

Sustainability and The Campus:

Rooftop Garden Initiative

MACALESTER COLLEGE



Sustainability Department
Sarah Wescott and Valentia Sundell
Spring 2016



(LiveRoof)

Table of Contents

Introduction
 Project Summary.....Page 2

The Problem
 Refurbishing the Roofs.....Page 3

Benefits
 Why do the Gardens Matter?.....Page 4

The Solution
 Steps to Getting There.....Page 5
 The Sustainability Office.....Page 7
 Implementing Physical Changes.....Page 8
 Signage and Education.....Page 9

Educational Opportunities
 Educational Opportunities.....Page 10

New Addition
 Kagin Markim Hall Link.....Page 11
 LiveRoof.....Page 12
 Construction and Planting.....Page 13

Long Term Upkeep
 Club Collaboration.....Page 14
 Conclusion.....Page 15
 Bibliography.....Page 16



(Roach)

Introduction-Project Summary

Our aim is to revamp the pre-existing green roofs on campus, as well as add one more green roof to Macalester's campus. Along with the green roofs we would also like to create educational signage that informs Macalester's students about the benefits of green roofs. This project would be a collaboration between the Sustainability Office, student organizations, and the Facilities Services Department. Green roofs offer many benefits such as: the slowing of water run-off, aesthetic improvement, moderation of urban heat island effect, improved air quality, fire retardation, improvement in energy efficiency, noise reduction, and they serve as a useful educational tool. By refurbishing our current on campus green roofs and creating a new green roof we will be maximizing these benefits and create conversation for green initiatives on campus. (MacCARES)



