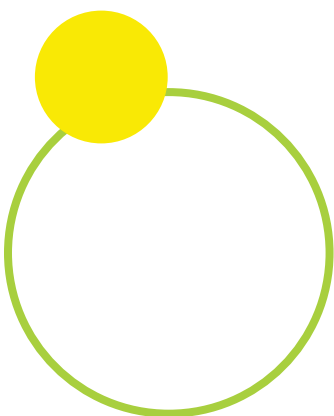


LIVING LABORATORIES FOR THE COOK/DOUGLASS CAMPUS

ENHANCING EDUCATIONAL OPPORTUNITIES
AND CAMPUS ENVIRONMENT



A RUTGERS UNIVERSITY UNDERGRADUATE
LANDSCAPE ARCHITECTURE THESIS
WRITTEN BY THERESA HYSLOP

Enhancing Educational Opportunities and Campus Environment
Through the Use of Living Laboratories
for the Cook/Douglass Campus

by Theresa Hyslop '15

A thesis submitted to the Honors Committee of the
School of Environmental and Biological Sciences, Rutgers University
in partial fulfillment of the requirements of
The George H. Cook Scholars Program

Written under the direction of

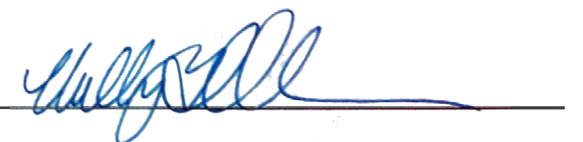
Holly Nelson
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New Brunswick, New Jersey

May, 2015

Enhancing Educational Opportunities and Campus Environment
Through the Use of Living Laboratories
for the Cook/Douglass Campus

I have reviewed the project conducted by Theresa Hyslop and
endorse its consideration for the George H. Cook Scholar award.



HOLLY NELSON, Project Advisor
Department of Landscape Architecture

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And lastly, but definitely not least, much love and thanks to all of my friends, family, peers, and puppies who have helped throughout the thesis process.

To all of my fellow Rutgers students, I hope I can inspire you to see your campus in a new light and do what you can to make it a better place.

INTRODUCTION

Project Overview

Rutgers University is currently at the beginning of a new era, as outlined by the Rutgers Strategic Plan. Living laboratories could play a significant role moving forward in this new campus experience, providing the opportunity to combine experiential learning opportunities with facilities improvement strategies and overall campus sustainability (Cohen, 2011). Specifically, living labs have the potential to help with all of the university's strategic goals: envisioning tomorrow's university, building faculty excellence, transforming the student experience, and enhancing public prominence. Rutgers plans to address sustainability issues through living labs, but specific plans are not yet developed (Strategic Plan, p50). My role as a landscape architecture student gives me a unique insight into the Cook/Douglass campus and its potential for living laboratories. Through my major, I have gained valuable skills in design and how to analyze the ecology and social and cultural aspects of a place. Through my time at Rutgers, I have utilized the campus for several classes and have had the opportunity to observe the campus for four years, which have inspired me to seek out how I can better the campus for my thesis. This thesis analyzes current conditions of the Cook/Douglass Campus, and with information from research, case studies, interviews from the Rutgers Community, and my personal experiences, aims to provide a framework for the implementation of living laboratories for the Cook/Douglass Campus.

What are Living Laboratories?

Put simply, **living laboratories can be defined as any productive/educational use of the campus landscape**. Under such a broad definition, many things that may not be formal labs can still be considered living laboratories, from streams on campus to campus buildings. Various organizations and publications have crafted more detailed definitions of what a living lab can be. The American Association of Community Colleges (AACC) defines living labs as “hands-on learning opportunities for students” that “**merge academics and campus facilities management** to provide students with real-world skills and, for the

institution, a path to meet its sustainability goals” (Cohen, 2011). Similarly, for Portland State University, a living lab is “a given place where **problem-based teaching, research, and applied work** combine to develop actionable solutions that make that place more sustainable” (Our Living Laboratory). However, living labs can also be defined more specifically for certain situations. For example, at the Greater Newark Conservancy, living labs are “outdoor garden classrooms, created and maintained by Greater Newark Conservancy at Newark Schools” (Living Laboratories). Regardless of the scope or size, **all living labs have experiential education at their heart**.

Connecting to the Rutgers Mission

Rutgers University has a three-fold mission:

- providing for the instructional needs of New Jersey's citizens through its undergraduate, graduate, and continuing education programs;
- conducting the cutting-edge research that contributes to the medical, environmental, social, and cultural well-being of the state, as well as aiding the economy and the state's businesses and industries; and
- performing public service in support of the needs of the citizens of the state and its local, county, and state governments.

Living laboratories easily fit in with the first two parts of the University's mission: they enhance the student educational experience, while providing opportunities for innovative research to be done on campus. Students who participate in living laboratory projects can gain crucial real world experience that will help them become better public stewards. As such, living labs also fit indirectly with the third part of the University's mission.

Key Questions

What roles can living laboratories play on college campuses?

- What are their benefits and drawbacks?
- What effect do living labs have on students and students' perception of campus?
- How can they be used to not only enhance the educational experience of users on campus, but also improve the overall campus experience?
- How can living labs be incorporated into sustainability on campus?

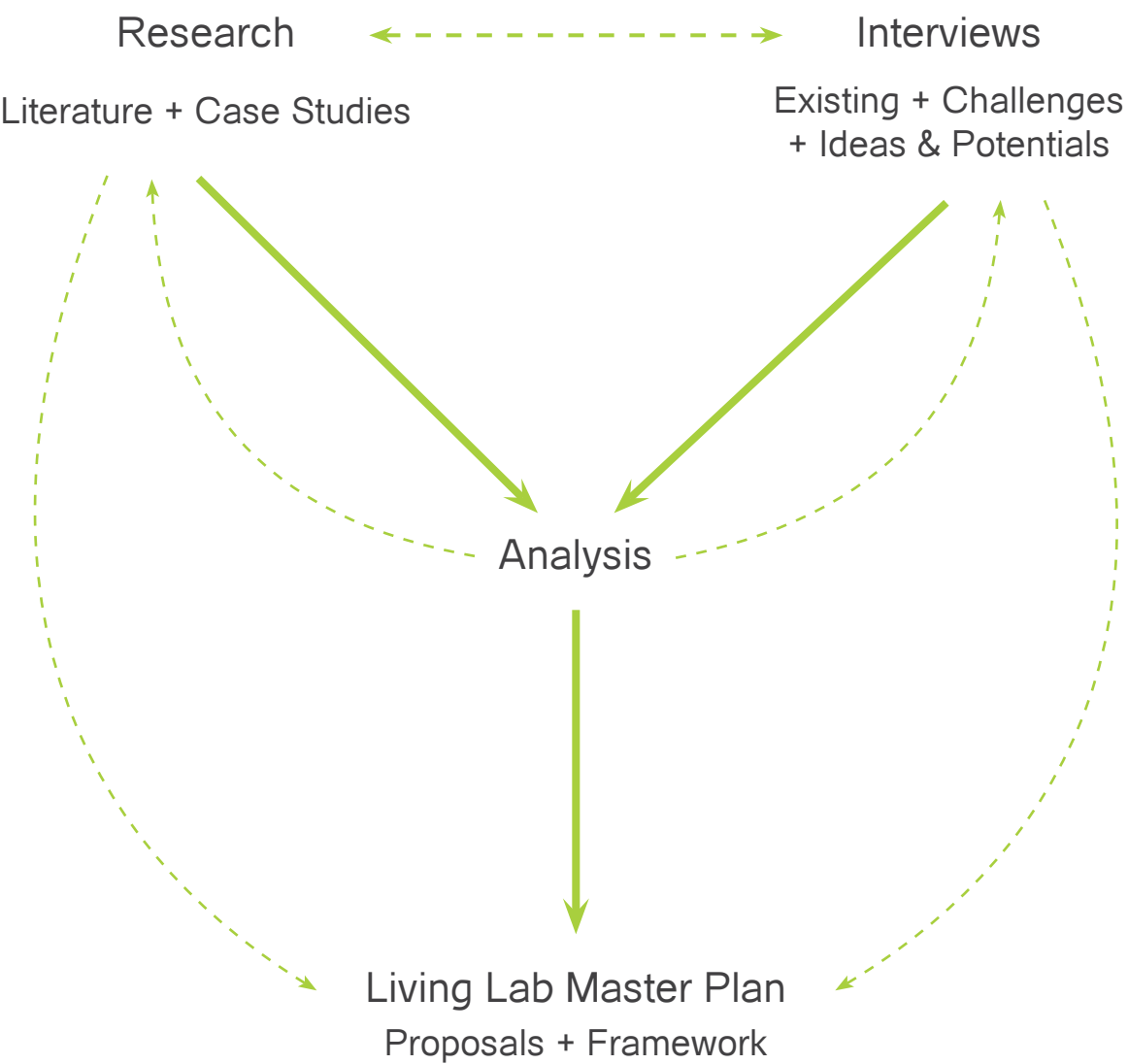
How can you implement living labs on college campuses?

