



Honeybee Boxes and Permaculture Garden:

A Feasibility Study

for

SUNY-ESF

Prepared for: Dan Conrad, ESSO, GCI, PPC, and the Biomimicry Club

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SUNY-ESF

May 2, 2017

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Introduction

Environmental sustainability and consciousness has long been a cornerstone of ESF, and our campus should reflect these ideals. One way in which we can display this is through the implementation of permaculture gardens, which are “designed agriculture, so that the species, composition, array and organization of plants and animals are the central factor” (Mollison, 1979). While there have been individual permaculture plantings on the south end of campus, ESF has no specifically designated permaculture garden on its campus. Planting one on or within walking distance of SUNY-ESF campus could fit the campus for several reasons. As we found through research, the implementation of these gardens would benefit the ESF community by increasing both the aesthetic and environmental conditions of the campus. Another option for enhancing ESF campus’s biodiversity is placing honeybee boxes in strategic locations on campus in the interest of mitigating the dramatic population decline honeybees are experiencing in the United States. A USDA survey found that the annual honeybee loss for 2014-2015 was 42.1% (Kaplan 2015). If this project is successful, the establishment of honeybee boxes could help bolster bee populations, which would fit with the values of the SUNY-ESF community. Additionally, we believe that as a learning institution, SUNY-ESF could enhance the student experience by providing opportunities for further education in permaculture and beekeeping, which are subjects not traditionally taught in a classroom environment.

Ultimately, if both a permaculture garden and honey bee boxes were implemented, they would work together in a mutually beneficial relationship; the gardens would provide sustenance for the bees and the bees would pollinate the garden.

A survey of 191 ESF students and staff showed that there is an overwhelming amount of support for this project. A high number of students indicated that they would be willing to help the project's initial startup, as well as maintain the project going forward. We have been in contact with four student organizations that have expressed a more concrete, interest in being stakeholders. Dan Conrad, head of shipping in the physical plant, was interviewed as well and expressed interest as an additional stakeholder. Mr. Conrad has beekeeping experience and has even mentioned the desire for a beekeeping club at ESF in the past. Additionally, though survey gathering, a staff member briefly mentioned hopes for a beekeeping class in the future.

Overview of Alternatives

Alternative A: Permaculture Garden

Our first alternative is establishing a permaculture garden on or within walking distance of SUNY-ESF campus. Species that could be planted in the garden include fruit bearing trees such as apple trees, woody shrubs such as raspberry and blackberry, and perennial herbs like mint, lavender, rosemary, sage, thyme, and parsley, which require little maintenance (Baker 2016). These plants are also very attractive to bees and grow well in this climate (Baker 2016). Potentially suitable locations for the garden include the garden beds lining Baker Lab, Oakwood Cemetery and Thornden Park.

Alternative B: Bee Boxes

Another alternative is the installation of honeybee boxes in suitable areas on campus. These honey bee boxes, could be situated on the rooftops (such as Gateway or Walters Hall), or along the back of Marshall Hall and Baker Lab. These locations would be chosen in the interest of being away from heavy campus activity areas, such as the Quad, in order to prevent conflicts between the students and the bees. The honeybee boxes would be maintained by the same clubs, as well as faculty, listed in Alternative A. Once the honey bee boxes are installed, they could also serve as a valuable education tool, (e.g., related classes, future students, clubs, and research projects.) Furthermore, the boxes could help combat the rise of the devastating colony collapse disorder (VanEngelsdorp, 2008). We also spoke with the head of the Bookstore in thought of selling the honey on campus and this would be welcomed adding another benefit to the ESF community.

Alternative C: Both Permaculture Gardens and Bee Boxes

A third alternative is the implementation of both permaculture gardens and honeybee boxes in suitable locations on the SUNY-ESF campus. These gardens would create an area for the bees to forage, and the garden would benefit from the presence of pollinators. This option would also provide students with an opportunity to gain hands-on knowledge of the mutual relationship between pollinators and plants.

Alternative D: None of the Above

Leave the SUNY-ESF campus the way it is by implementing none of the previous alternatives.

While there is a permaculture garden managed by the Green Campus Initiative (GCI) located on the SUNY-ESF property of Lafayette Street, it is not readily accessible to students without transportation. There are also permaculture plantings on the South end of campus, but no specifically designated garden exists.

