

# Permaculture Integration at the University of Michigan

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## 1.0 Executive Summary

Permaculture is an ecological design science modeled after natural ecosystems and based on ethical principles. It attunes those who study it to the patterns inherent in natural systems, which are used as a lens in solving current societal problems. Permaculture has enormous potential to build more efficient and enriching food, energy, and water systems for the University of Michigan that are symbiotic with nature. This would allow the University community to live within the patterns of abundance that already exist in nature, thereby going beyond sustainability to create a regenerative campus. The 12 Permaculture Principles, if integrated into the University, would decrease irrigation, fertilization and waste management costs while providing an enriching and educational experience for faculty, students, and staff. Permaculture integration will help the University attain its sustainability goals in climate action, waste prevention, healthy environments, and community awareness (Planet Blue, 2011).

The following is a list of recommendations for the University of Michigan Sustainable Food Program and Chiwara Permaculture that indicates how permaculture can be integrated into the University of Michigan. These recommendations are derived from research and interviews conducted by students enrolled in Environment 391 - Sustainability and The Campus:

- 1 The establishment and maintenance of a satellite garden is crucial to the integration of permaculture on campus. The following sites are possible satellite garden locations based on visibility, feasibility, utility, and applicability of permaculture principles.
  - a Northeast of Dana Building, West of CC Little Science Building
  - b Northeast of the Exhibit Museum of Natural History
  - c North of the Museum of Art, South of Tisch Hall
  - d North of the Museum of Art, South of Tisch Hall
- 2 The UMSFP should work with Chiwara on co-curricular educational programming.
  - a A lecture series by Nate Ayers on the 12 Permaculture Principles and how they can be implemented at the University of Michigan will target students from various schools and departments and will be sponsored by the UMSFP.
  - b Hands-on student workshops organized by the Permaculture Design Team and held at the Chiwara Permaculture Research and Development Lab in Ann Arbor.
- 3 The creation of an interdisciplinary capstone course that promotes permaculture principles and cultivates further involvement in sustainable food efforts on campus.
  - a The following faculty members that have expressed interest in such a course: Raymond De Young (SNRE/LSA Program in the Environment), Joseph Trumpey (SNRE/School of Art & Design), and Rebecca Lange (LSA Earth & Environmental Sciences).

The next steps of this project include meeting with Sue Gott, the University Planner, in order to secure a location for a satellite garden, holding a round table with the professors interested in being involved with the interdisciplinary capstone course, and the possible continuation of this endeavor as an Environment 391: Sustainability and the Campus project during Winter 2013.

## 2.0 Project Objectives

Our sponsors asked for recommendations for how to integrate the permaculture design principles into the University's sustainable food efforts by creating more hands-on, complex-systems learning experiences for students and staff. Through consultation with the sponsors we developed the following four deliverable objectives for the project:

- 1 Recommendations for possible locations for a pilot permaculture satellite garden.
- 2 Recommendations for how Chiwara Permaculture can have a presence on the University of Michigan campus.
- 3 Recommendations for how Permaculture Ethics and Design Principles can be incorporated into existing curricula and new courses that could be created.
- 4 An educational presentation that teachers and students can use to educate themselves and others on the Principles and Ethics of Permaculture with examples that apply to the University.

The long-term goal is to educate students about food production that does not harm the earth and traditional methods of growing food. Chiwara Permaculture and the U-M Sustainable Food Program are working to educate current and future generations in sustainable food production. These efforts are in conjunction with President Mary Sue Coleman's Sustainability Goals including: "the purchase of 20% of U-M food in accordance with U-M Sustainable Food Purchasing Guidelines by 2025" and "to educate our community, track behavior, and report progress over time" (Planet Blue, 2011).

## 3.0 Introduction

### 3.1 Project Background

The University of Michigan has an expansive selection of theory-based courses from which students can choose from to enhance their educational experience. In addition, the University's focus on research provides the opportunity to integrate theory into practical applications. Permaculture presents the opportunity to apply theoretical knowledge in a living laboratory, which will provide students with more hands-on, systems-based learning in order to develop skills that will help solve pressing environmental problems that are becoming ever more complex.

The sponsors of this project are the U-M Sustainable Food Program and Chiwara Permaculture. These are the mission statements of our sponsors:

*U-M Sustainable Food Program*

"Fostering collaborative leadership that empowers students to create a sustainable food system at the University of Michigan while becoming change agents for a vibrant planet."

*Chiwara*

“Chiwara Permaculture is a Michigan based research, education, design and incubation firm. We research, design and educate permaculture solutions in 6 main areas: Food, Energy, Water, Building, Transportation and Waste. We offer three tiers of educational programming: K-12, College/University, and Professional. We believe that permaculture is a powerful vehicle for STEM [Science Technology Engineering Math] education and problem based learning. To that end, we combine our research work with our educational programs, in pursuit of innovative solutions to community problems. Our best ideas are incubated and shared, toward ecological economic development. Our mission, guidance, and business practices are found within the Permaculture principles and ethics. We promote small scale, community based solutions.”

Our sponsors stressed the importance of obtaining a permaculture “lens” which would allow us to properly locate sites for a satellite garden and foster a discussion between group members, students, and faculty. We obtained this “lens” through a day-long intensive training in Permaculture Ethics and Principles, which took place on Tuesday, October 16th.