- What challenges are there?
- What are keys to successful implementation?
- What opportunities already exist at Rutgers?
- How do living labs address the University's four strategic priorities?

METHODS

I began my process with initial research about living laboratories in general and how they could connect with Rutgers University. Case studies of living labs at various schools around the country provided project and implementation examples. At the same time, I was conducting interviews of the Rutgers community. The goals of the interviews were to find out current ways the campus is used as a teaching tool, discover ideas and potentials for living laboratories on campus, and discuss challenges associated with living labs on campus. There was a strong focus, and thus interview bias, toward members of the School of Environmental and Biological Sciences (SEBS) on Cook campus because of SEBS’s easy applicability to living laboratories. The research and interview processes were highly connected: research often informed some interview questions, while interviews often led to new avenues of research.

Literature, case studies, and interviews were then analyzed for how they related to my key research questions and how they could be used to develop a Living Lab Master Plan for the Cook/Douglass campus. Current campus conditions and current uses of the campus were also incorporated into the analysis. From this analysis, I explored several potential ideas for living laboratories on campus and methods to establish a framework for living labs at Rutgers. Concepts for living laboratories were developed based on input from faculty, staff, and other students, and examples from other universities.



RESEARCH

Literature Review

Last year, three of my fellow Landscape Architecture students each did a George H. Cook Thesis examining a different aspect of sustainability for the Cook/Douglass Campus. In their respective theses, Rebecca Cook, Michelle Hartmann, and Jessie Woods analyzed the campus in terms of stormwater, social space, and transportation, and proposed ways to increase campus sustainability in these three areas. A large part of their research was also spent analyzing the people who currently use the campus. Building off of their research gave me more time to focus on case studies for other living laboratories and to interview members of the Rutgers community. All three theses emphasize that in order for their proposals to be fully realized, the way in which we think about the Cook/Douglass campus needs to change. Living labs have the potential to promote this change of thinking by deepening stewardship connections between campus and students through working on living lab projects. Thus, students serve as stepping stones to shifting the current thoughts about campus into ones that will help bring about a more sustainable and visionary Rutgers University.

The educational component of living laboratories is often cited as their main benefit. Students can achieve a deeper level of experiential learning that is not possible from inside the classroom. Additionally,

living labs provide opportunities for college campuses to test innovative solutions, improve campus sustainability, and engage the community (through living labs open to the community or located in the community). Some more specific benefits to living laboratories for colleges include:

- **facilitating experiential learning and making curricula relevant (through multidisciplinary and experiential learning)**
- **reducing the college's carbon footprint**
- **using institutional resources efficiently**
- **improving college completion** (Cohen, 2011)
- **enabling businesses to test products and technologies while building tighter partnerships with universities**
- **helping governments and NGOs achieve larger sustainability goals while building partnerships with universities**
- **fostering internal partnerships within universities**
- **enhancing student learning through relevant and impactful courses**
- **instilling students with relevant skills that have real-world impact**
- **providing support for operational staff for implementing certain projects**
- **launching a new, innovative model for high education** (Beaudoin, LLL, 2013).

Many college campuses have already implemented or are in the process of starting living laboratories in order to meet their education and sustainability goals. There is ample opportunity for Rutgers University to do the same. Many areas of Rutgers campus are already used as teaching spaces, but there is currently no university- or even campus-wide living lab program in place.

Rutgers University recently developed *A Strategic Plan for the New Rutgers*, a university-wide strategic plan that will guide the university's planning and policy over the next several years. The main goal presented in the plan is an ambitious one: for Rutgers to be "broadly recognized as among the nation's leading public universities: preeminent in research, excellent in teaching, and committed to community." Rutgers is already one of the nation's great research-intensive universities, but needs improvement in several fields to meet its goal. Two fields that are applicable to my thesis include financial resources (such as endowments, funding, and alumni support) and the overall student experience. The report reviews several strategic priorities, integrating themes, and foundational elements that are aimed to help Rutgers achieve its main goal.

As one of the plan's integrating themes, the university aims to create a sustainable world through innovation, engineering, and technology. As part of their strategy to achieve this goal, Rutgers is looking to "create living laboratories for sustainability by performing discovery and applied research, and by implementing models of sustainable practices on our campuses and in New Jersey". Additionally, Rutgers plans to educate involved citizens and effective leaders for a dynamic world. Living labs have the potential to address real world

issues that can benefit local and statewide communities. They can also provide avenues for interdisciplinary education and better prepare students for real world careers while enhancing campus sustainability.

In order to improve the student experience, Rutgers is looking to "construct a campus environment that supports student social needs and improves student satisfaction while encouraging academic growth and engagement." This can, once again, can be addressed through living laboratories integrating with and enhancing the campus. Due to Rutgers' location at the heart of New Jersey, students already have access to a wide range of natural ecosystems for their classes and study. In other words, New Jersey itself serves as a large living laboratory for research and teaching. Establishing living laboratories more directly as a part of campus can help Rutgers achieve many of their aforementioned goals. Each campus has different opportunities for living labs, though at the time of this report, an overall living laboratory plan has yet been officially developed by Rutgers. My thesis hopes to provide some of the initial steps in planning living labs for the Cook/Douglass Campus.

As of the writing of this report, Rutgers University has yet to publish their new Physical Master Plan.