Criteria

We assessed the feasibility of our alternatives based on the following criteria. The chosen project must:

1. Be supported by significant student interest.
2. Create an opportunity for further education in beekeeping and/or permaculture.
3. Be environmentally responsible and sustainable. In addition, improve the environmental conditions of the SUNY-ESF campus by increasing biodiversity and productivity.
4. Be financially affordable and sustainable.
5. Create a long-lasting project that will endure on campus for future SUNY-ESF students, with the potential for ~~work~~ study and volunteer hours.
6. Create potential for community involvement through student/faculty run workshops promoting “green” ideas that coincide with SUNY-ESF’s philosophy.
7. Require minimal maintenance.

We selected these criteria because they assess the feasibility of our alternatives while bringing green attitudes into the SUNY-ESF campus community. The ability of the project to be financially and environmentally self-sustaining is key to its success. As SUNY-ESF is a learning institution, we have prioritized criteria 1 and 2, as they focus on maximizing learning opportunities and experiences for students. It is important that criteria 3 is met because one of our major objectives for this project is to improve the environmental conditions of our campuses for students, faculty, and wildlife. Criteria 4 and 7 are critically important to the success of the chosen project because without adequate funds and maintenance, the project will not be feasible. Criteria 5 and 6 focus on maximizing the student experience and providing an opportunity for community involvement.

Methods

We gathered our qualitative information pertaining to beekeeping and permaculture projects from online sources such as scholarly journals and YouTube videos. Additionally, we attended a meeting of the Syracuse Beekeepers' Association, where we acquired information that directly influenced many of the choices that we made for the bee boxes. Beekeepers at the meeting suggested that since we intended to use the boxes as educational tools, a Langstroth 8 frame bee box should be used. These boxes are relatively small, can easily be handled by a wide variety of people, and can produce ample honey. Locations were suggested that would keep the bee boxes away from areas of high student activity and vandalism. The rooftops that we had initially thought of were suggested by others at the meeting. We also emailed with an ESF Alumni who owns a beekeeping business. The quantitative data was gathered through survey questionnaire distributed throughout campus to both faculty and students, with the majority of surveys taken by students.

We approached a variety of student organizations to work on this project regarding the setup, maintenance, and funds for all mentioned. PPC, ESSOS, GCI, and the Biomimicry Club expressed that they would be interested in having one or both of these projects on campus and have spare money in their budgets that could potentially support most, if not all of the project going forward. Being that this project wouldn't be going forward until next semester, these student organizations could include the startup costs of the garden in their budgets. We found most of the Student organization leaders during survey distribution. All contact information was given freely.

In total, 191 surveys were conducted on ESF campus. The questionnaires were printed with 5 questions, with three questionnaires to a page. The survey was kept relatively brief to help ensure maximum participation. The questions pertained to whether the student body desires to have permaculture gardens or bee boxes on campus. We included an additional question to assess how many students have a bee allergy, and whether this could be a concern regarding the bee boxes. This was important to include because the results of this question could have potentially eliminated the bee box alternative outright. These data were compiled and the results analyzed in Microsoft Excel.

There was a potential source of error in the survey questions. The first three questions were

specific enough to not allow for confusion on what is being asked. The fourth question however, caused some confusion. In the interest of evaluating which project (the permaculture garden or the honeybee boxes) is preferred by ESF students, faculty, and staff, question four asked which project they would be most excited to see implemented on campus. Of the surveyed individuals, 11.1% of the surveyed checked both boxes, which did not give us a clear answer to the question. Therefore, we chose to take this section out of the graphs to get a more realistic measure of which project is preferred. From this we learned we should have included an additional box for choosing both proposed ideas. This could mean that a high percentage of those surveyed may have selected an option that included both projects if they were given the choice and this could lead to a change in which alternative we conclude to have the greatest amount of support.

Evaluation of Alternatives

Alternative A: Permaculture Gardens Meet criteria (1, 2, 3, 4, 5, 6, & 7)

There are several varieties and combinations that can be used to design a permaculture garden as listed in the above Alternative A (Baker 2016). The suggested plant species are ideal being they require little maintenance and grow well in the upstate N.Y. climate (Baker 2016). Students, faculty, and local wildlife would continue to benefit from the addition of these gardens on campus.