### **3.2 Permaculture Training**

We began our training at the Nichols Arboretum with a nature walk led by Nathan Ayers, our project sponsor and creator of Chiwara Permaculture. He used the many ecosystems existent in the Arboretum to teach us the fundamentals of permaculture. We observed examples of closed loop systems, biodiversity, and the patterns that naturally exist in nature. Observation is vital to permaculture, as it uses biomimicry to duplicate systems that are found in nature. We also learned about plant fundamentals and why preserving biodiversity is vital to sustainability. Nate Ayers stressed that our agricultural dilemmas are issues of scale and that understanding and being able to duplicate nature’s stacked functions is key to fixing the system. Small and slow solutions allow permaculture designers to consider all elements of a system and how they interact with each other when building new systems. These concepts are explained in the 12 Design Principles of Permaculture founded by Bill Mollison and David Holmgren (Holmgren, 2002):

- 1 Observe and Interact
- 2 Catch and Store Energy
- 3 Obtain a Yield
- 4 Apply Self-regulation and Allow Feedback (set limits to growth)
- 5 Use and Value Renewable Resources and Resources
- 6 Produce No Waste
- 7 Design From Patterns to Details
- 8 Integrate Rather than Segregate
- 9 Use Small and Slow Solutions

- 10 Use and Value Diversity
- 11 Use Edges and Value the Marginal
- 12 Creatively Use and Respond to Change

Using these Principles and the design techniques learned during the intensive training, we developed the criteria for locating potential sites for a pilot satellite garden for the UMSFP's Campus Farm. These criteria are explained in the Methodology section (4.0). The Principles are used to help us design in tandem with nature's patterns. The UMSFP is already planning to use permaculture methodology in the design of the Campus Farm. In addition, they would like to have an educational satellite garden on campus that would function as a pilot Research and Development Lab for high-yield, low-labor growing techniques. One of the advantages of a permaculture satellite garden is that it is a never-ending resource for research and education.

### **3.3 Existing Projects at Other Universities**

#### *University of Massachusetts: Amherst*

UMass Amherst is the nation's leader in permaculture initiatives that are gaining massive momentum and support (UMass Permaculture Committee, 2012). In 2010, students from the UMass Permaculture Initiative approached campus food services with a detailed proposal to grow food for the dining commons. According to Andrew Mack, their proposed budget was \$10,000 for a ¼ acre space in front of the Franklin Dining Hall. This area had a high amount of traffic and was visible to both the students and the community. This was an important component in attracting enough interested volunteers to turn this idea into a reality. The first step taken was growing fertile soil. The students used sheet mulching to regenerate and aerate the earth: this included 1,200 pounds of organic matter, 500,000 pounds of university compost, recycled cardboard and mulch (UMass Amherst In the Loop, 2012).

While the soil sat for five months, the UMass Permaculture Initiative held a design roundtable that attracted over 100 community members and university students from across the nation. The group was mainly comprised of undergraduates who created 40 different designs for the ¼ acre space. Upon checking the soil, students found about eighteen worms per square foot with fungi colonies birthed throughout (UMass Amherst In the Loop, 2012). These are indicators that the soil is rich in nutrients, which is the most vital aspect for a successful garden. The goal for this space was to provide food for the students and to be an educational hub for the entire community (UMass Amherst In the Loop, 2012).

Over 1,000 volunteers planted a total of 150 different species of plants in a 3,500 square foot space, producing over 1,000 pounds of food in one year. Interest in permaculture spread quickly on campus. Over 20,000 students, about 70% of the student body, became familiar with the term and could explain what permaculture is trying to accomplish. The students were so intrigued by permaculture that the senior class of 2012 funded the newest garden project outside of Berkshire Dining Hall with money raised by their class. The students understood that they should not just

be consumers, but also creators (UMass Amherst In the Loop, 2012). The enthusiasm and work ethic that this project evoked was remarkable and can be replicated on other college campuses.

### *Yale University*

Yale University is an example of a peer institution that is incorporating permaculture principles into its campus. The farm was established in May 2003, when the Yale Sustainable Food Project was initiated. Although this farm is not described as a 'permaculture' garden, it utilizes and incorporates many of the permaculture principles. Prior to the farm's creation, this space was overrun by shrubs, weeds and several dying hemlock trees (Yale University, 2012). Students, staff and community volunteers came together and transformed this degraded plot to a fertile and productive garden that produces a variety of edible plants. It was important for their team to create a garden that is beautiful, productive and sustainable (Yale University, 2012). They also have a chicken coop located next to a compost pile, which aids in the aeration of the organic matter and speeds up the composting process. This is a model of a closed loop system; the output of one system is the input of another. A native species section functions as a food forest with fig trees and medicinal plants. This is a key aspect of permaculture; native species require less maintenance and watering because they are adapted to local conditions. Yale's utilization of their garden is similar to how UMSFP and the University of Michigan could use our proposed satellite garden.

## **4.0 Methodology**

The first part of our project was focused on learning about the elements of permaculture. This was accomplished through the previously mentioned intensive training.

The second part included developing recommendations for a satellite garden, integrating permaculture into the University curriculum, and raising awareness about permaculture on campus. In order to accomplish these goals, we identified faculty and staff whose field studies were related to permaculture and/or had previously shown interest in Chiwara. Once key players were identified, we held interviews with them to obtain valuable information for our recommendations for the garden sites and integration of permaculture into curricula.

