has begun to attract attention on campus by students and faculty alike. "Local foods" are food products that are produced in close regional proximity with their consumers. A new focus on local food production is reflected by the recent installment of a garden that supports the Heirloom Café in the Wexner Center. In just a few short years, student pressure for locally sourced food has caused OSU Dining Services to increase local foods purchasing (Z. Ahmed, personal communication, March 12, 2013). On a larger scale, societal trends reflect a strong consumer desire for better farm-to-fork connections, especially in urban areas. Therefore, a focus on local food production is a natural step for Ohio State, especially considering its goal of reaching carbon neutrality by 2050.

The installment of a small-scale lettuce hydroponic system in the academic core, particularly in OSU's Recreation & Physical Activity Center (RPAC), is a great way for Ohio State to address both of these issues. This system would grow lettuce for the Courtside Café inside the RPAC, with the aim of meeting a portion of the café's lettuce demand. Following in the footsteps of the Heirloom Café, this system would join the ranks of local food producers by supplying customers within close proximity, thus reducing overall carbon emissions by decreasing "food miles". This system would also be a great educational tool with the potential of increasing student and community involvement in the academic core, especially among agricultural and environmental students.

A hydroponic system would not only help meet the goals of Ohio State's Framework Plan, but would likely prove to be a great community builder. The overall aim of the hydroponic installation is to increase OSU's self-sufficiency, while keeping the idea of expanding the

hydroponic system in mind. Acceptance of this proposal would also bring the university one step closer to making the campus a true Living Laboratory.

Introduction

The nature of the local foods movement is intrinsically associated with the environment and sustainability. As concern for the environment and its condition has escalated, so too has the desire to impact the environment in a positive way. In the local foods movement, a means has been found to try and lessen the impact that agriculture has on the environment. However, the environment is not the sole area that can be impacted by the movement towards locally grown food. The movement can also have positive impacts on personal health, community well-being, and the local economy.

As the burgeoning local foods movement continues to grow and gain popularity in the mainstream, OSU has a tremendous opportunity to raise awareness about a vast range of topics. Among these are the environment, carbon footprints, nutritional health, and food production. As a premier university, with a reputation for research and extension, Ohio State is uniquely capable of reaching a broad number of demographics. From students and staff, to the media and other universities, Ohio State has an opportunity to be at the forefront in stimulating conversation about the local foods movement.

Through the installation of a food production system in the center of campus, Ohio State could begin to raise awareness about local foods, which would impact students and the campus community. One of the major constraints at Ohio State is available space, so a food production system would have to be flexible while remaining eye-catching. A hydroponic system meets both needs, and is a viable option for OSU.

Local Foods Info

The first cultivation of crops drastically changed the course of human history. Since then, the growth and consumption of fresh, local food has been a driving force behind the onset of civilization. Fast forward several thousand years, however, and many American consumers seem to be discovering local foods for the first time. After observing the effects of agribusiness and food transport chains on the environment, consumers are searching for a way to fix an inefficient food system.The exact moment when local food systems began to regain popularity in the United States cannot be pinpointed, but a United States' Department of Agriculture (USDA) report shows remarkable increases in local food networks nationwide. One statistic reported that "the

number of farmer's markets rose to 5,274 in 2009, up from 2,756 in 1998 and 1,755 in 1994" (Martinez et al., 2010). Franklin County alone hosts 23 farmer's markets, which are a very popular medium for direct consumer sale. A direct consumer sale merely describes the sale of a product directly from a producer to a consumer, with no middleman involved (O' Hara, 2011). The fact that Columbus hosts several local food distribution mediums in a metropolitan area is a great indicator of the growing popularity of the local foods movement. The movement's growing popularity can be heavily attributed to increasing social concern of food production and transportation.

Definitions

Despite rapidly growing support for local food, no exact definition of "local" has been termed (Martinez et al., 2010). In the eyes of many, including Ohio State, any food produced within the state of Ohio qualifies as local. Others define "local" as being sourced within a certain number of miles from their home. Such a loosely generalized term could easily make the notion of local food systems seem more accessible, but the market also calls for conscientious consumers. For example, local food systems have a connotation of being more environmentally friendly than conventional international food systems. However, this is not always the case. The definition of "local" only requires a shorter distance between producers and consumers and does not address methods of production, regardless of how environmentally friendly they are.