Several models and guiding documents for living laboratories offer significant opportunities for Rutgers to build upon. Published by the American Association of Community Colleges (AACC)'s Sustainability Education and Economic Development (SEED) Center, *The Campus as a Living Laboratory: Using the Built Environment to Revitalize College Education* is a guidebook for community colleges looking to implement

living laboratories on their campuses. Green projects on college campuses provide opportunities for the college to become more sustainable while providing enriching learning opportunities for students. Through interviews with leaders from schools with successful living labs, the SEED Center developed eight common elements for building a living lab. These are as follows:

- engage the right campus participants
- identify key collegiate programs
- build credibility through engagement and data
- integrate it into the curriculum
- expand beyond individual programs of study
- build partnerships with industry
- engage support beyond the campus
- open your labs to the community

Even more of a treasure trove of living laboratory guidelines can be found in two presentations from the Campus Sustainability Living Learning Laboratory Workshop run

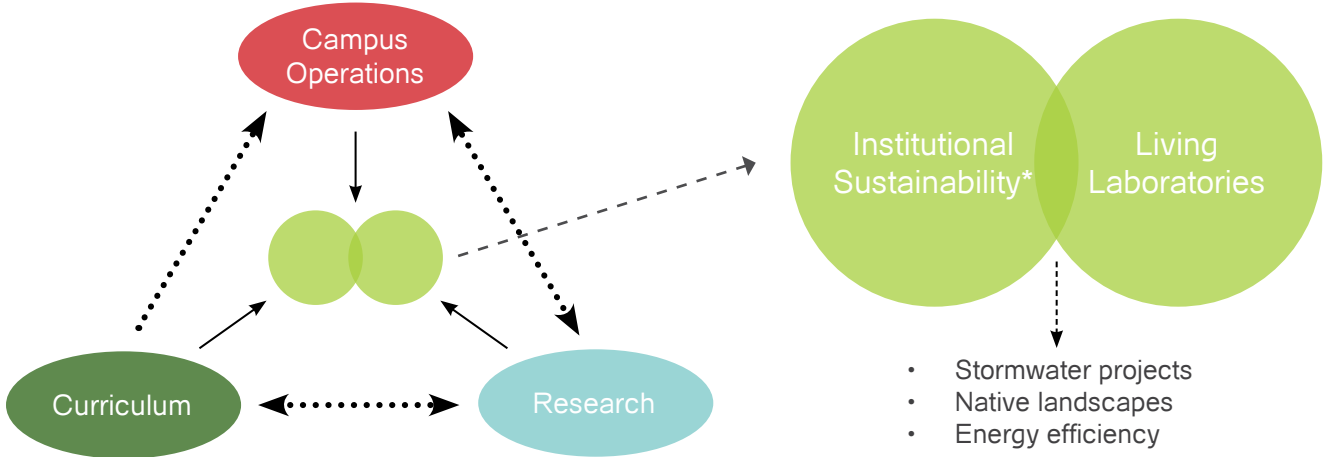
by the Association for the Advancement of Sustainability in Higher Education (AASHE). The main goal of the workshop was to enable participants to develop a plan to turn their campuses into living laboratories. One presentation from the workshop, Portland State University's *Developing a Campus Living Learning Laboratory*, offered an introduction to living laboratories. Several case studies were included from a variety of colleges and universities that detailed the institution's living laboratory program elements and project examples. The document also identified current challenges in implementing living labs and potential solutions for them (these are discussed in more detail in Living Labs on Campus).

It is important to establish the foundation for a living lab program, and not just for a living lab project. A project implies one effort, while a program commits to planning and implementing several projects over time. More details on establishing the framework for such a program were presented in *LLL*:

Guiding Criteria for Projects, also by Portland State University. Establishing criteria for living labs is the first step for setting up a framework.

Another crucial aspect is how to translate the living lab vision into a real-world model. There are two critical pieces to this: a Transacademic Interface Manager—a bridge between operations and academics who both prepares and manages projects (to varying degrees of management)—and Problem- and Project-Based learning (PPBL). The transition from the current campus to a living lab program needs to be effectively managed. This can be done through strategies fitted for the different stages of transition (predevelopment, take-off, acceleration, and stabilization). At the core for successful living labs, especially those targeting sustainability is the “magic triangle” between campus operations, curriculum and research, as shown on the left. Other tools to use for developing a living lab program include case studies and guiding documents from your own university (e.g. strategic plans, sustainability plans). A living lab website is a powerful and interactive way to provide information and coordinate groups for living laboratory projects.

The above information should be taken into account for developing a living laboratory program and individual living lab projects at Rutgers University. Especially important is the need to engage both Facilities, staff, and faculty in the creation of living labs. My efforts with this thesis are some of the first steps in starting the conversation of turning Cook/Douglass campus into a living laboratory, with the potential to expand to the rest of Rutgers University.



The Magic Triangle. Adapted from Beaudoin, LLL, 2013.

*Institutional Sustainability is frequently tied into living laboratories, and so the same framework can be applied toward the success of living labs. Some areas of overlap include stormwater projects, native landscapes and energy efficiency.



Case Studies

Many other schools around the country already have or are in the process of implementing living laboratories on their campuses. Five schools were selected as case studies to gain a better understanding of living labs at different scales and see what lessons can be learned that can be applied to the Cook/Douglass Campus. There is no doubt that many steps and much planning and time would be necessary for implementing similar living lab systems at Rutgers. These case studies represent different possibilities for living labs, as well important considerations for implementing living laboratories at Rutgers.

THE LAWRENCEVILLE SCHOOL

Lawrenceville is a private high school located in Lawrenceville, NJ. Their Green Campus Initiative aims to enhance campus sustainability while educating the study body and involving the broader community. Several years ago, Andropogon Associates, Ltd. drafted an Environmental Master Plan for the school that included a Living Laboratory Vision Plan. In the years since the plan, the school has implemented some of the ideological framework behind the vision but has had issues with labor, cost, and feasibility in terms of full plan build-out. Even so, the campus still functions as a living laboratory with strong ties to the campus's overall sustainability. The Lawrenceville campus boasts on-site composting, a small farm, and a solar farm with bee hives, all of which are tied to classes at the school, and to their Sustainable Food Project. Class curricula are also connected with the Lawrenceville campus and the realization of the full living lab vision. Through these classes and campus meetings, the school community is exposed to a deeper education about sustainability throughout their years at Lawrenceville.

Notes from my interview with Sam Kosoff (Director of Sustainability at the Lawrenceville School) can be found in the Appendix of this report.



SECTION 4 : LIVING LABORATORY – THE VISION PLAN

22 *Environmental Master Plan*
Vision Plan for a Sustainable Campus
What is the Vision Plan?
The Outdoor Learning Centers
The Farm: Sustainable Organic Agriculture
The Meadow
The Wetland
The Forest
The Pond and Stream
The Links: Biohabitat Golf Course
The Faculty Residences

42 *Circulation and Parking*
Potential Future Circulation Diagram

44 *Spatial Representation*
Three-Dimensional Campus Model
Spatial Data Library

48 *Curriculum Integration*
Watershed Study
Plant Communities / Invasive Plant Study
Sustainable Agriculture
Conclusion

Living Lab Highlights

PROJECTS

- On-site composting - vermiculture composting and leaf composting
- School-supported agriculture
- Solar farm underplanted with wildflower meadow to support bee hives
- The Pond - restoration projects and curricular tie-ins
- Sustainable Food Project

LARGER CONNECTIONS

- All projects tied to classes at the school
- Environmental science classes often utilize the campus as a living lab
- Some independent studies and projects involve the campus
- Green- and sustainability-focused theme month



Image Source: "New Jersey school offsets 90 percent of energy use with 6.1 MW of SolarWorld solar panels." 2012. Accessed March 2015. <http://www.solarworld-usa.com/newsroom/news-releases/news/2012/lawrenceville-school-solar-array>

DUKE UNIVERSITY

Duke University is a private research university located in Durham, North Carolina. They consider their campus a living lab with strong opportunities for learning about sustainability. Notable living labs include the Home Depot Smart Home, the Duke Campus Farm, Duke Forest, the Duke Lemur Center, the Duke University Wetland Center, Duke Marine Lab, and Duke Carbon Offsets Initiative. The Sustainable Duke website boasts a list of on-campus sustainability projects that students can pursue. Many courses also use the campus for enhancing education, such as cataloging the insects of Duke campus and doing research about the school's food program. Duke University seems to have done an excellent job of integrating living labs into many different aspects of college life, from classes to dorm life in the Home Depot Smart Home, and across different scales, from a dorm building to a 7,000 acre forest. There is a high degree of faculty and student involvement with the labs, which has contributed to their success. Unlike Rutgers, Duke is a private university with a large endowment and has a smaller student body, which has made many of their living lab programs easier to implement and manage. Even so, Duke serves as a great example of the potential for living labs at Rutgers University and an excellent model to strive for.