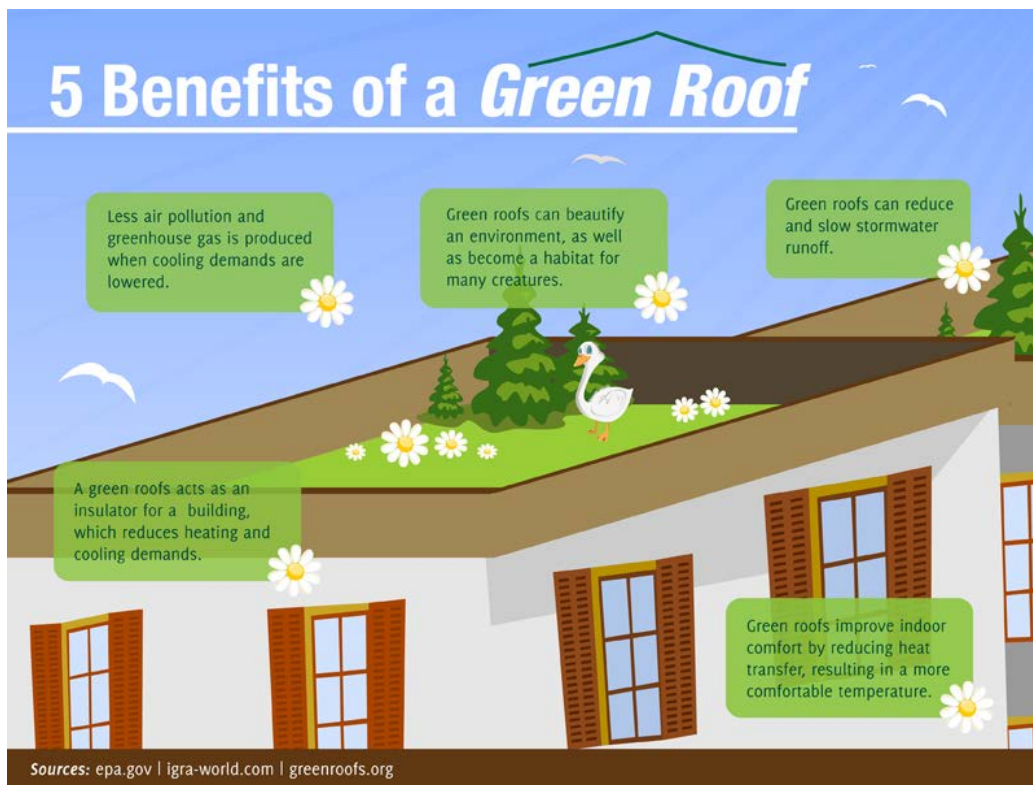
The Problem-Refurbishing the Roofs

At the moment there are two pre existing rooftop gardens on campus. One of these is located on the roof of the “fishbowl” which links Doty and Turck hall together. The green roof was originally installed as a student project in 2005 with the help of students and donations from local businesses. Most of the initial plantings on this roof have died out and therefore need to be replanted. The garden was originally planted with prairie plants that are known for having particularly deep roots, which could have been cause for the roof failure. The roof beds are shallow which means that in the future we will need to choose plants that can handle a shallow bed, while also being able to cope with the shade that covers the “fishbowl” for most of the day. The second green roof is located on the roof of Kagin Commons. This roof was replanted with sedums by the Sustainability Office in 2012. While in better shape than the “fishbowl” roof, the roof is still in need of some TLC. The plants that are on the Kagin roof are not dead, but there are weeds in the beds that need to be pulled out and cuttings from the existing plants can be spread over the rest of the plot. The Kagin green roof is a much easier fix that can be dealt with in one afternoon and we will work on the roof this coming Thursday. (MacCARES)



Benefits- Why Do the Gardens Matter?

Macalester's green roofs are a symbol of Macalester's commitment to sustainability and the environment. Rooftop gardens offer many benefits, from the educational opportunities that come with their implementation to improved air quality, the slowing of water run-off, and the aesthetic value of such gardens. Furthermore, they factor into Macalester's larger sustainability goals. Green roofs help with insulation, which means that they lower heating and cooling demand, thereby helping with Macalester's goal of carbon neutrality by 2025. Roofs also shed valuable stormwater and are sources of pollutants, so the upkeep and implementation of green roofs can solve these problems by reducing pollution and changing stormwater runoff. Overall, these roofs are useful, necessary, and worth working on because they improve discourse regarding sustainability and contribute to Macalester's sustainability goals at the same time.



(The Alfano Group)

The Solution-Steps to Getting There

Kagin Roof Maintenance:

1. Go on the roof and trim the existing plants once per year.
2. Create and distribute educational signage and communicate within the Environmental Studies, Biology, Chemistry, Physics, Geology, Geography, and Sustainability Departments to let professors know they can use the gardens for classes and research.

Kagin/ Markim Rooftop Connection

1. Determine the weight capacity of the roof between Kagin Commons and Markim Hall to see if a garden would work there by working with the architect of Markim Hall.
2. If the roof has enough capacity to have a garden, contact local contractors to receive a quote and receive funding from the Technology, Equipment, and Maintenance fund at Macalester.
3. Since the roof does have capacity for the garden, we contacted a LiveRoof representative to get a quote and found that working with a traditional construction company would be cheaper.
4. Work with Greenwald Roofing to install the plants and trays for around \$3000 (includes plants, installation, and materials)
5. This will likely happen over the summer, since the Sustainability Department's budget will restart in June.

The Solution-Steps to Getting There Cont.

Fishbowl Roof

1. As far as the Fishbowl roof, we researched sedums that would actually work in the space to replant the garden.
2. Order the sedums.
3. Acquire drainage pads and aluminum trays.
4. Implement the garden (likely only a one day process)

The Solution-The Sustainability Office

We are implementing this project through the sustainability department with the help of Facilities Services. Suzanne Hansen, the Director of Sustainability at Macalester, provided us with a budget and helped with the project coordination. We are working with the Sustainability Office because this initiative is not in collaboration with any academic department, but rather, deals directly with sustainable behavior and facilities management on Macalester's campus. Further, Facilities Services has direct access to these roofs.



(AbuBakr)

The Solution-Implementing Physical Change

We will begin by cleaning out the dead plants on the “Fishbowl”, and also add extra nutrients to the soil. After that we will simply replant the garden. Replanting is Scheduled for May 14th and 15th. For the Kagin roof, a few hours have been scheduled on the afternoon of April 26th to do the necessary garden maintenance.

Best Plants for the “Fishbowl” :



Sedum spurium 'Fuldaglut'

Foliage: height - 10cm (4"), width - 30cm (12")

Flowers: Aug-Sept;

Zone: 3-9

Both of these Sedums are worth growing, even side by side. There is enough of a difference with the shape and redness of the leaves to easily tell them apart. Also, the pink colour of the flowers are quite different. For the longest time, 'Fuldaglut' was my favourite spurium, until I grew 'Voodoo'. Now I can't decide which of the two I prefer above all others. Drought and shade tolerance are the main attribute and the red deepens during the winter months.



Sedum glaucophyllum

Foliage: height - 10cm (4"), width - 20cm (8")

Flowers: April-June

Zone: 3-8

Early spring flowers are always welcome, however the main feature for this Sedum is the foliage. The edges of the flat leaves have both wavy edges which are tinged with a silver white colour. This is above another Sedum that grows better in partial shade.