The Growth of Local Food

Major consumer problems with conventional food systems in the United States have increased demand for a less environmentally and economically demanding food market. In the eyes of local food consumers, the conventional global food market of today is a continuous cycle of environmental and economic exploitation. Food is produced in excess amounts, with excessive inputs applied not only to the production, but the transport of food products. For example, "food miles" are the miles that food travels from producer to consumer, and are identified as a major inhibitor of the sustainability of conventional food systems. By minimizing food miles, consumers of local food, or "locavores", seek to maximize the freshness and nutrition of their diets while minimizing environmental impact. Ironically, the USDA lacks sufficient evidence to conclude whether or not the use of local food systems actually does minimize overall environmental impact (Martinez et al., 2010).

Foods that are locally produced not only boast added freshness and quality, but have shown substantial evidence of strengthening social ties as well. During direct consumer sales, "locavores" can put a face on the food they eat by meeting the farmer that grew it. Such community interaction cannot be overlooked because the benefits of enacting local foods partnership lend themselves to community-building processes. A study conducted by the Union of Concerned Scientists found that "75% of shoppers at farmers markets arrived in groups while 84% of supermarket customers came alone" (O' Hara, 2011). Furthermore, shopper interactions with employees and other consumers were much more common at farmers markets than supermarkets (O' Hara, 2011). Strengthening social ties, especially in urban and suburban communities also paves the way to economic benefits. Empirical data compiled by the USDA showed that fostering the growth of local foods systems proved beneficial to economic growth and conditions (Martinez et al., 2010).

Economic support for local food stems from current laws and regulations, which also tend to favor local food production. The USDA report mentioned above outlines several government programs ranging from local to federal levels, which "support the growth of local food markets" (Martinez et al., 2010). One of the primary legislative supports of local food is the 2008 Food, Conservation, and Energy Act (AKA the 2008 Farm Act).

The 2008 Farm Act assisted in the spread of local food by funding an array of federal programs. Some of those programs provide grants for local producers that show initiative by further processing or marketing their products. Others appropriate government funding toward an objective of increased distribution of local food. One notable program funded by the 2008 Farm Act is the Community Food Grant Projects Program, which was reauthorized and made permanent by effect of the 2008 Farm Act (Martinez et al., 2010). The Community Food Grant Projects Program provides grants to small businesses that distribute or market local food to low-income communities. Several other programs also seek to increase accessibility to low-income families. Therefore, government agencies appear to have a strong desire to distribute local food across all social demographics, regardless of income. For instance, the WIC Farmers' Market Nutrition Program (FMNP) and Senior Farmers' Market Nutritional Program (SFMNP) makes local food more accessible to women with infants or children (WIC), or senior citizens of low income. Because families of low-income are often urban dwellers, these programs are likely to foster widespread urban involvement with local foods. Rural communities are not left out, either.

Local food initiatives have historically thrived within rural communities, mostly due to an abundance of land. In fact, some schools have already capitalized on their rural setting.

Case Study – Dickinson College

Dickinson College of rural Carlisle, Pennsylvania is one great example of a thriving and unique local food market. The campus is home to a 50 acre, USDA certified organic farm that started as a pair of 100 square foot plots in 1999. The garden was put together by a student group with an interest in "researching sustainable agriculture and organic gardening" ("History", 2013). Student interest grew rapidly as more students became aware of the farm and also began to work on it. Over the next decade, the farm grew steadily to its current size through the help of grants and community support. A focus on sustainable methods of production and student/community involvement has changed the dynamics of food production on the campus as well as local food markets in the greater community. One of the most notable extensions of the farm is its own form of CSA (Community Supported Agriculture) called "Campus Supported Agriculture". Using this system, Dickinson Farm provides food for over 130 community families ("College Farm", 2013). The farm also produces foods for several local restaurants and every campus dining hall, putting Dickinson College in a position of near culinary self-sufficiency. The success story of Dickinson Farm provides a learning experience for universities nationwide. We feel this is especially true for Ohio State, whose history is rooted in agriculture.