Home Depot Smart Home



Duke Forest

LARGER CONNECTIONS

- Nicholas School Master’s Projects frequently use the campus for sustainability research and projects
- Many classes use Duke’s campus for project-based learning
- Sustainable Duke lists on-campus sustainability project ideas on their website

Living Lab Highlights

PROJECTS

- Insects of the Duke Campus
 - ongoing Entomology course project
- Home Depot Smart Home
 - a living lab for building sustainability for students living in the home
- Duke Campus Farm
- Duke Forest
 - site of dozens of research projects and teaching opportunities
- Duke Lemur Center
- SWAMP, the Duke University Wetland Center
 - outdoor classroom and field laboratory for wetland restoration
- Duke Marine Lab
- Duke Carbon Offsets Initiative
 - projects to generate carbon offsets and to increase energy efficiency

WEBSITE

- Concise but explanatory website
- List of on-campus sustainability project ideas
- Short descriptions and links for highlighted living laboratories



Image Sources:
Duke Forest. <http://dukeforest.duke.edu/>
Our Smart Dorm. Duke Smart Home Program. <http://smarthome.duke.edu/dorm>

PORTLAND STATE UNIVERSITY

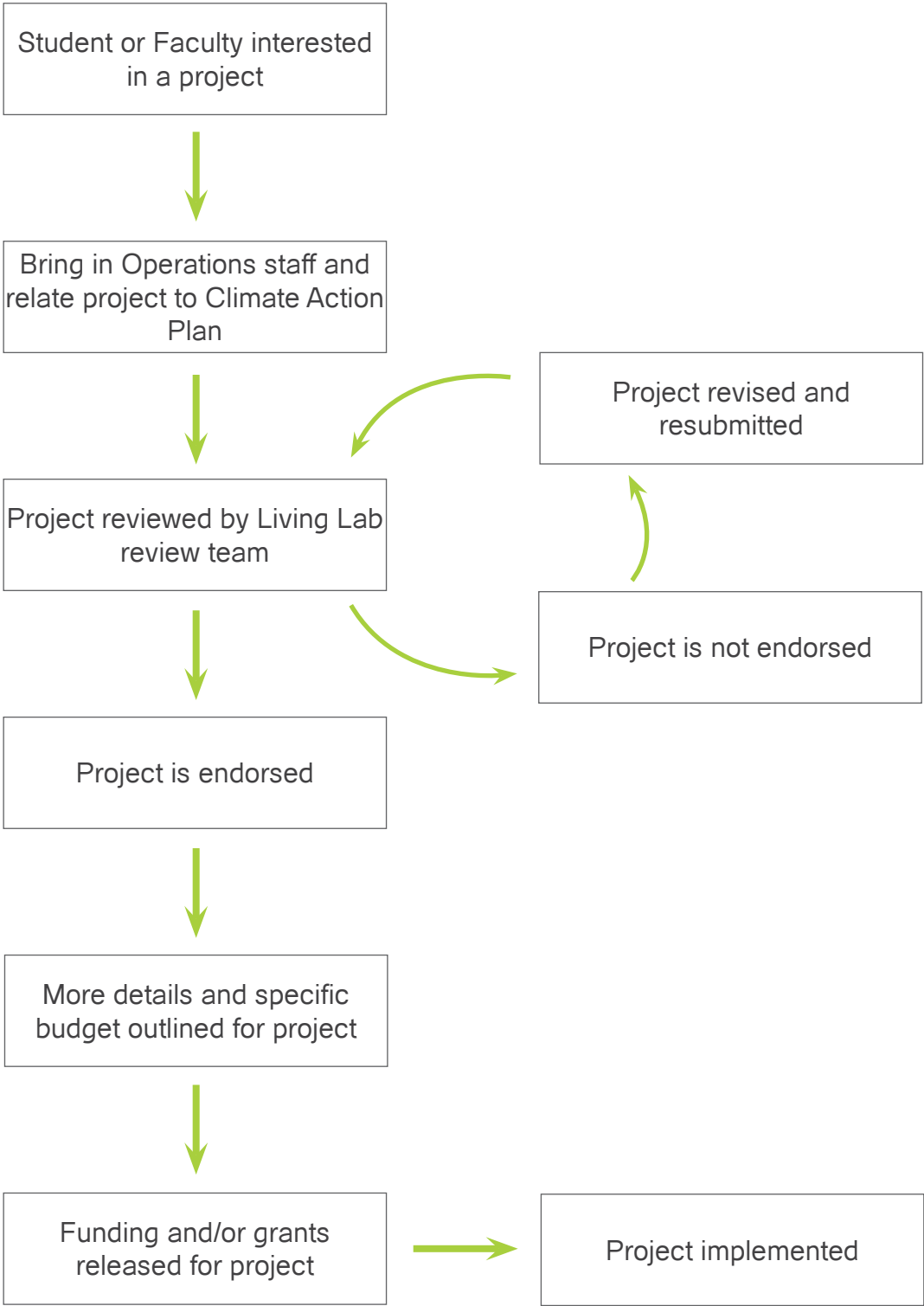
Portland State University is a public university located in Portland, Oregon. They consider their entire campus to be a living laboratory working towards sustainability. Students, faculty, staff, and Operations engage in a joint effort to move towards the goals of PSU’s Climate Action Plan while also providing educational opportunities and community ties. When a student or faculty member is interested in starting a living lab project, they are responsible for bringing a member of the Operations staff on to the project, and from there, submitting an application to the Living Lab review team (Beaudoin interview). Living lab projects at PSU have seven criteria they must meet: sustainability, fit, context, scale, collaborative action, educational design, and monitoring, evaluation, and continuous improvement. (Fit means that the project advances campus sustainability priorities and metrics; context represents awareness of campus characteristics and history; and scale means that the project outcomes are applicable at other scales and locations.) (Our Living Laboratory). If the project is endorsed by the Living Lab review team, it becomes sponsored and more details, including a budget, are proposed for the project. This system of checks and balances ensures the quality and success of projects. The success of the program is also helped by the cross-section of sustainability between the Sustainability Leadership Center and the Institute for Sustainable Solutions. Still, there are some challenges with conflicting timelines between classes and Operations, and with the time it takes to secure funding for projects (Beaudoin interview). A similar living lab system could be implemented at Rutgers, but it would require time, a concentrated effort, and better communication between faculty, students, and staff.

Notes from my interview with Fletcher Beaudoin (Assistant Director of the Institute for Sustainable Solutions, Portland State University) can be found in the Appendix of this report.