The Solution-Signage and Educational Opportunities

To make the rooftop gardens interactive and informative, educational signage is necessary. Similar to the signage in front of the Macalester Plymouth United Church about their stormwater drainage garden, the signs should be easy to understand and have interesting graphics showing the purpose and benefits of green roofs. While we will order the signs from an outside vendor, we delegated the design of these signs to the MacCARES representatives working in collaboration with us on the rooftop garden initiative. At this point, MacCARES has assessed the possibilities of the signage and decided that they should be designed by a professional, which should not cost much.

Some things that should be included in the signs are pictures of the process of installing the green roofs, points about the benefits of rooftop gardens, a link to Macalester's sustainability page on their website so viewers can learn more about the college's sustainability efforts and recent projects, and small details about which companies helped implement the rooftop gardens so if anyone else wants to complete a similar project, they can view the signs and see how Macalester accomplished it.



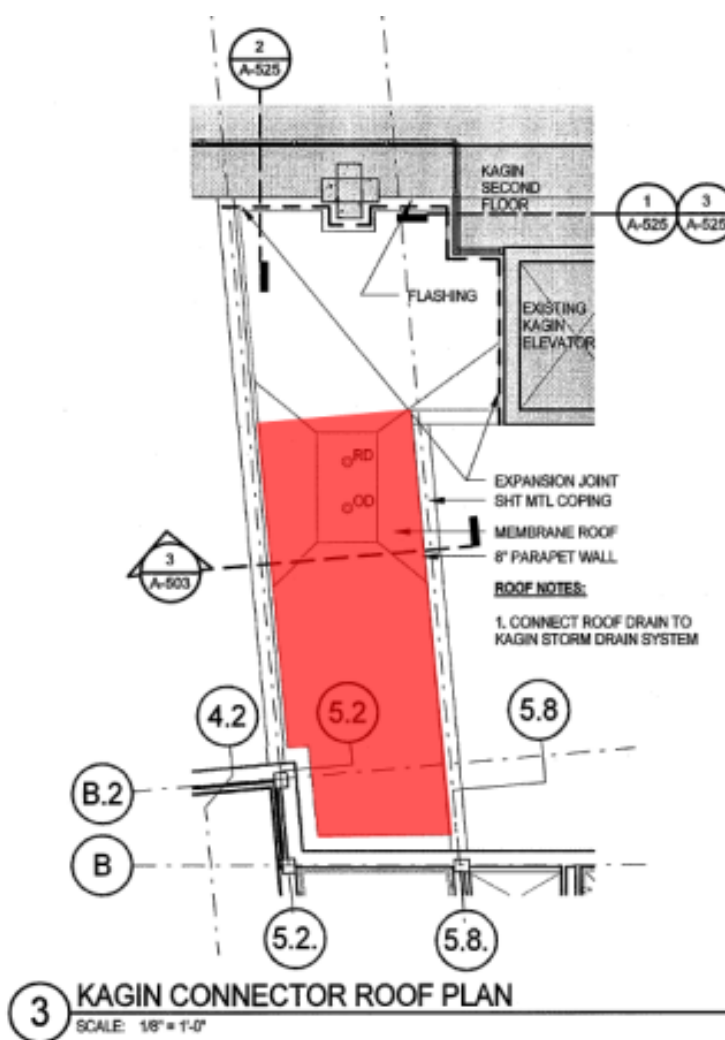
Educational Opportunities

Along with the signage, the rooftop gardens provide many opportunities for engagement with sustainability on campus. In particular, the departments of Environmental Science, Biology, Chemistry, and Physics can use these gardens as educational resources in classes and research. For example, the Kagin rooftop garden has been utilized by these departments in the past to measure runoff rates, rain levels, pH levels, nitrogen levels, insulation, and infrared scanning. They are a useful tool for ecology and geography classes as well, since the roofs contain plants native to Minnesota and the Mississippi River area. It would be an interesting project to research why exactly certain plants fail on green roofs and why others succeed. The green roofs can also be included in Sustainability Tours on campus as examples of student sustainability projects. Beyond this, they could be included in *Dirty Trainings* and in orientation sessions like *This Matters at Mac* about sustainability and environmental efforts on campus.

Aside from educational opportunities from Macalester's community, the broader Minneapolis-St. Paul area can also benefit from these rooftop gardens. In our project process, we contacted Hamline University after finding out about their green roof initiative, and it is very possible that other groups, organizations, and schools aiming to create their own green roofs would be inspired by the existence of Macalester's rooftop gardens and benefit from finding out how Macalester accomplished their projects. Local schools and community groups like Boy Scout or Girl Scout troops could also use Macalester's rooftop gardens as educational tools. Elementary schools, middle schools, and high schools could all look at the gardens for science classes and Boy Scout and Girl Scout troops could incorporate the gardens into badges and projects about ecology and the environment. In these ways, the rooftop gardens serve as living laboratories for the community at large.