OSU's Food Culture

Ohio State was established in 1870 by the Ohio General Assembly. Since then, it has celebrated a long tradition of agricultural leadership. The university was established under the conditions of President Lincoln's Land-Grant Act ("Ohio State History and Traditions", 2013). The fact that OSU is a land-grant university means that it is associated with the agricultural ventures of the state of Ohio. Waterman Dairy Farm located on Lane Avenue and the hydroponic research facility at OSU's Ohio Agricultural Research and Development Center (OARDC) in Wooster are both examples of this association.

A major issue with these two facilities, however, is that little attention is given to food production for the university. Both facilities have placed an emphasis on research and community outreach rather than food production for student consumption. Although some food that is produced is sold in the community and on campus, the amount is negligible in comparison

with universities like Dickinson College, who are mostly self-sufficient. Therefore, Ohio State must overcome space restrictions to catch up to counterparts like Dickinson. Because OSU is situated in a metropolitan area, the university's Framework Plan (2010) expresses a desire to construct no "new net academic space". As a result, Ohio State must be resourceful and readapt existing spaces to better serve students of all disciplines.

Due to the urban environment of the campus, most students are unaware of the origin of their food, even if it is locally sourced. Furthermore, they are usually not indicated as such,even when the products in OSU dining halls are local. The only dining hall on campus known for its self-sufficiency is the Heirloom Café in the Wexner Center for the Arts. The organic garden that supports the Heirloom Café is maintained through sustainable cropping methods like composting and cover cropping during the winter (Brokenshire, 2012). In an interview, Angelica Huerta of the Ecological Engineering Society stated that the garden was constructed in response to a "big push for local food" (Brokenshire, 2012). Furthermore, the chef at Heirloom Café has reported several benefits for business as a result of the garden growing. This garden could be the catalyst that pushes OSU to embrace greater agricultural self-sufficiency. Rather than consuming a few foods that are "Ohio Proud", OSU students could one day boast the expanded option of "Ohio State Proud" foods.

The Role of Ohio State

In order for any movement to have success, awareness is critical. If a demographic is not aware of a problem, it is unlikely the demographic will act in a way that mediates that problem. If the average citizen did not believe or know that recycling was good for the environment, they likely would not bother to recycle, opting instead for the simple status quo of sending everything to a landfill. Thus, raising awareness about food production systems is important if any change is to be wrought in the way the average American goes about filling their stomach.

As one of the largest universities in the United States, The Ohio State University is uniquely positioned to reach a wide range of demographics. The first and most obvious demographic is its student population, numbering over 55,000 students on its main campus in Columbus, Ohio – 55,000 thousand students who upon graduation will become leaders in their respective fields and communities. By reaching OSU students, the university could create a dynamic group of young adults who, after graduating, go forth and spread the knowledge and awareness they gained while in college. While students are clearly a key demographic, OSU's

prestige allows it to have influence far beyond its own campus. In the state of Ohio, supporters of Ohio State are ubiquitous; its network of alumni spans the entire globe. With its international profile, Ohio State can be a trendsetter, sparking interest and providing a major boost of publicity in the things that it chooses to do.

By installing a food production system on its campus, Ohio State can help increase awareness about food production and the benefits of local foods. With its broad reach and large base, OSU is positioned to impact culture in ways that smaller institutions like Dickinson University are not. The goal, however, is not simply to place a food production system on campus. That has already been done in the past with a vegetable garden outside the RPAC, and another outside the Wexner Center. Neither of those locations has generated a significant amount of publicity or awareness, and the garden outside the RPAC has even been mothballed due to the theft of its produce (Hitzhusen, personal communication, March 27, 2013). The goal is to make the system so intriguing that students will be engaged and willing to invest in learning about hydroponics and local foods in general. By engaging student, knowledge about local foods will be disseminated so that students can make more informed decisions about the food they eat. Similar to increased awareness about recycling, increased awareness about local foods has the potential to impact concentrated areas where the movement takes hold.

Bringing Local Foods to OSU

OSU is already improving its local foods profile through buying a portion of its products from certified Ohio Proud producers (Ahmed, personal communication, March 12, 2013). What Ohio State is lacking, however, is the dissemination of information about food production and local foods to students. While OSU strives to support Ohio producers, its failure to educate students limits the good it is capable of accomplishing. By raising students' awareness of local foods, OSU could make itself an agent of change in the greater society, rather than remaining static in the impact it has. OSU has the ability to make a bigger impact by bringing an engaging food production system to the center of its main campus.