Our survey results indicate that there is significant student interest in having one or more permaculture gardens on campus. 99.48% of students answered that they would be interested in having these gardens on campus, (Figure 1) satisfying criteria 1. Being that students would have the opportunity to learn about permaculture by observing and maintaining the gardens, criteria 2 would be met as well. Implementation of a permaculture garden would increase the campus's biodiversity, provide sustenance for pollinators, and produce locally grown food, as well as give students an opportunity to connect with the environment, all of which satisfies criteria 3.

The costs of starting a permaculture garden would lie in purchasing bulbs, seeds, and/or saplings, all of which are inexpensive. However, being that we do not know the size of the garden, that would be implemented, we do not have sufficient data for an accurate cost analysis. Therefore, we cannot say with certainty that criteria 4 would be met. These permaculture garden/s are intended to serve as a permanent fixture on campus, thus meeting criteria 5. Interested professors

could use the garden/s as an added teaching tool for future students meeting criteria 6.

Being that the definition and overall purpose of a permaculture garden is to be self-sufficient and self-sustainable, after the initial setup, this garden would require minimal maintenance meeting criteria 7. Additionally, maintenance of the gardens would be organized by the interested students, as well as our stakeholders including the Plant Propagation Club (PPC) the Environmental Studies Student Organization (ESSO), the Green Campus Initiative (GCI), the Biomimicry Club, as well as Dan Conrad.

Overall, a permaculture garden would generate interest in locally grown food, create opportunities for education, and enhance the beauty of the area while supporting the overall interest of what SUNY-ESF stands for: "environmental discovery, learning, and sustainability."

(<http://www.esf.edu>.)

Alternative B: Bee Boxes Meet Criteria 1, (2, 3, 4), 5, 7

Our survey results indicate that there is significant student interest in the installation of bee boxes on the ESF campus, thus meeting criteria 1. As with the permaculture garden, professors would have the opportunity to use the bee boxes as a teaching tool, and students would have the opportunity to learn about beekeeping hands-on, which satisfies criteria 2. This alternative is environmentally responsible, as it has potential to help bolster honeybee populations in the area, and so criteria 3 is satisfied. Studies have shown that bee boxes produce more biomass by weight in urban areas than rural areas (Lecocq, 2015), therefore, satisfying criteria 4. The maintenance of the bee boxes would be performed by PPC, ESSO, GCI, and the Biomimicry Club, meeting criteria 5 & 7.

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Alternative C: Both Permaculture Gardens and Bee Boxes Meets Criteria 1, 4, 5, 7

Permaculture gardens that are specialized for honeybees could be planted in areas such as the flower beds that line the front of the Baker Lab, as well as the backs of both Baker Lab and Marshall Hall. Of our four alternatives, having both permaculture gardens that are specialized for honeybees in addition to the bee boxes would be the most environmentally responsible. By providing suitable habitats for the bees through the planting of a permaculture garden, there would be an opportunity for the students to gain hands-on knowledge as well as observing the mutualistic relationship between pollinators and plants in addition to assisting both the gardens and the bees to thrive. This would meet criteria 4. The maintenance of the garden and bee boxes would be performed by PPC, ESSO, GCI, and the Biomimicry Club, meeting criteria 5 & 7.

Alternative D: None of the Above

Leave the SUNY-ESF campus the way it is by not implementing the previous alternatives. While there is a permaculture garden managed by the Green Campus Initiative (GCI) located on the SUNY-ESF property of Lafayette Street, it is not readily accessible to students without transportation.

Conclusion

Our initial objective with this report was to assess the feasibility of either a permaculture garden, or a bee box project on campus. However, through our research we discovered that these two projects are not mutually exclusive. Our information suggests that the two projects should coincide with one another, and the data we collected supports this conclusion. An overwhelming majority of those surveyed supported both a permaculture garden and bee box project. The data also indicates that when deciding between one project and another, most of those surveyed chose bee boxes over permaculture. The data presented shows that in the case of budgetary restrictions or other obstacles, the bee boxes would be the most feasible project.