Living Lab Highlights

PROJECTS	LARGER CONNECTIONS
<ul style="list-style-type: none">Waste Audit Living Lab Experience, aka WALL-E<ul style="list-style-type: none">- works with classes to perform waste audits of buildings across campusUniversity Place hotel<ul style="list-style-type: none">- classes are conducting research and proposing new solutions for stormwater and developmentTrash Talk Videos<ul style="list-style-type: none">- video shorts to spread the knowledge about reuse initiatives on campus	<ul style="list-style-type: none">Living Lab is a partnership between the PSU Sustainability Office and the Institute for Sustainable Solutions through sub-offices with curriculum and operationsLiving Lab Project Team works with facilities, planning, and sustainability staff to identify potential projects and match staff needs to faculty expertiseLiving Lab Team review process ensures the quality and success of approved projects

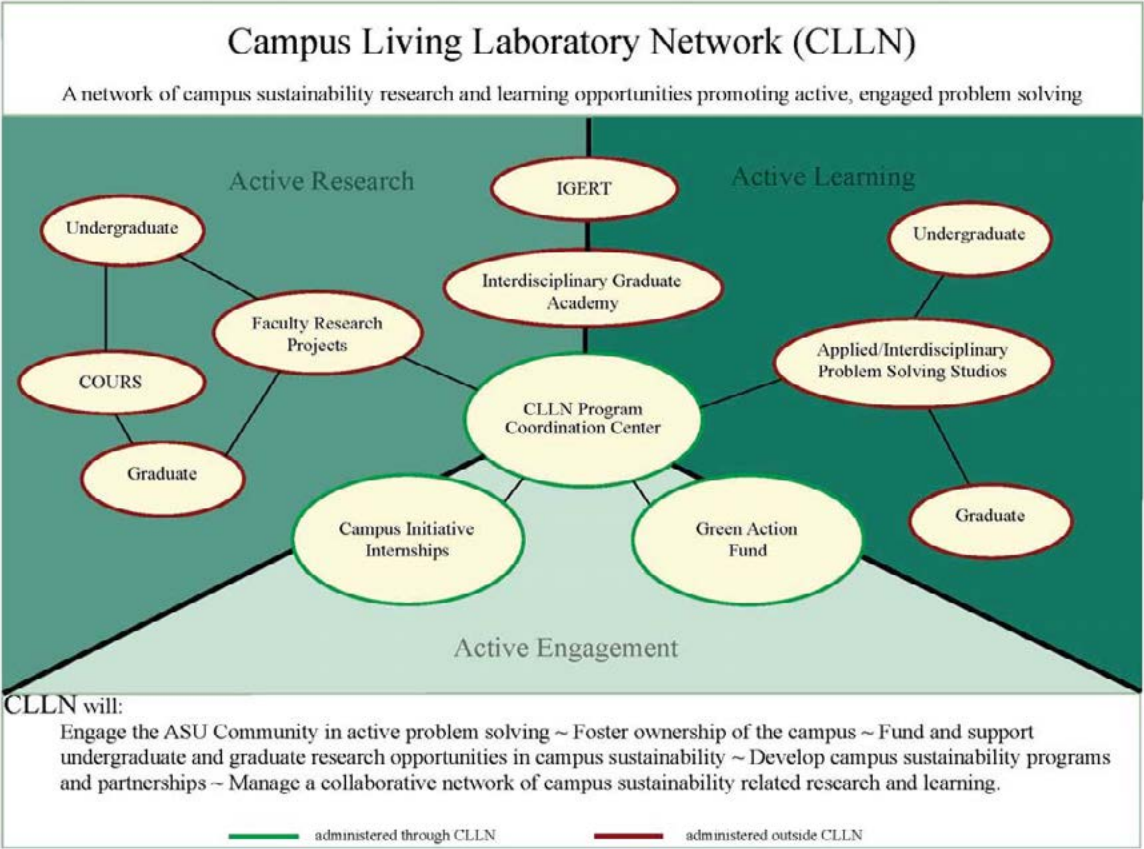
Living Lab Project Process



Fletcher Beaudoin. Interview. March 4, 2015.

ARIZONA STATE UNIVERSITY

Arizona State University is a public research university located in Tempe, Arizona. It is the largest university in the United States based on enrollment, with four campuses and an online “campus.” Their living lab program is specifically directed toward improving sustainability on campus and having the school serve as a model of sustainable processes and practices (ASU website source). Their website highlights over 30 “Sustainability Points of Pride” – examples of sustainability at ASU. They recognize several challenges to incorporating sustainability at universities and work to overcome these challenges through their Campus Living Laboratory Network (CLLN). CLLN works to break down silos of different university players, instead bringing diverse key players together, engaging students, and supporting projects on campus.



ASU has four types of CLLN programs: research projects; Campus Initiative Internships; Green Action Fund; and Applied, interdisciplinary problem-solving studios. A Memorandum of Understanding for each project outlines each player’s role, the required resources, and the project timeline to increase the chances of a successful project. ASU’s current challenge is how to get the word out about the living sustainability laboratory projects while supporting those that are in progress. As such, the CLLN Web Portal is a main priority in order to show current and past projects and to serve as an idea board for future projects (ASU power point source). ASU has made an ambitious commitment to university-wide sustainability that should inspire other universities to do the same.

Living Lab Highlights

PROJECTS

- **37 Projects highlighted as “Sustainability Points of Pride”**
- Campus Harvest & Local Foods Initiative
 - food grown in the campus arboretum is harvested and used in dining facilities
- PolyHarvest
 - Community-supported agriculture program
- Plant Walk at West Campus
- Interdisciplinary Science and Technology Buildings I-IV, Hassayampa Academic Village and several other buildings
 - LEED-Certified
- The Sustainability House

LARGER CONNECTIONS

- Campus Living Laboratory Network works to bring diverse players together, engage students, and support projects on campus
- Proposed CLLN Web Portal will show current and past projects, and serve as an idea board for future projects



PROJECT SPOTLIGHT: The Sustainability House at Barrett, the Honors College

- Sustainability living and learning community
- Student-initiated and student-run project
- Features solar panels, a gray water reuse system, an organic garden, an experimental green roof, and state-of-the-art energy use modeling
- Student community partners with administration, faculty, and staff for sustainability objectives

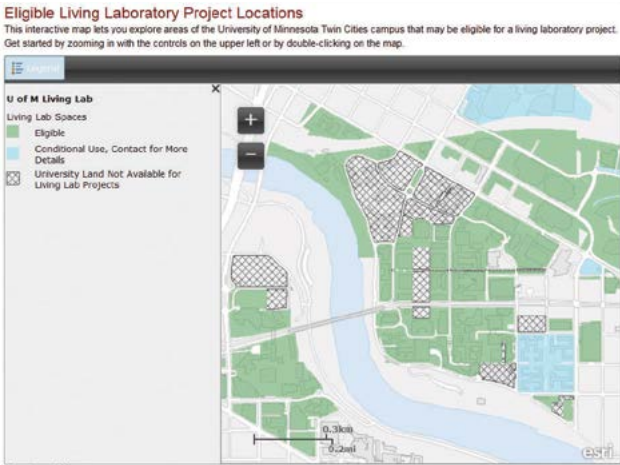
Image Source: Sustainability House at Barrett (SHAB). ASU. <http://barretthonors.asu.edu/student-life/barrett-residential-life/living-communities/sustainability-house-barrett/>

UNIVERSITY OF MINNESOTA

The University of Minnesota is a public research and land-grant university located in Minneapolis and St. Paul, Minnesota. The school’s sustainability campaign, *It All Adds Up*, doubles as a living lab program that is one of the best case studies for living labs in the United States because of its successful framework and informative website. According to their website, University of Minnesota “aspires to create a “living laboratory” in which the campus grounds are not only a backdrop of campus life, but an integral component of teaching, research, and outreach” (Living Laboratory). The pilot living lab program was started in 2013 for grounds and landscapes, and was revised and expanded after the first year. Since 2013, ten living lab projects have already been implemented on the Twin Cities campus (2014 Operations Sustainability Report). The living lab program encompass a wide range of sustainability goals across a range of areas including energy, recycling and reuse, transportation, purchasing, water, food, buildings and grounds, community, education, and research (Living Laboratory). Projects are designed to work with and augment existing systems of operation and decision making. The university encourages the community to submit proposals for living laboratories on campus. Following the initial application, proposals evaluated by the Living Lab Review Panel to meet several criteria:

- Support of university mission
- Stewardship of the University and the University Community
- Academic Alignment
- Financial Plan
- Letter of Support (for students submitting a proposal)
- Other factors: likelihood of success, effective use of existing infrastructure

Selected proposals move forward with implementation on campus. Funding is arranged separately from the living lab process. To help with proposals, *It All Adds Up* has easily accessible links to a map of areas of campus eligible for living lab projects and a list of planned maintenance and improvement projects for campus. This enables applicants to potentially align their proposal with existing plans. However, some challenges can arise if these lists are not kept up to date. The University of Minnesota offers a very integrated and in-depth living lab program that can serve as a great model for Rutgers, especially considering the similarities between universities (see chart on the following pages).