Ohio State should install a small-scale lettuce hydroponic system in its Recreation and Physical Activity Center (RPAC). This system would be able to provide fresh, locally and sustainably raised lettuce to OSU dining facilities, including the RPAC's Courtside Café. The RPAC is one of the most highly visited buildings on Ohio State's campus, so the number of students reached would be quite high.While it is easy to walk past an outdoor vegetable garden

without a second glance, a hydroponic system inside one of OSU's premier buildings is sure to capture attention. With engaging and informative signage, the opportunity to impart useful knowledge to students is high. By reaching its students, OSU can impact not only its campus and the state, but also the nation and the world.

Hydroponics

A hydroponics system grows plants in a soilless medium. There are two methods of hydroponic production: liquid culture and aggregate culture (Coolong, December 2012). Plants in a liquid culture are grown solely in a nutrient solution. In an aggregate culture, the plants are supported by an inert medium and grown in a nutrient solution. Both of these systems are located in controlled environments and use high-intensity grow lights as artificial sunlight. Hydroponic crops undergo normal physiological maturation processes as they would if they were grown in soil, but also have the advantage of environmental stability.

The crop producer controls the environment of a hydroponics system. The environment consists of the intensity and duration of light, temperature, humidity, nutrient concentrations, soluble salt concentrations, solution pH, and biological activity (Coolong, December 2012). These factors trigger and influence the growth of the plant from seedling germination to harvest. With proper maintenance, all factors within the system are sustained at optimal levels to meet the plant's needs.

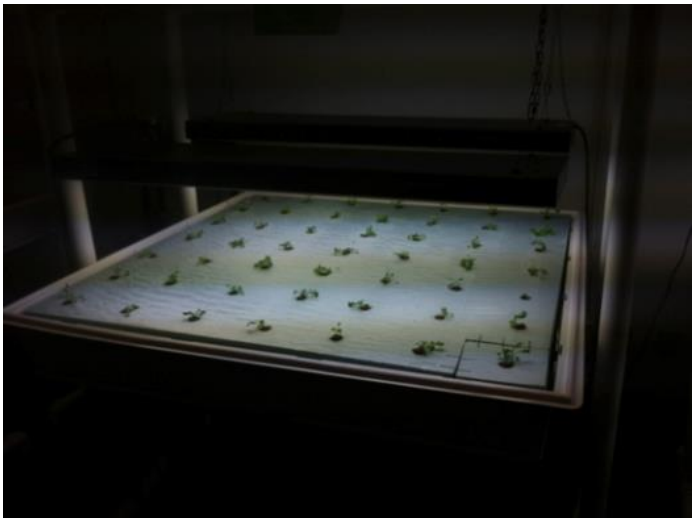

Figure 1: This figure depicts the model of the reservoir tank proposed. (Bracken, 2013)

The hydroponic system we are proposing be implemented in the RPAC is an aggregate culture (*see Figure 1, right*). A Styrofoam raft, 2-feet wide by 4-feet long, will support the plants. Each plant will be grown individually in evenly spaced holes with an inert medium of Hydroton grow rocks. Hydroton is an ecologically sustainable medium derived from clay (GreenCoast, 2006). These grow rocks are pH neutral and will facilitate high oxygen levels for the plant roots. The Styrofoam raft will sit in a 20-gallon reservoir tank, also known as a flood

table, and keep the roots submerged in the nutrient solution. The reservoir tank will sit on a table beneath a lighting unit. This lighting unit will be built from 2-inch diameter PVC pipe (*see Figure 2, below right*). Construction will require: two 10-foot pipes, two 90° fittings, and two "T"-joints. The10-foot sections will be cut into a 4-foot section and two 5-foot sections. The 4-foot section will be the overhead bar and connect to the 5-foot sections through the 90° fittings. These pieces will form the upright portion of the unit. Then, the two "T"-joints will connect to each end of the upright portion and be used to build the base of the unit. From the remaining pipe, four 1-foot sections will be cut and attached to each of the "T"-joint fittings. Once the fixture is built, metal chains will be used to hang the high intensity grow lights from the overhead bar. The distance between the grow light and plants is determined by the spectrum and intensity of light required by the plant.