We propose both bee boxes and a permaculture garden as both coincide with many ESF sustainability principles that the college campus wishes to establish and instill in the student body. In the beginning of April, ESF committed to be a bee-friendly campus, which adds to the

variable = native or non-native pollinators. - consider?

argument that there should be more help preventing further decline in bee populations. Adding permanent bee boxes maintained by students and staff will promote learning about the issues bees are facing, basic husbandry and beekeeping skills, and responsibility for living creatures. Permaculture gardens will allow there to be a food source for both the bees as well as the student body and any other person that utilizes the garden. The garden could lead to a more established bond between students and Syracuse residents and can lead to more green practices by members of the community. The proposed ideas will promote the health of the environment by allowing for increased reproductive chances for honey bee populations and the flora that is pollinated by them.

Recommendations:

Considering the student surveys that we based and evaluated our criteria against, we recommend that both the bee boxes and a permaculture garden are implemented on campus. Implementing both the bee boxes and the permaculture garden would be the best means to follow many of the ESF values that are stressed and taught to the student body. There are also multiple clubs that have expressed their desire to be involved with the garden and boxes who are willing to maintain the project. GCI, PPC, ESSO, and the Biomimicry Club have shown interest in sharing ownership for the maintenance and upkeep of the bee boxes with guidance from Dan Conrad. The combined effort of these clubs and the experience Dan Conrad offers could create a sustainable project that benefits both the campus and the environment.

Appendix 1

References

- Baker, L. (2016, September 13). What to Plant in Your Garden to Help Save the Bees | One Green Planet. Retrieved from <http://www.onegreenplanet.org/lifestyle/what-to-plant-in-your-garden-to-help-save-the-bees/>
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Appendix 2

One hundred ninety-one surveys were completed primarily at the Trailhead Cafe in the Gateway Center, with some being completed in Moon Library.

Permaculture Garden/ Bee Boxes Survey Questions

1. Would you like to have a sustainable permaculture garden on campus?
Yes
No
2. Would you like to have honeybee boxes on campus?
Yes
No
*If no, are you allergic? Please specify:
3. Would you be interested in having bulb flowers lining walkways on campus, in order to help the honeybees?
Yes
No
4. Which of these options would you be most excited to see implemented on campus?
Permaculture Garden
Honeybee boxes & flowers