The following criteria were used for identifying satellite garden sites:

1. Determined using permaculture criteria:
  - Sufficient southern exposure for adequate sunlight
  - Between 1/10 and 1/8 acre to allow for enough space to implement permaculture practices, but not more than can be properly maintained while the program is in its infancy
2. Determined using our understanding of University practices:
  - Visible to most of the campus population
  - Ability to incorporate signage that is highly visible and demonstrative of the practices being applied

- Easy access for Grounds and student volunteers for purposes of maintenance and care
- Close proximity to water access OR a rainwater capture system for irrigation

The faculty interviews were conducted using the following topics as a general framework for the discussions with key faculty about how to integrate permaculture into curricular activities:

- Their existing knowledge of permaculture and explained it if necessary
- How permaculture could be (or is) incorporated into what they already do
- If there are existing courses that teach elements of permaculture (and may not be calling it that)
- How changes in curriculum are implemented at UM
- Barriers to creating new curricular programs (i.e. courses, seminars, special topics, minors, etc.)
- How to make permaculture attractive and interesting to the campus at large
- Recommendations of other key players to interview

When interviewing Tracey Artley, Sustainability Programs Coordinator for Plant Building and Grounds Services, different questions were asked since this interview was to gain information about how best to implement a satellite garden. The questions were:

- *How do we go about getting our voice heard?*
- *Given that the University of Michigan - Ann Arbor is not an explicitly agriculture-focused university like MSU, how do you see a campus satellite garden fitting within the University's core mission?*
- *Have you heard any student interest for this kind of project before?*
- *What challenges do you identify with our project?*
- *Are there other contacts for consideration?*

Additionally, we successfully planned and hosted a Diag Day on Central Campus, where we handed out “green smoothies” (made out of apple and kale) to students while explaining the basics of closed-loop systems. We used a stationary bicycle connected to a generator that powered LED lights that would grow kale, hence allowing the user to consume it and gain energy to re-start the whole cycle. This event was used as a means for us to gauge interest among students and staff and to increase awareness about permaculture. We wanted to see how people reacted when informed of the basic idea of permaculture and systems thinking.

Lastly, we created a presentation on the 12 Permaculture Principles. This presentation was prepared on prezi.com, a website that allows for information to be presented as a visual story with flow and narrative. This presentation format mimics the way permaculture urges us to think about and imitate nature.



## **5.0 Findings**

### **5.1 Student Interest at Diag Day Event**

As mentioned above, the purpose of our Diag Day was to increase permaculture awareness on the University of Michigan campus and gauge student interest. We talked to students about the benefits of permaculture designs, and we demonstrated a closed-loop system in action. Moreover, we collected signatures for a petition in support of the sustainable food program's effort to implement an educational satellite garden on campus. The purpose of the petition was not for official use but rather to gauge student interest and passion for the implementation of such ideas. We found that there is interest among students in learning more about this subject.

### **5.2 Faculty and Staff Interviews**

In order to start gathering information on how to approach this project, we met with Tracy Artley, the Sustainability Programs Coordinator for Plant Building and Grounds Services. We asked her questions on what the first steps should be in order to obtain a land space for the satellite garden. With her information we were able to identify possible options on campus, and create a list of "must haves" and "would likes" that the garden requires. Moreover, she pointed out previous teams that have worked on landscape redesign around campus that could be helpful people to contact. We also identified some of the future challenges that our group may face, such as who will be in charge of the garden in a few years and who will take care of it in the meantime. She also mentioned that the university is moving towards more natural looking landscapes because of costs, and finding a spot on Central Campus may be harder than finding a spot on North Campus. However, with enough support from faculty and staff, this project would have a higher potential of continuing.

Our next step was to identify key faculty members that would get on board with the interdisciplinary capstone course. We sat down with Professor Raymond DeYoung from the School of Natural Resources and the Environment, and figured out current courses on campus that are related to permaculture. Some of these are in urban planning, education and policy offered by SNRE and Program in the Environment (LSA). However, if we were to reach out to other fields like humanities, international studies and even poetry programs, we could get new stakeholders involved in sustainability issues, which could lead to more people talking to the deans. For example, faculty in engineering and business are interested in sustaining the health of the planet.

Professor DeYoung mentioned that in order to reach new students and get them involved in permaculture, it is necessary to create a precursory familiarity with the idea and to create an association between the word and its concept. For instance, students could see a small demonstration site, read about it in a poem, hear about it on campus, or read about it online. As Professor DeYoung mentioned, "the third time you see something is the time it clicks." After this preliminary exposure to permaculture, students who see a course being taught about the topic

will be more likely to take the class. Some courses are taught in a case based format, so another potential publicity avenue is to use cases that talk about permaculture.

Other options that Professor DeYoung suggested were to take one principle and use it as a pre-existing solution for one aspect of the university instead of showing the whole system at once, which may be overwhelming. Students should be informed of the benefits of permaculture on campus and point out where could it be implemented using small demonstration sites. The students could then question why it is not being implemented yet and be compelled to ensure that permaculture is integrated into the University. He also recommended the creation of a Diag demonstration pilot. The best way to approach this is to sit down with Grounds staff and ask them if it would be a feasible option.

We also approached Professor Joseph Trumpey from the Stamps School of Art and Design. He also agreed that Central Campus was a better location for the satellite garden because of the amount of students that walk around in a daily basis. Furthermore, Professor Trumpey seemed very interested in supporting us in the creation of the interdisciplinary capstone course, and helped us determine the first steps towards it. The first step is to identify the department that would host the class, identify specific faculty members that are interested, and obtain support from the dean. Once this has been accomplished, a “special topics class” could be created. The University of Michigan is decentralized, and this requires us to approach each dean individually. However, the decentralized nature of UM will allow us to reach new frontiers and break a lot of institutional barriers. He strongly recommended getting the students involved. After all, it is the students who have a bigger voice in this university, even more than the faculty.