Figure 2: This figure depicts the hydroponic lighting system for the proposed units (Bracken, 2013).

The main concern for producing crops through the university is crop health and quality. When the plant is subject to unfavorable temperature, humidity, light, moisture, and other environmental factors such as biological activity, they become susceptible to pest problems. Pest problems include disease and insect infestation. These factors need to be taken into consideration along with the subsequent chemical inputs. The most common problems associated with hydroponics systems are water molds/mildews and insects such as aphids, thrips, whiteflies, and mites (Coolong, December 2012). Hydroponics is designed for closed and controlled environments, so there are far fewer preventative measures necessary than inoutdoor production. Specifically, there are very few pesticides labeled for greenhouse production use and no available fungicides for water mold diseases. However, some preventative measures include growing a pest resistant crop variety, maintaining a sanitary growing location, scouting crops for signs of potential problems, and utilizing insect screens around the growing system (Rich, 2010).

Although pest infestation is a potentially devastating problem, reduced chemical input is an ecologically positive attribute as well as a healthier means of production.

Other influences on crop health and quality include solution pH, nutrient management, and soluble salt concentrations (Aggie Horticulture, n.d.). All of these factors contribute to nutrient uptake. For hydroponic systems, the essential plant nutrients are made plant available in a single solution. The nutrient solution is added to the water in the reservoir tank and dispersed for root uptake. This is important because the water medium allows nutrients to remain plant available. When nutrient ions are in the soil, they can become unavailable by adsorbing to soil particles and either become tied up with another elements or take other form in unfavorable soil conditions. Water does not have the buffer capacity of soil and the pH can be adjusted back to the preferred 6.0 -7.0 acidity with relative ease. While these concerns require intense management, the variables in this system can be controlled.

Implementing a hydroponics system into the RPAC would bring local food production into the midst of the Ohio State community. In a location with no room to expand and an increasing concern for sustainability, the University and the individuals affiliated with it would greatly benefit.

Biophilia

A unique aspect of our project is that an indoor hydroponic system is likely to result in a "biophilia" effect. "Biophilia" is a term coined by Dr. Stephen Kellert of Yale University to describe the benefits that interaction with the environment has on human health and well-being. Dr. Kellert defined biophilia as the inherent inclination to affiliate with nature as a celebration of its instrumental role in determining human physical and mental health (Kellert, 2012). After learning about the concept of biophilia, it is apparent that our project not only has the potential for great academic success, but can also be instrumental in bettering the physical and mental health of the student population.

Several studies have shown individuals receiving benefits from being in the presence of natural surroundings. This project incorporates the ideas suggested by Dr. Kellert's research to exemplify the added benefits that a hydroponic system could have if placed in a highly visible location, such as the RPAC. Dr. Kellert reviewed positive research findings in three main categories: surgery patient recovery, work force, and child health care studies. These studies discovered that the people who had access to natural aesthetics and surroundings (in even

minimal amounts) recovered faster, worked harder, and had better health. Demonstrating the concept of biophilia in the form of hydroponic green space in a dining location thus has a strong chance of increasing student wellness and morale, leading to a more successful student population.

Student Involvement

Student involvement and education through participation are two key factors that will help ensure project success. The first step is to create a lasting foundation for student involvement. The goal is to create a student club, which will provide a hands-on learning environment. The student club will also promote interdisciplinary collaboration, leading to education through participation. The club would not only serve as a foundation for student support, but also a direct link to the university's dining services management team. Establishing this link will help students to feel a sense of ownership of the facility. In return, students will self-promote the facility. This, along with other factors of support, will lead to lasting success.

The facility will also provide the university with an exceptional opportunity for creating a learning environment which will promote interdisciplinary collaboration. In essence, horticulture, marketing, business, design, environmental, and all other student groups will have the opportunity to be involved. Having a wide range of student groups working together to complete one mission will create a learning environment reminiscent of the "real world". Every student will have the opportunity to be exposed to working with a wide range of educational backgrounds, along with university management personnel. The opportunity for students to enjoy a multifaceted team experience is a highlight of the project.