Appendix 3

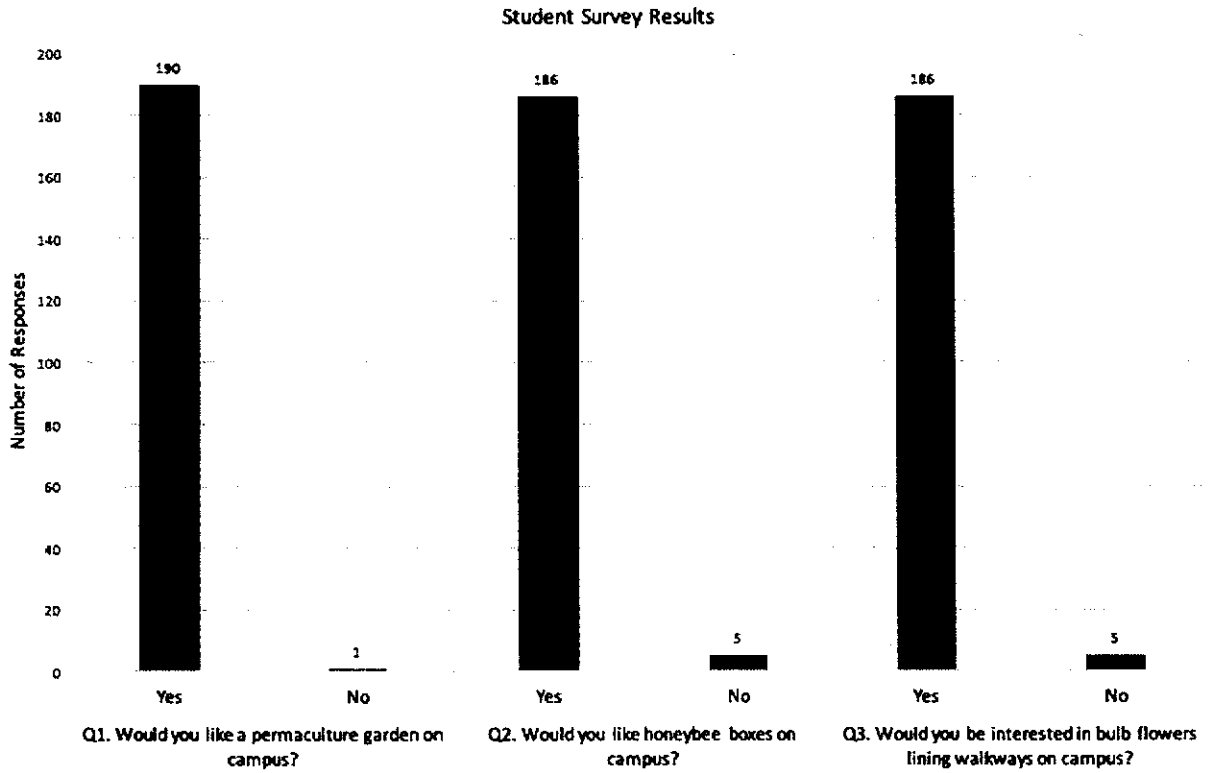


Figure 1. Results for questions 1-3 of the student survey. For question one, 190 responded yes and one responded no. For questions two and three, 186 responded yes and 5 responded no.

4. Which of these options would you be most excited to see implemented on campus?

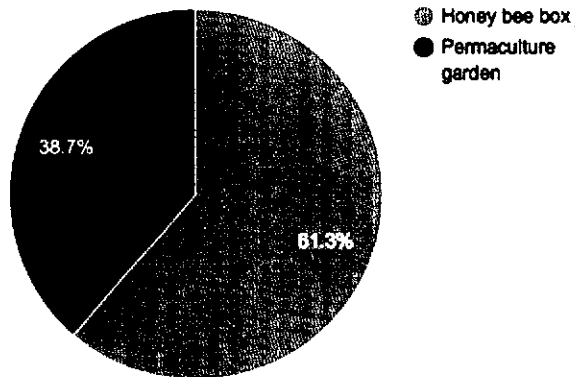


Figure 2. Results from question 4 of the student survey. 38.7% preferred permaculture gardens and 61.3% preferred honey bee boxes. 11.1% added they would like both.

1. Would you like to have a sustainable permaculture garden on campus?

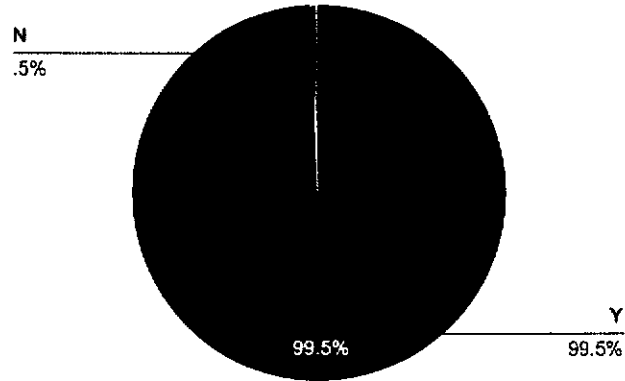


Figure 3. Results from question 1 of the student survey. 99.5% responded yes and 0.5% responded no.

2. Would you like to have honeybee boxes on campus?

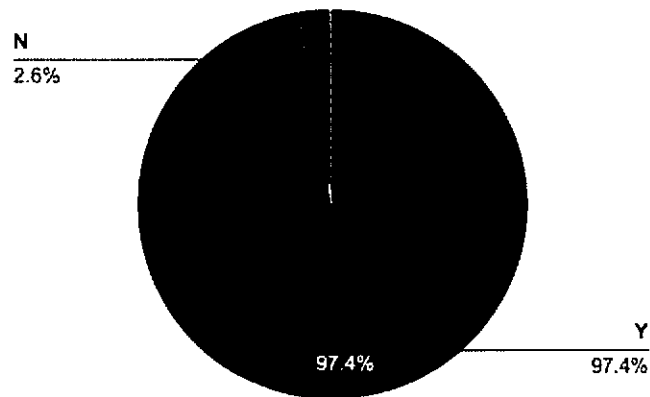


Figure 4. Results from question 2 of the student survey. 97.4% responded yes and 2.6% responded no.