We were also able to meet with PhD student John Graham. John is focusing his dissertation in ecological design of systems and agricultural restoration. He talked to us about his view of permaculture and inspired us to make our project more appealing to the public. For example, we could start speaking about environmental ethics in order to get a wider audience, since social responsibility is a characteristic that every student should have. Learning the basics can make people feel empowered. With any kind of political or cultural movement, we must talk to people in their language. For example, if they value money, find out what that does for them. He mentioned Aldo Leopold, an ecologist and philosopher who published a book in 1949 laying out an ethical philosophy. Leopold wrote essays that say we need to extend ethical consideration to the non-human community. We must include soils, animals, plants, and ecological processes in our ethical community. Since Leopold’s work, others have expanded this idea. Leopold's land ethic should be an inherent ethical system of permaculture and of the university. This is a question of how our system holds power. We are a part of a community that extends beyond our species. Therefore, we must extend our ethical responsibility beyond our “tribe.” Some of the challenges we will face include the lack of peer-reviewed science attached to permaculture practices and principles, examining ways of doing permaculture type activities on a larger scale, and raising awareness of what permaculture is.

Our interview with Professor Rebecca Lange, Chair of the Department of Earth and Environmental Sciences, reinforced what both professors previously expressed about student involvement. Student initiatives and their commitment to their projects is what the campus needs for this university to keep moving forward. Furthermore, professors should get involved in this project as well. This project serves as a good educational tool, where students can get involved in a more practical way. The capstone course can include trips to the satellite garden where “hands on” activities can take place, and students can learn from a classroom as well as on the field. This course can also be designed to be interdisciplinary, where professors from different departments can give lectures throughout the course.

## **6.0 Recommendations**

The following is a list of recommendations for the University of Michigan Sustainable Food Program and Chiwara Permaculture that indicate how permaculture can be integrated into the University of Michigan.

### **6.1 Satellite Garden**

The University of Michigan Sustainable Food Program's [UMSFP] long-term plan for the University includes the implementation of satellite gardens directly on campus. However, no funding has been allocated towards this project thus far. The purpose of a satellite garden is to expand the visibility of the Sustainable Food Program on campus and reach students that normally would not voluntarily visit the campus farm. The visibility of a student led garden is crucial to the development of sustainable food awareness throughout campus. The campus farm has attracted many students that are already excited about sustainable food systems, but in order to engage those without this predisposition, a satellite garden is necessary.

The Permaculture Design Team [PDT], a member organization of the UMSFP, is currently focused on acquiring funds for the start up costs associated with the implementation of one satellite garden. To help with this, Madeline Dunn, Co-Founder of the PDT, has applied for a grant from the Planet Blue Student Innovation Fund for \$10,000. The anticipated outcome of this project is a student-operated garden that would embody the needs of communities located in close proximity. For example, a garden by the School of Art and Design may grow fibers that can be harvested and dyed for student projects. The UMSFP already has had success in rallying volunteers for workdays at the Campus Farm. We anticipate an even higher level of student engagement due to the easy access and visibility of the proposed satellite garden.

We will be using permaculture methodology to design this garden. This means that it will be a low maintenance space that employs companion planting and polycultures to ensure a closed loop system. It will produce little to no waste and will need no synthetic inputs. The goal of this garden is not to feed the entire university, but rather to expose the university community to a new way of thinking about how land can be used and how to grow food. Further goals include

providing students with opportunities to volunteer and a source for research into alternative land use solutions.

Potential sites for the satellite garden have been chosen based on visibility and permaculture requisites that were developed through our intensive training with Chiwara Permaculture. Having a site on Central Campus is crucial to student engagement. After conversing with the students in our group who take classes on North Campus, we have determined that a satellite garden on North Campus may be rarely used and appreciated. This is not due to disinterest or apathy, rather to the ample time intensive majors located on North Campus. We have spoken with many faculty and staff members regarding possible site locations and uses for a garden. We spoke with Tracy Artley who told us that a project like this is innovative and likely to succeed. Meeting with Sue Gott, the head university planner, needs to be the next step in implementation of a satellite garden for the UMSFP.

We will then work with the University Grounds staff to prepare the soil. The challenges in working with grounds include the following: the sheer mass of campus land they have to cover and take care of, they are not necessarily an educational component of the University, they already have a logical system set in place and we are asking them to take care of a piece of land that may be intensive for a few years. They have their job and they complete that based on recommendations and order from a higher authority. This will vary depending on the site location. Typically, an area is sheet mulched using recycled cardboard, mulch, and compost. After roughly five months, the soil can be tested and planting can begin. The Permaculture Design Team will help create the design for the garden as well as evaluate the soil quality of the location.

The UMSFP can measure the success of this project by keeping records of the official uses of the satellite garden. This can be done through a guest book at the garden. For example, when a teacher uses the garden for a class project or when a student organization volunteers in the garden we will document this usage. Also, the general student interest and engagement can be monitored through periodically sending out surveys to the University population. In the long run, the garden will be an easy passing point during campus day tours or new student orientations.

***Site recommendations for a satellite garden include, but are not limited to the following:***

- 1 Northeast of Dana Building directly west of CC Little Building (Latitude 42.27768, Longitude -83.735937)
  - a Location is highly visible to the student, faculty and staff population because it is at the crossroads of the Central Campus Transit Center, the entrance to the hill area of campus, and three other highly trafficked educational buildings: The Chemistry, Dana, and C.C. Little Buildings. With a large percentage of the University population passing by this site every day, this location allows for a large volunteer base due to its visibility and accessibility.