Understanding that these ideas are much easier stated than realized, the proposal is designed with a notion of frugality. The proposed facility is not intended to be a burden on OSU. On the contrary, the university should accept the proposal as an opportunity to showcase that OSU's money and research are being put to good work. We realize that our project requires work, but our goals will be more easily accomplished with the effort of many rather than the effort of one. This vision of the proposal highlights the fact that the students will share the work load and learn from the experience.

Collaboration

The majority of projects that are successfully implemented involve various individuals, researchers, and organizations collaborating together to reach a specific goal. By reaching out

into the local community, a few individuals that are currently involved with their own food projects and responsibilities have already given their support for the project. The first individual is Zia Ahmed, who is the Senior Director of The Ohio State University's Dining Services. The second is Jeff Bracken, a chemistry teacher at Westerville North High School.

We met with Zia Ahmed on March 12, 2013 to introduce him to our proposal for hydroponics in the RPAC. This meeting provided our group with great insight and ideas to incorporate into our existing plan. Initially, we were struggling to choose a specific location that would house our hydroponics system. The Parker Dairy Store on the west side of campus seemed an ideal location based upon the store's hours of operation and the volume of customers that the store supplies on a daily basis. These two points led us to believe that we would be capable of meeting the store's supply and demand needs. However, after meeting with Zia, the RPAC on main Campus was deemed to be a better location. Zia feels that placing the system within the RPAC would dramatically increase student and community curiosity, which in turn would also increase awareness of the potential benefits of local foods. We have since taken the advice of Zia and are now focusing solely on the RPAC to implement our hydroponics system. However, Zia expressed concern with the project: will there be enough support to continue running our hydroponic system after all the members in our group graduate?

This is why we believe that our collaboration effortswith Jeff Bracken, an A.P. Chemistry teacher at Westerville North High School, will benefit our project. The additional mentorship provided by Jeff Bracken makes us confident that student involvement and support for our project will not diminish.

Hydroponics Case Study

One specific case study that has been examined happens to be Jeff Bracken's hydroponics system. Jeff's system is currently set up and running at Westerville North High School. Jeff was able to start his operation with one small scale hydroponics system after he received a grant in 2008. Initially, Jeff's hydroponic operation began inside of a very small storage closet near his classroom. After receiving a grant for $10,000 from the Ohio State University and the Ohio Agricultural Research and Development Center (OARDC), Jeff was able to expand his operation throughout the entire high school. He currently has hydroponic systems set up in his classroom, the teacher's lounge, library, front office, and other classrooms.

An important reason why Jeff has experienced success with his operation is due to the high level of student involvement with the hydroponics system. A large amount of his chemistry students are staying after their regular school hours to help Jeff with various tasks, such as harvesting and creating new systems. Some students have the privilege to conduct their own experiments with Jeff's oversight. As of today, Jeff and his studentshave been successful in growing crops such as oregano, basil, pineapples, blueberries, strawberries, and lettuce. Jeff's operation has been so successful that he sells basil to two different restaurants within Westerville, Ohio: Marcella's Italian Kitchen and Giammarco's Pizza & Pasta. In comparison to all of the crops that Jeff and his students have grown, basil has been the most successful: "We've had great success with basil. We are now able to have multiple crop cycles growing at once. This allows us to distribute our basil to two local restaurants at $12.00 per pound. So far we've gained a net revenue of about $7,600.00 just from basil!"(Jeff Bracken 2013). With this additional revenue of $7,600 Jeff plans to self-fund future projects, like an aquaponics system. In addition to gaining additional revenue, growing hydroponic crops helps to eliminate many costs of food production, such as transportation/shipping and paying suppliers. As for his long-term goals, Bracken hopes that his operation will continue to grow and gain attention, not only from his students but throughout the local community.

Discussion

Limitations

Implementing a hydroponic crop production system in the RPAC is both practical and beneficial. However, in order to create a sustainable system, certain limitations must be overcome. One limitation to this proposal is student involvement and interest in the local foods movement. This system is going to require the participation of students from numerous areas of study and experience, as well as support from various Ohio State administrators.