New Addition-Kagin Markim Hall Link

We contacted Jason Jewhurst, the Markim Hall architect to determine the weight capacity of the roof on the Kagin Markim Link, and found that the red portion on the plan below is suitable for a green roof as long as the load does not exceed 25 lbs per square foot.



(Jewhurst)

New Addition-LiveRoof

We received a bid from the LiveRoof representative Brett Hansen for about \$3,000. However, because the roof is only able to hold about 25 lbs we would need to work with the LiveRoof lite system which needs a sprinkler system. For this reason we estimate the working with the LiveRoof tray system would end up being more expensive than working with a traditional construction company.



(Sustainability Office)

New Addition-Construction and Planting

We are currently working with Greenwald Roofing representative Rex Greenwald to make a plan for installing a green roof on the link between Kagin commons and Markim Hall. Rex is planning on visiting the Macalester soon to give a final budget, but for now we estimate the project will cost about \$3,000. This would include the plants, installation, and materials meaning that it would most likely be cheaper than working with the LiveRoof system.

Greenwald Roofing is a small family owned company located in a Northern suburb of the Twin Cities called Fridley. The company has experience installing green roofs and is also small enough to have direct contact with the owner.

<http://www.greenwaldroofing.com/>



(Greenwald)

Long Term Upkeep-Club Collaboration

In order to plant and maintain the gardens in the future, we will work with the Sustainability Office and the student organization known as Macalester Urban Land and Community Health (MULCH) as well as MacCARES. MULCH currently works on the Macalester community garden and chicken coop. They have a summer gardener who maintains the garden and coop as well, so working with MULCH to maintain rooftop gardens on campus seems feasible. Vivian Mitnick from the Sustainability Office has passed on information regarding the gardens to MULCH for these aforementioned purposes.

MacCARES has previously been considering taking steps to repair the existing green roofs as well implement a new roof. They are willing to help with research needed for the project and in making sure that the project can be sustained in coming years, both through the involvement of MULCH and Maya Swope who is the Issue Based Organizer of environment and sustainability. Maya is planning on adding checking on the green roofs each year to her job's listed responsibilities. In addition, MacCARES will complete the educational signage designs for the rooftop gardens.

Conclusion

Overall, we accomplished our goals of continuing upkeep of the current rooftop gardens and assessing the potential for implementing a new green roof over the link between Markim Hall and Kagin Commons. While we faced more communicative and collaborative struggles than we originally anticipated, we persevered in getting the information and scheduling done that we needed. The Kagin roof will be weeded and trimmed this week, while the Fishbowl just needs sedums ordered and planted at a cost of around \$650. As far as the Kagin- Markim link, the capacity has been evaluated and is suitable for a green roof, which Greenwald Roofing can implement for around \$3000 (which would come out of the Sustainability Department's budget) over the summer. These projects are manageable, achievable, and will benefit Macalester's sustainability goals.

Bibliography

- AbuBakr, Rashidah Ismaili. "Springtime in Minnesota." *St. Paul Almanac*. Lift Creative, 30 Apr. 2012. Web. 26 Apr. 2016.
- BlueStem Nursery. "Perennials." *Sedums*. BlueStem Nursery, n.d. Web. 12 Apr. 2016.
- Greenwald Roofing. "Green Roofing." *Greenwald Roofing & Sheet Metal, LLC*. Greenwald Roofing & Sheet Metal, LLC, n.d. Web. 26 Apr. 2016.
- Jewhurst, Jason. Provided architectural plans for Markim Hall/Kagin Commons link
- "MacCARES - Kagin Green Roofing Photos." *Macalester Conservation and Renewable Energy Society*. MacCARES, 2006. Web. 26 Apr. 2016.
- Roach, Margaret. "Happily Ever after in a Sea of Sedum - A Way To Garden." *A Way To Garden*. Margaret Roach Inc., 15 July 2009. Web. 26 Apr. 2016.
- Sustainability Office. "This Month's Theme Is....Jobs!" *Sustainable Scots Newsletter*. Macalester College Sustainability Office, Dec. 2014. Web. 26 Apr. 2016.
- "Step 3 | LiveRoof Hybrid Green Roofs." *LiveRoof Hybrid Green Roofs RSS2*. LiveRoof, n.d. Web. 26 Apr. 2016.
- The Alfano Group. "The Alfano Group." *The Amazing Benefits of Green and Living Roofs*. Blogger, 10 May 2015. Web. 26 Apr. 2016.