- b The size and geography of this location allows for the implementation of an outdoor classroom within the garden that will be specific to and utilized by the three buildings surrounding it.
  - c This site is not obstructed by shade from any trees or buildings during the peak hours of sunlight and is south facing.
  - d This location currently only houses grass that requires synthetic inputs, mowing, and an ample amount of water. Right now the main use for this space is for University aesthetics and we would like to enhance this purpose using permaculture methodology. By using permaculture methodology, we can not only turn this space into a more aesthetically pleasing and productive area, but also make it more inviting to students.
  - e This space is designated as a Horticultural Zone Two Planting Bed by the University. This means that it is an area designated for gardening.
  - f Mike Shriberg mentioned in passing that the Dana Native Garden space, directly adjacent to this site, is going to set up a rainwater collection system. By collaborating with the Native Garden, the satellite garden can utilize their water resources.
  - g All trees, shrubs, bushes and plants will be productive in the sense that they are edible, medicinal, native or fix the nutrients of the soil while also properly representing University aesthetics.
  - h “Small and slow solutions” is the Ninth Permaculture Principle. This 1/10 acre space is the perfect size to do a pilot satellite garden.
- 2 Northeast of the Exhibit Museum of Natural History (Latitude 42.278557, Longitude - 83.735511)
- a Location is highly visible to the student, faculty and staff population because it is at the crossroads of the Central Campus Transit Center and the entrance to “the hill” area of campus, including the Natural History Museum. This site is also visible from every bus that passes through the Transit Center.
  - b This site is not obstructed by shade from any trees or buildings during the peak hours of sunlight and is south facing which is a key factor in using permaculture methodology.
  - c This location currently only houses ornamental trees and brush that require synthetic inputs, mowing, and an ample amount of water. Right now the main use for this space is for University aesthetics. By using permaculture methodology, we can not only turn this space into a more aesthetically pleasing and productive area, but also make it more inviting to students.
  - d All trees, shrubs, bushes and plants will be productive in the sense that they are edible, medicinal, native or fix the nutrients of the soil while also properly representing University aesthetics.

- e “Small and slow solutions” is the Ninth Permaculture Principle. This 1/8 acre space is the perfect size to do a pilot satellite garden.
- 3 Directly North of the Museum of Art and South of Tisch Hall (Latitude 42.276008, Longitude -83.740003)
- a This site is highly visible to the student, faculty and staff population as well as the Ann Arbor community due to its central location. This site can easily be incorporated into campus tours, as they start at the Student Activities Building and pass this location when moving from the Michigan Union to the Diag. This prime location allows for both prospective students and their parents to become educated about the University’s commitment to sustainability. With a large percentage of the University population passing by this site every day, this location allows for a large volunteer base due to its visibility and accessibility.
  - b This site is not obstructed by shade from any trees or buildings during the peak hours of sunlight and is south facing which is a key factor in using permaculture methodology.
  - c This location currently only houses ornamental trees and brush, which requires synthetic inputs, mowing, and an ample amount of water. Right now the main use for this space is for University aesthetics. By using permaculture methodology, we can not only turn this space into a more aesthetically pleasing and productive area, but also make it more inviting to students.
  - d All trees, shrubs, bushes and plants will be productive in the sense that they are edible, medicinal, native or fix the nutrients of the soil while also properly representing University aesthetics.
  - e “Small and slow solutions” is the Ninth Permaculture Principle. This 1/10 acre space is the perfect size to do a pilot satellite garden.
- 4 Directly South of Shapiro Science Library on South University (Latitude 42.27512, Longitude -83.737164)
- a This site is highly visible to the student, faculty and staff population as well as the Ann Arbor community due to its central location connecting the Shapiro Undergraduate Library to South University. This site sits directly on South University and is due East of the President’s house and due West of the Southeast entrance to the Diag. With a large percentage of the University population passing by this site every day, this location allows for a large volunteer base due to its visibility and accessibility.
  - b This site is not obstructed by shade from any trees or buildings during the peak hours of sunlight and is south facing which is a key factor in using permaculture methodology.
  - c This location is currently covered in grass and sits in front of a row of ornamental trees which both require synthetic inputs, mowing, and an ample amount of water.

Right now the main use for this space is for University aesthetics. By using permaculture methodology, we can not only turn this space into a more aesthetically pleasing and productive area, but also make it more inviting to students.

- d All trees, shrubs, bushes and plants will be productive in the sense that they are edible, medicinal, native, or fix the nutrients of the soil.
- e “Small and slow solutions” is the Ninth Permaculture Principle. This 1/10 acre space is the perfect size to do a pilot satellite garden.

We have made the preceding recommendations based on the knowledge that we gained during our intensive permaculture training. Please refer to Section 4.0 Methodology for more information on the specifics of site selection. Mike Shriberg was consulted upon choosing this site. He said that as a professor who frequently teaches in the Dana Building, he is very excited to see this space become a satellite garden. Shriberg also noted that he would most definitely utilize the space as an outdoor classroom as well as a zone of contemplation. Please see appendix for photographs of the site.