Another limitation is the initial start-up costs of the hydroponics system. Unfortunately, the OSU hydroponics proposal is starting from scratch, which makes it nearly impossible to self-fund the project. However there is potential for funding opportunities. One opportunity in particular is the Coca Cola Sustainability Grant. This grant provides funding from $500 to $15,000, which is more than enough to cover the start-up costs of the operation. There are more grants available for this project similar to the Coca Cola Sustainability Grant; finding and

securing these grants will be vital to the projects future success. With start-up costs of under $300 per unit, a modest grant would make a big impact.

Moving Forward

This proposal has the potential to immediately impact the OSU community in a positive way. In order to finalize the plan, the hope is to continue communicating with Zia Ahmed and the Ohio State Dining Services. Once the exact amount of lettuce the RPAC café would request is determined, the scale of production and an actual start-up and operating budget will be able to be determined. Along with this, continuing to develop a relationship with Jeff Bracken and his Westerville North hydroponic crop production program would benefit the system moving forward. Jeff's knowledge of the hydroponic systems and experience with installing and maintaining these systems would be invaluable help. By fostering community relationships and integrating students, a hydroponics system in the RPAC could play a key role in spreading knowledge about local foods and food production in general.

Conclusion

Bringing a lettuce hydroponic system to OSU would provide multiple benefits to the university and more importantly to students. Through increasing student awareness about local foods and food production, OSU could have a positive impact on society as a whole, encouraging consumers to be mindful of how their actions influence the environment. Students would gain the knowledge to make informed decisions about food, and OSU dining services would receive fresh lettuce from the same building in which it is served. With its low start-up costs, this proposal is quite attainable and will continue moving forward with the help of OSU administrators such as Zia Ahmed.

Works Cited

Aggie Horticulture.Nutrient Solutions for Greenhouse Vegetable Gardens. Retrieved from http://aggie-horticulture.tamu.edu/greenhouse/hydroponics/solutions.html

Brokenshire, H. (2012). Ohio state campus cafe fueled by nearby organic garden.*The Lantern.* March 18, 2013. Retrieved from www.thelantern.com/campus/ohio-state-campus-cafe-fueled-by-nearby-organic-garden-1.2947561#.UVrYLlfJI4y

Coolong, T. (December, 2012). Hydroponic lettuce. Retrieved from http://www.uky.edu/Ag

College Farm. (2013). Retrieved from www.dickinson.edu/about/sustainability/college-farm/content/About-the-College-Farm/

College Sustainability Report Card. (2011). Retrieved February 20, 2013, from http://www.greenreportcard.org/report-card-2011/schools/ohio-state-universitycolumbus/survey/dining-survey

Green Coast Hydroponics. (2006). Hydroton Hydroponic Grow Rocks. Retrieved from http://www.gchydro.com/Hydroton+Hydroponic+Grow+Rocks.html

History. (2013). Retrieved from http://blogs.dickinson.edu/farm/about/history/

Hydroponic Crop Science. (2011). Retrieved from http://oardc.osu.edu/hydroponics/t01_pageview2/Home.htm

Kellert, Stephen R. (2012). Birthright*: People and Nature in the Modern World*. New Haven: Yale UP.

Local & Regional Food Systems. (2013). Retrieved from http://www.gracelinks.org/254/local-regional-food-systems

Martinez, S. et al. (2011).*Local foods systems: Concepts, impacts, and issues.* (Economic Research Report No. 97). Washington, D.C.: U.S. Department of Agriculture, Economic Research Service.

O' Hara, J. K. (2011).*Market forces: Creating jobs through public investment in local and regional food systems.* Acton, MA: Union of Concerned Scientists Food and Environment Program.

Ohio state history and traditions. (2013). Retrieved from http://www.osu.edu/news/history.php

Rich, J.R. (September, 2010). Considerations for Managing Greenhouse Pests – Florida Greenhouse Vegetable Production Handbook, Vol. 31Retrieved from http://edis.ifas.ufl.edu/cv248

The Ohio State University Framework plan. (2010). Retrieved fromhttp://oneframework.osu.edu/framework.htm

Waterman Dairy Center. (2013). Retrieved from http://ansci.osu.edu/facilities/waterman-dairy-center/