Source: <http://italladdsup.umn.edu/livinglab/map.php>

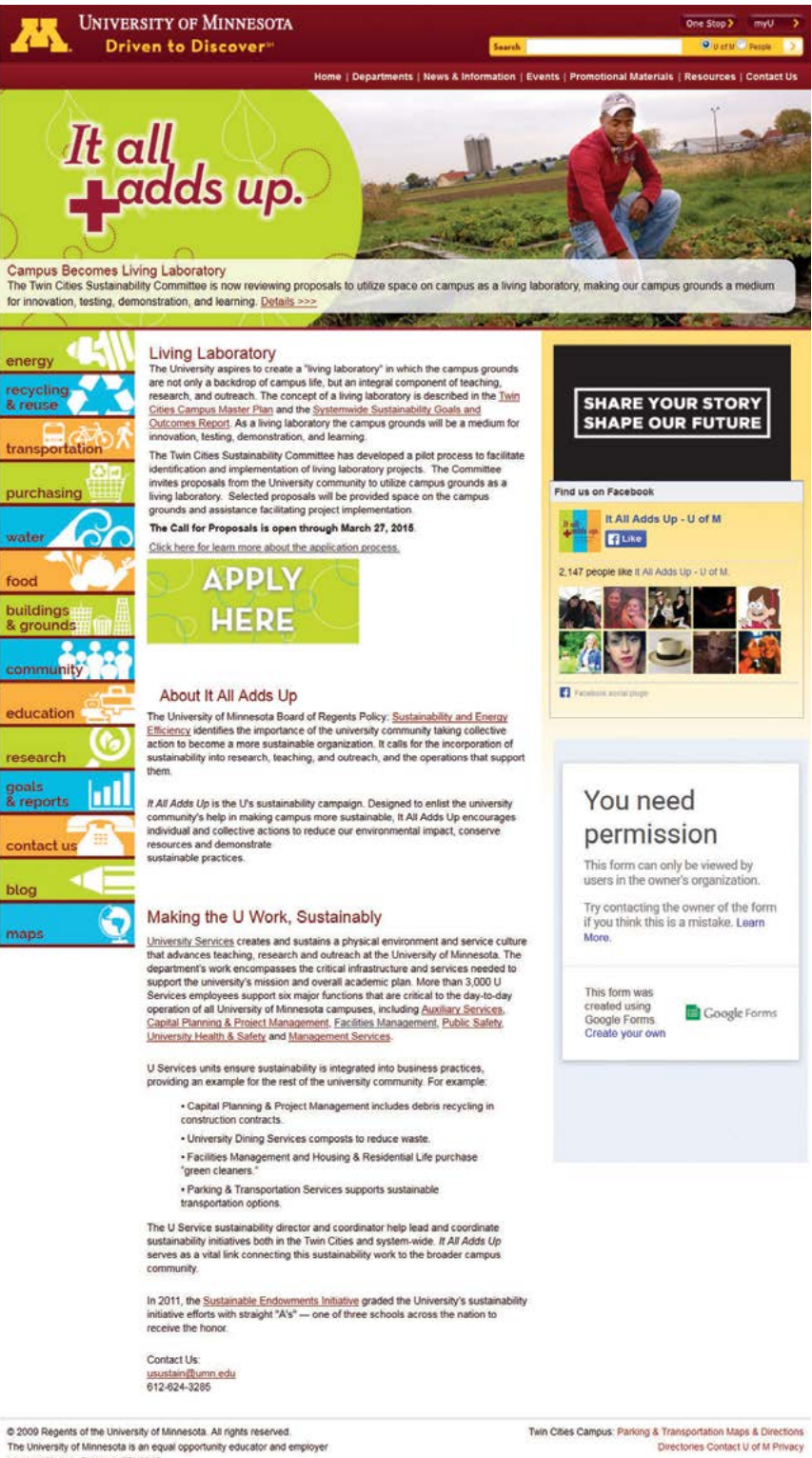
Living Lab Highlights

PROJECTS

- **10 Living Lab projects implemented since 2013**
- Low Maintenance Turfgrass
 - three model areas tested for better adapted, low-input turfgrasses, evalutated over multiple years
 - collaboration between U of M Landcare and Turfgrass Science
- Community Connections Garden
 - teaching and outreach, used for K-12 education over the summer and regular UM courses
- West Bank Community Garden
- Native Meadow Restoration (in process)

WEBSITE

- Detailed, informative, and user-friendly
- Easily accessible application
- Link to funding search tools and opportunities
- Links and information on numerous sustainability initiatives on campus
- Website links to a map of areas of campus eligible for living lab projects and a list of planned University maintenance and improvement projects for grounds



Case Study Summary Chart

School	Rutgers University - New Brunswick	The Lawrenceville School	Duke University	Portland State University	Arizona State University	University of Minnesota
Location	New Brunswick, NJ	Lawrenceville, NJ	Durham, NC	Portland, OR	Tempe, AZ	Minneapolis and St. Paul, MN
Type	Public; multi- campus; research; land-grant	High school; private; college- prep	Private; research	Public; research	Public; research	Public; research; land-, sea- and space-grant
Acreage	2,688 (urban and suburban)	700 (suburban)	8,470 (suburban)	50 (urban)	1,550 (urban)	2,370 (urban)
Enrollment	40,720	816	14,850	28,241	69,397 (physical); 83,147 (online)	30,375
Living Lab Framework?	none currently	Green Campus Initiative	Sustainable Duke	Living Lab Project Team	Campus Living Laboratory Network	It All Adds Up
Living Lab examples	<ul style="list-style-type: none">• Rutgers Field Stations• Hutchinson Memorial Forest• Cook Farm and Ryders Lane Farm• Cook/Douglass Campus (plants)*	<ul style="list-style-type: none">• On-site composting:• School-supported agriculture• Solar farm with bee hive<ul style="list-style-type: none">• The Pond• Sustainable Food Project	<ul style="list-style-type: none">• Home Depot Smart Home• Duke Campus Farm<ul style="list-style-type: none">• Duke Forest• Duke Lemur Center• SWAMP, the Duke University Wetland Center• Duke Marine Lab<ul style="list-style-type: none">• Duke Carbon Offsets Initiative	<ul style="list-style-type: none">• Waste Audit Living Lab Experience, (WALL-E)• University Place hotel• Trash Talk Videos	<ul style="list-style-type: none">• Campus Harvest & Local Foods Initiative• PolyHarvest• Plant Walk at West Campus• Several LEED- Certified buildings• The Sustainability House	<ul style="list-style-type: none">• Low Maintenance Turfgrass• Community Connections Garden• West Bank Community Garden• Native Meadow Restoration
Key Lessons	already a lot being done, but it can be significantly improved	capitalizing on being a small school	fully utilizing campus environments, labs, and centers	creating a review process for living lab projects	sustainability and living labs can be done at a large university	excellent website and application process

* A full list of ways Rutgers campuses and off-campus sites are currently used as teaching tools can be found in the Existing Living Laboratory section later in this report.

Other colleges and universities that can serve as additional case studies include: University of British Columbia, Lane Community College, California State University, Ohio State University, Swarthmore College and Delaware Valley College with their Henry Schmieder Arboretum.