## **6.2 Chiwara Involvement at U-M**

Liz Dengate of the University of Michigan Sustainable Food Program (UMSFP), Nathan Ayers and Sam Schiebold of Chiwara Permaculture formed our sponsor group. Chiwara Permaculture is a Michigan based research, education, design and incubation firm. Their goal is to research, design and educate permaculture solutions in six main areas: food, energy, water, building, transportation and waste. Over the past several years, Nathan has transformed his backyard into a living permaculture research and development (R&D) lab. Each portion of his garden displays a different permaculture principle. He uses the garden to teach students about permaculture and as a source of food. We recommend that the UMSFP and Chiwara Permaculture work closely to achieve common goals. Chiwara will be able to aid the UMSFP in designing an efficient food garden and the UMSFP can aid Chiwara in helping connect the organization with the University of Michigan.

In order to reach our goals, we recommend that Nathan Ayers conduct a lecture series targeting the following departments at the University of Michigan: LSA Program in the Environment (PitE), School of Natural Resources and Environment (SNRE), the College of Engineering, LSA Ecology and Evolutionary Biology (EEB), LSA Earth and Environmental Science, the School of Education, the Gerald R. Ford School of Public Policy, Taubman College of Architecture and Urban Planning, and the School of Art and Design. The series should be a collaboration between the U-M SFP and Chiwara Permaculture, as this will foster a relationship between the University and outside sponsors. We recommend that this lecture series be held in the Dana building on University of Michigan’s central campus. This location would be ideal as it is the SNRE and PitE building as well as LEED Gold certified building that incorporates some of the

permaculture principles into its design and everyday functions. Marketing for this lecture series would be most efficient in the Dana building as well as this is where most students who already hold a stake in environmental issues take classes and study. We hope to make the series open to the public in order to reach the most people. Approval by both the University and the Dana building will be necessary.

The lecture series will be instrumental in teaching the permaculture principles and ideas to a wide range of people on campus. Permaculture is an ideal topic to present because its principles can be framed in multiple ways and the goals can be extended beyond their use in a food garden. The founders of permaculture, Bill Mollison and David Holmgren, created permaculture with food at its heart but hoped that it could be applied to almost every aspect of life. Chiwara focuses on six areas that permaculture can be applied to and only one of these is food. The other five address a wide array of societal needs. The lectures could play an important role in addressing the ways that permaculture can be applied to both food systems as well as the five other community based solutions. Each lecture can revolve around a different permaculture principle. The hope is that this will be an avenue towards creating a University of Michigan Permaculture Certification course (see appendix).

### **6.3 Interdisciplinary Capstone Course**

Our third recommendation for integration of permaculture into the University of Michigan is the creation of an interdisciplinary capstone course that promotes permaculture principles and cultivates further involvement in sustainable food efforts on campus, ideally through the satellite garden.

We explored various options for the structure that such a course could hold. These included a freshman seminar, an interdisciplinary course, a senior capstone course, a special topics course in education/engineering/art and design/PitE/public policy/urban planning, or some combination of these options. After interviews with professors, we concluded that the best format for such a course would be an interdisciplinary capstone course. Because permaculture tends to connect various aspects of sustainable practices and encompasses an extremely wide range of topics, it would be better received as a senior capstone course rather than a freshman seminar. A freshman audience might dismiss the topic because of the overload of information. Permaculture attracts people that have been working on various aspects of permaculture without realizing it and without using the language. It serves as the conceptual framework for the culmination of their efforts, and therefore its lessons would be best received in a senior capstone course. We recommend that the course be interdisciplinary—that is, held by two or more professors in different departments—due to the nature of the subject and its wide application across disciplines.

Course content could include the three permaculture ethics (earth care, people care, and fair share) along with the 12 permaculture principles. These could be presented in six modules:



Food, Energy, Water, Building, Transportation and Waste. A main objective of the course would be to apply the principles and the ethics to the University to make it a more regenerative and enriching system overall. The course could take a design approach, for example, of energy efficient systems. However, course content could take many forms depending on the faculty members that participate.

In order to reach the most students, it would be ideal for this course to reside in the college of Literature, Science, and the Arts. Unfortunately, this college is not adding more courses at this time. Through our interview with Joe Trumpey, we learned that the most effective way to add a new course is to approach several interested professors and gain their support. According to Rebecca Lange, the Provost and the deans of many colleges on campus encourage interdisciplinary collaboration by professors. These professors must approach a department or college with a plan as to how this course would be executed, its target audience, and its subject matter. Our research also indicated that an effective way to integrate sustainability into the curriculum is to utilize individual faculty members. Stubbs & Schapper argue that “most curriculum initiatives [in sustainability] have been driven by individual faculty” (2011). They also make the point that in the absence of an integrated sustainability program individual faculty members can use their disciplinary and pedagogical backgrounds to enhance their own courses in a meaningful way (Stubbs & Schapper, 2011). This grassroots approach may be more feasible at a decentralized university such as the University of Michigan.

In research conducted, we also found that curriculum design can take on different perspectives depending on the university and the department. Vincent & Focht (2009) interviewed environmental program managers and found three overarching perspectives: programs can aim to produce environmental citizens, problem solvers, or scientists. Schools that wish to produce environmental citizens “take a broad liberal arts approach and reject career-focused training” (Vincent & Focht, 2009). This perspective holds that students in all fields need to develop environmental literacy and that sustainability education should be infused into all higher education disciplines (Vincent & Focht, 2009). For environmental problem solvers, “environmental programs should train people to solve environmental problems and influence environmental management decisions and policy” (Vincent & Focht, 2009). Finally, the environmental scientist perspective advocates curricular depth in a specific discipline; programs should train professional specialists to solve environmental problems. This perspective recommends that students combine environmental studies with another field of study (Vincent & Focht, 2009). All three perspectives on the outcome of an environmental education agree that programs should employ an interdisciplinary approach and that students should develop systems thinking skills “in order to devise innovative solutions for pressing environmental problems” (Vincent & Focht, 2009). These perspectives are not antagonistic; a single university may aim to utilize multiple perspectives to have the most positive outcome for our society.