3. Would you be interested in having bulb flowers lining walkways on campus, in order to help the honeybees?

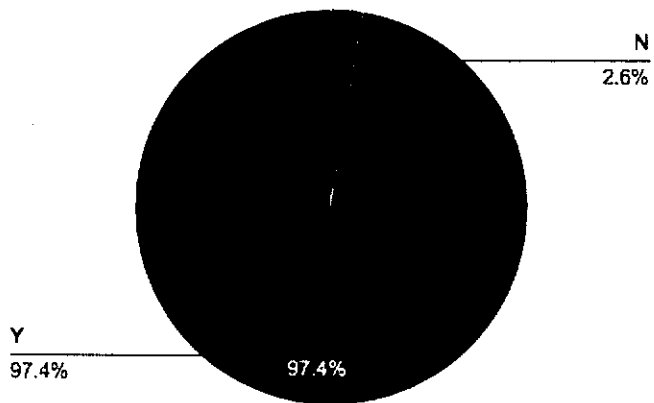


Figure 5. Results from question 3 of the student survey. 97.4% responded yes and 2.6% responded no.

To: Dr. Nosa Egiebor
From: Brenna Galligan, Kaitlyn Shanahan, Corrine Hurd, Steven Lukaszek, and Julia Silva

Subject: Accessibility on SUNY-ESF Campus: Feasibility Report

Date: April 10, 2017

Dear Dr. Egiebor,

Thank you for taking the time to review our feasibility report. We truly appreciate it as we have worked hard to show how improvements to accessibility have numerous benefits for the SUNY-ESF community.

The SUNY-ESF mission is to increase diversity and inclusion within the ESF community. We quote, "The Student Diversity and Inclusion Office, exists to support underrepresented students and to foster a campus community where cultural diversity is valued and appreciated. The programs and supports aim to prepare all members of the ESF community to effectively interact with others in an increasingly diverse and global society."

We have been working on a feasibility study that would increase accessibility on the ESF main campus, which would improve the quality of life for students, faculty, and guests with limited mobility. Our goal is to make sure that everyone has equal access and to receive a higher education from this exceptional institution.

With that being said, on behalf of our entire group, we are pleased to present to you our feasibility report. Through intensive research and interviews, we determined that the optimal alternative would be to implement an intra-campus shuttle service, which would greatly increase accessibility on SUNY-ESF main campus.

Again, thank you for your time and consideration.

Sincerely,

Kaitlyn Shanahan
Project Manager- EWP407 Accessibility Group
kashanah@syr.edu
(315)863-8813

Morgan Purdy
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Apt. #12
Syracuse, NY 13210

5/2/2017

Dr. Stavenhagen
Writing for Environmental and Science Professionals
1 Forestry Dr.
Syracuse, NY 13210

Dear Dr. Stavenhagen:

Today, I am submitting the feasibility report for honeybee boxes and a permaculture garden on SUNY ESF campus. Attached is the document "Honeybee Boxes and Permaculture Garden: A Feasibility Study for SUNY-ESF" that we have completed for our stakeholders.

Thank you for your guidance, proof reading, and constructive comments. The team has worked very hard on this project. The stakeholders will also be notified and handed a copy of the report. Further questions can be sent to me, my email once again is mwpurdy@syr.edu.

We look forward to hearing from the stakeholders and you on the finished product.

Sincerely,

Morgan Purdy

Morgan Purdy
111 Smith Ln
Apt. #12
Syracuse, NY 13210

5/2/2017

Stakeholders
“Bee feasibility interest groups”
1 Forestry Dr.
Syracuse, NY 13210

Dear Stakeholders:

Today, I am submitting the feasibility report for honeybee boxes and a permaculture garden on SUNY ESF campus. Attached is the document “Honeybee Boxes and Permaculture Garden: A Feasibility Study for SUNY-ESF” that we have completed for you, our stakeholders.

Thank you for your cooperation and input on the project. We wouldn't have been able to continue at the rate and vigor without your enthusiasm and support. We hope that with this report there is enough background information that you can start to implement these projects. Further questions can be directed at me (Morgan Purdy) at mwpurdy@syr.edu.

Good luck with the project and I look forward in hearing of its future.

Sincerely,

Morgan Purdy