Living Lab Research Takeaways

What roles can living laboratories play on college campuses?

1 It's more than just science

Because living laboratories are part of the campus landscape, studying natural processes and the environment is a natural fit. However, living labs can involve much more than science. For example, classes can find funding opportunities for creating living labs, study how people use spaces on campus, and promote the living lab landscape through art and film. This ties in with the next point...

2 Creating the living lab is part of the educational process

The transformation of any part of the campus into a living laboratory is an important educational opportunity. Data can be gathered about existing conditions of the campus. Students can also be involved with finding funding opportunities, the design and construction of the space, as well as monitoring conditions during construction.

3 Involve the community

The living laboratory should be integrated with the student curriculum and frequented areas of campus to best connect with the campus community. There should also be opportunities for the outside community to get involved with the living lab projects. A website can help inform and involve both students and the larger community with the projects.

4 Enhance sustainability

On many college campuses, living laboratories are deeply connected with making the campus more sustainable. Living laboratory projects provide avenues for students, faculty, and staff to pursue novel solutions to increase sustainability that may not have otherwise been implemented.

How can you implement living labs on college campuses?

5 Know the realities

With any college campus and with any living laboratory, there will be issues with labor, costs, and maintenance. Design solutions and effective communication can help to minimize issues. For the best results that will last over time, the larger campus community needs to be involved at all stages of the process.

6 Connect with other objectives

Living laboratories should intersect with and enhance other objectives of the campus to ensure their use and longevity. These include stormwater management, future growth, and most holistically, sustainability.

7 Work with and augment existing systems

A living lab program should not try to completely alter the existing university system. Rather, the program should work with what is already in place or what is being planned. This includes both existing departments and organizations, such as Facilities and Operations, and physical project sites.

8 Create checks and balances

Not all ideas for living lab projects are appropriate for the university or will be successful. Establishing a review board or another sort of an approval system for proposed projects will help ensure that only those projects that can ensure longevity and success will be implemented to avoid wasting time and resources.

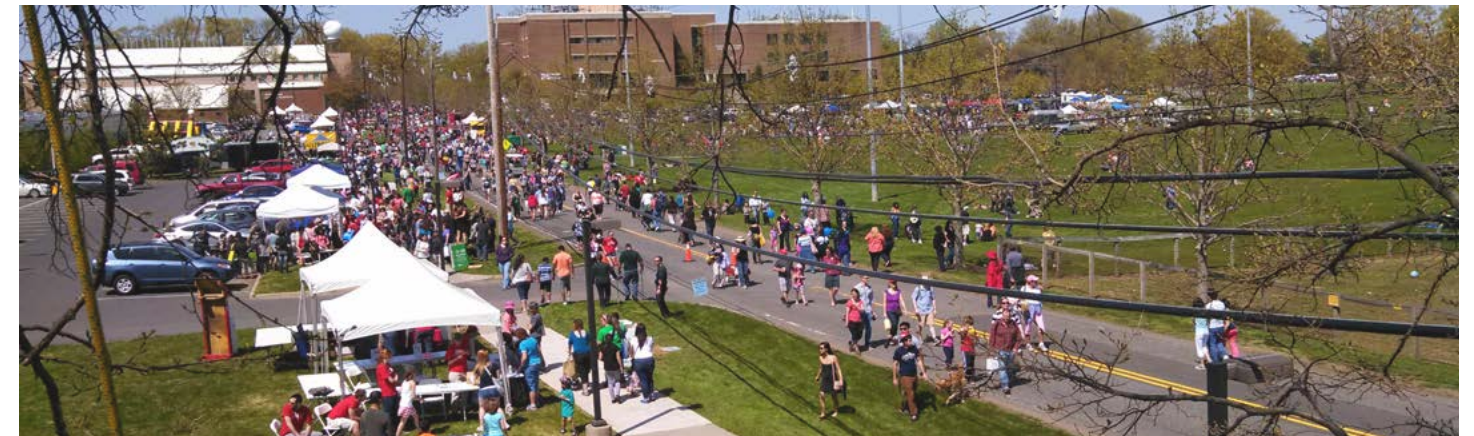
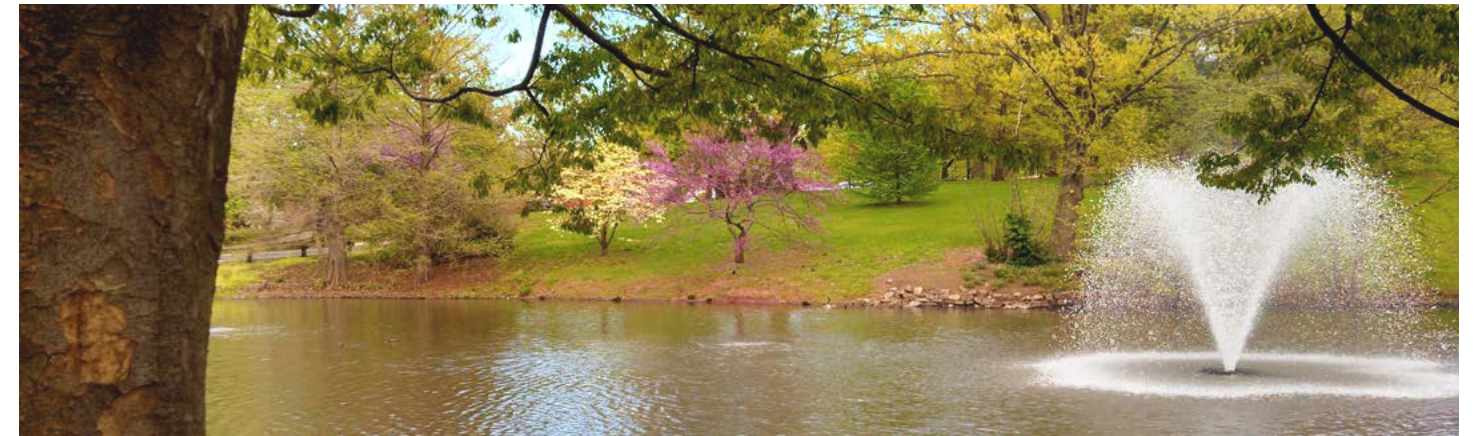
9 Build a website

A detailed, informative, and user-friendly website can serve as an information and communication hub for living laboratory projects on campus. It can promote collaboration and minimize conflicts. Those interested in living labs can discover existing proposals on the website and see what needs to be done for to begin a living lab project of their own or how to get involved in an existing proposal.