Further involvement in sustainable food efforts on campus would ideally be incorporated into the course. For instance, working on the satellite garden could be a course requirement that would provide a hands-on experience for students, faculty, and staff. This could address the need for more complex systems-based curriculum in order to develop skills in this kind of thinking to solve pressing environmental problems that our society faces, as previously mentioned. Another possibility is to provide students with the opportunity for involvement in the UMSFP or the Permaculture Design Team. Although these activities may not be required, the class could serve as a networking tool for interested students.

## **7.0 Conclusions/Lessons Learned**

Our three recommendations to integrate permaculture into the University of Michigan are to establish and maintain a satellite garden, to implement co-curricular educational programming with UMSFP and Chiwara Permaculture, and to create an interdisciplinary capstone course that promotes permaculture principles and cultivates further involvement in sustainable food efforts on campus.

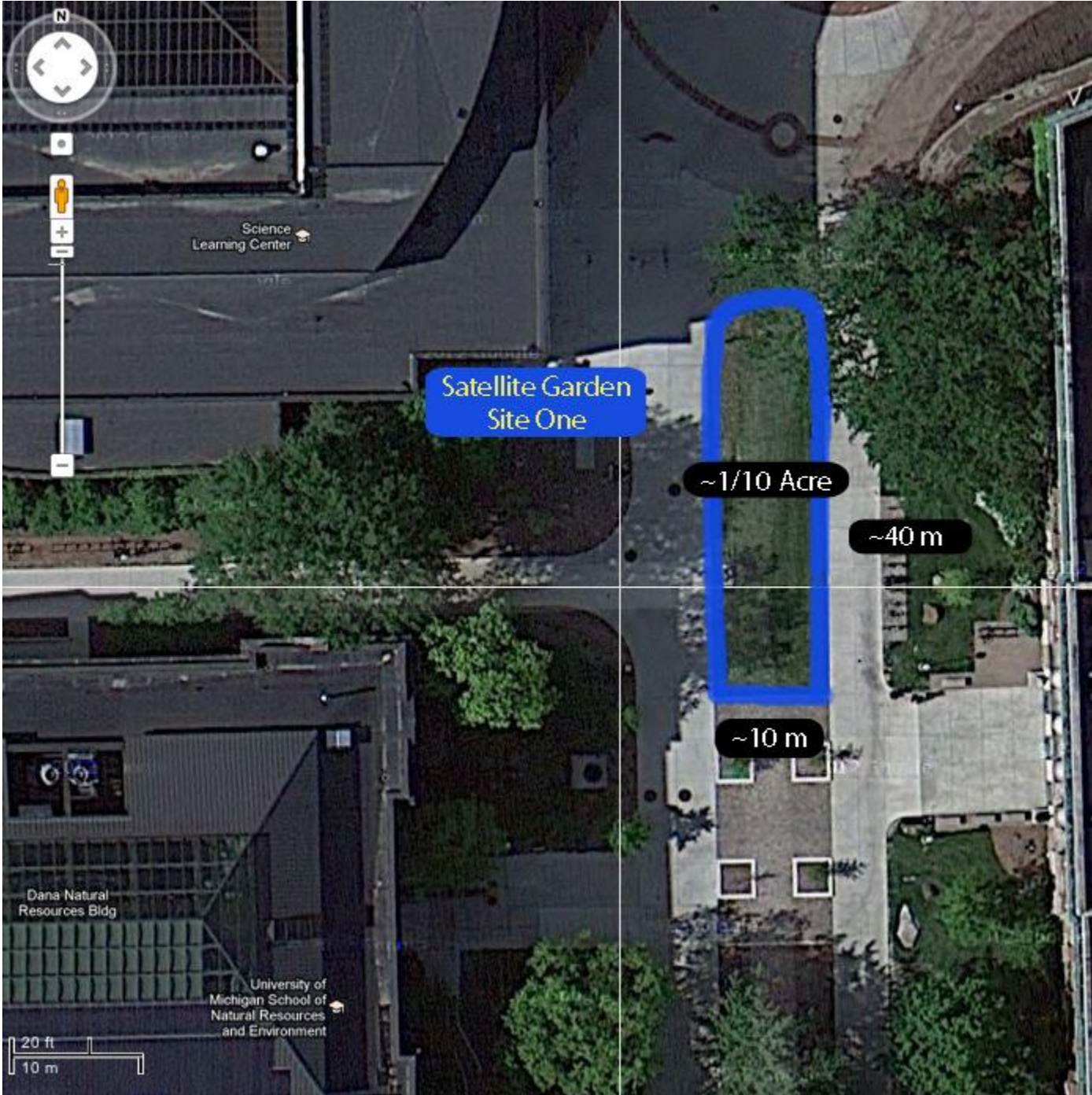
The satellite garden, lecture series, and hands-on permaculture experience will educate students about localization and growing food. These incorporations of permaculture on campus will demonstrate how closed-loop systems and systems thinking can conserve energy and resources. Permaculture is interdisciplinary by nature, and encourages thinking about larger systems and life cycles. The conversation about permaculture is actually the combination of several “common sense” ideals that teach creative problem solving.

Of our three recommendations, the most easily achievable (i.e., the low-hanging fruit) is the co-curricular educational programming. This can begin without the establishment and maintenance of a satellite garden, which is more of a long-term goal (long-term meaning more than one semester will be required). However, site identification for the satellite garden can proceed in the short-term, meaning within the next semester. Our recommendation that will take the longest time to complete is the establishment of an interdisciplinary capstone course. We will continue to gather support and best practices from faculty in the coming months, hopefully through a round table discussion.

We believe that this project should be included as a group project option next semester (Winter 2013). The group could help to organize and run events that we have recommended, such as the lecture series and trips to the permaculture research and development lab. Furthermore, they could make more progress on developing a capstone course and solidifying which site will be used for the satellite garden. Through the creation of the Permaculture Design Team and the continuation of this project in 391, we can ensure that this project is sustained.

8.0 Appendix

8.1 Satellite Garden Site Recommendation Photographs



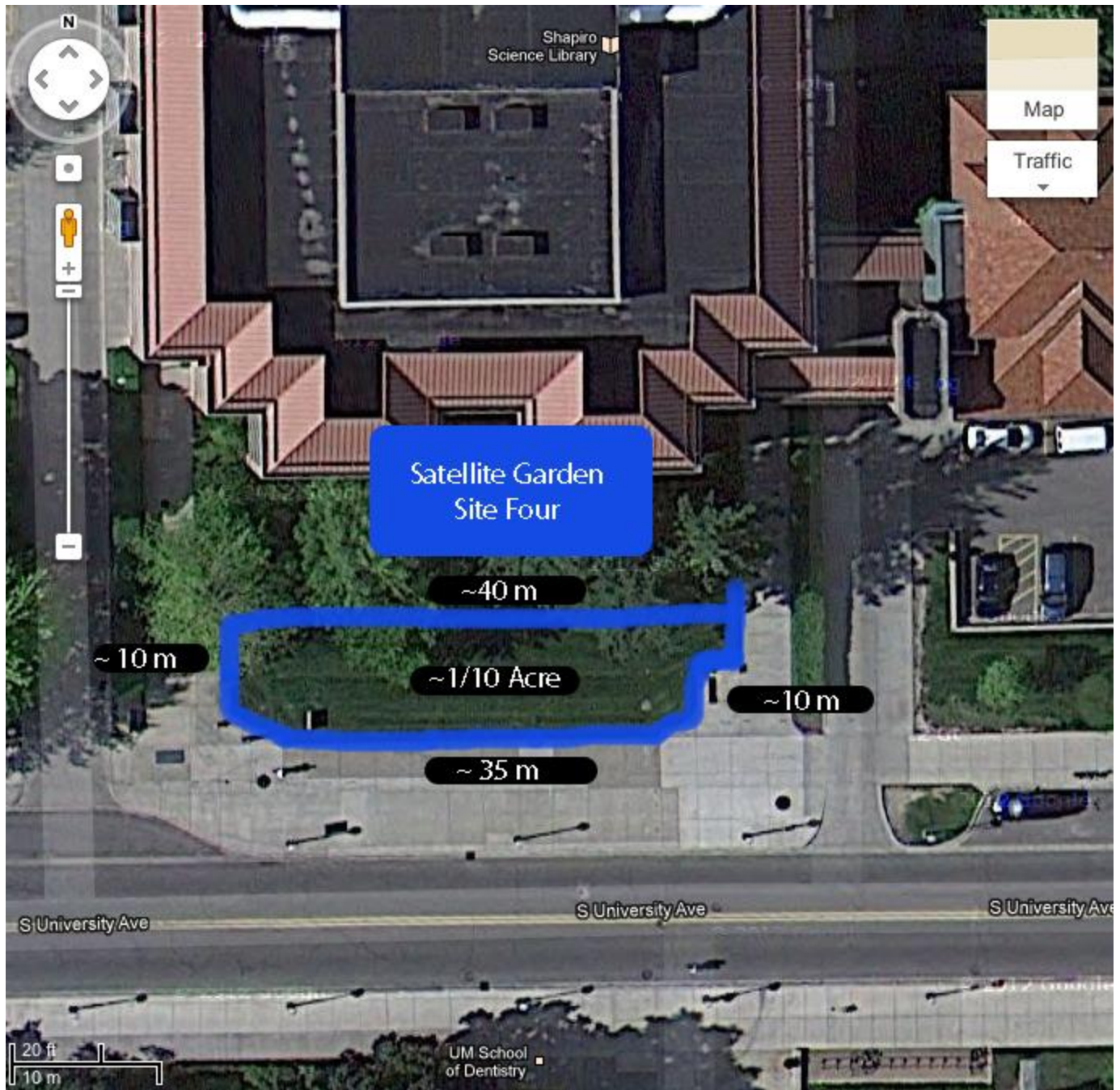
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Source: <https://maps.google.com>



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## 8.2 Permaculture certification course

Joe Trumpey brought up the idea of a permaculture certification course to Lindsey MacDonald of the UMSFP and to us during a separate interview. His rationale was that creating a class can be difficult. As a student organization we have no limits except for time, whereas professors have limits, including people to please, salaries to earn, and other things to worry about. A

permaculture certification currently has no official criteria. We can create our own U-M permaculture certification, which could include the following:

- Attending all 12 permaculture principle lectures by Nate Ayers
- Participating in two workshops by the Permaculture Design Team
- Putting in a total of 20 hours at the farm
- Taking relevant courses such as General Ecology, Soil Ecology, Ethnobotany, and/or Woody Plants

We would like to work with the Graham Institute to implement something like this due to their focus on sustainability education.

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