THE CAMPUS

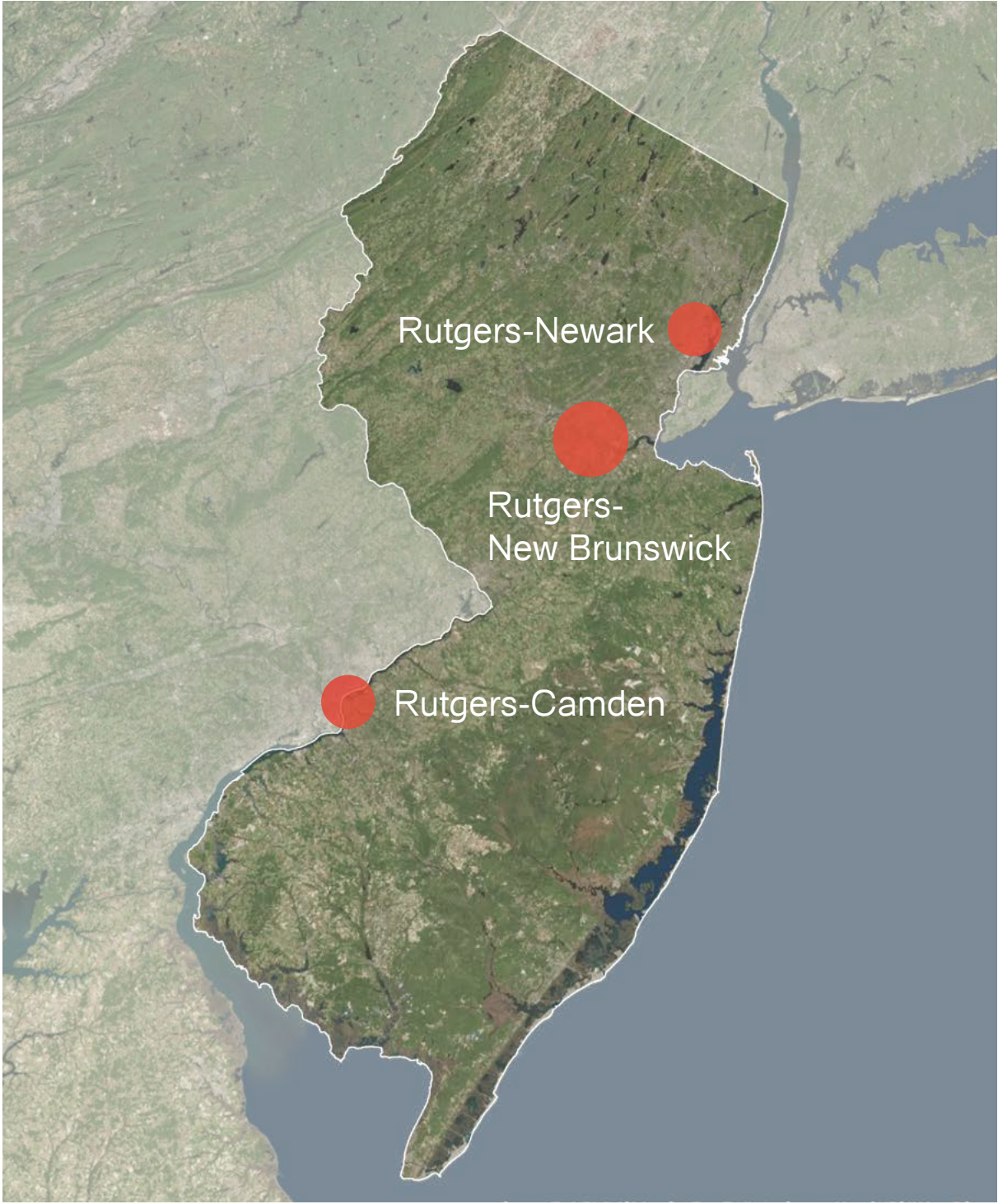
Rutgers University is located on three different campuses in the state of New Jersey: New Brunswick, Newark, and Camden. Rutgers New Brunswick is further broken down into four campuses: College Avenue, Cook/Douglass, Busch, and Livingston. I chose to focus on the Cook/Douglass campus for my thesis because of my close connection with the campus - I took classes and lived on campus, and knew and could access the campus well. Additionally, because of the departments on campus, living laboratories are more broadly and immediately applicable to Cook/Douglass than to other Rutgers New Brunswick campuses. This gives Cook/Douglass the potential to serve as a model for living labs for the rest of the University.

The Cook/Douglass Campus is composed of two distinct yet interrelated campuses: Cook and Douglass. They each have their own identities and academics, but share user groups. The same categories of players - students, faculty, and Facilities - are responsible for how the campuses are used and how they are managed. For this reason, Cook/Douglass is treated as a single entity for this report, with respect given to the unique histories and character of the two campuses.



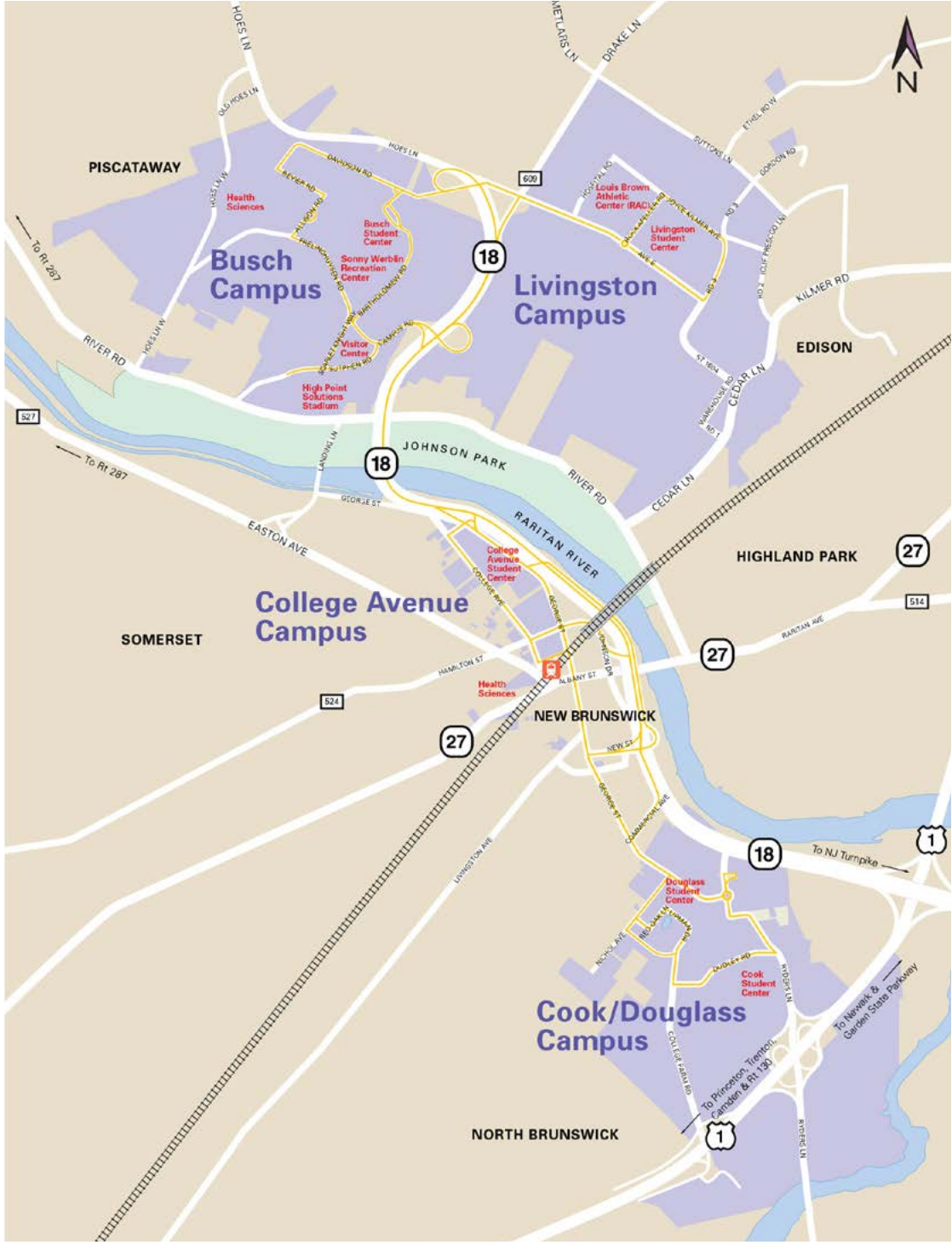
The Cook/Douglass campus.
Bottom right photo by James Brosius. All other photographs by the author.

RUTGERS UNIVERSITY



Rutgers has three campuses throughout the state of New Jersey: New Brunswick, Newark, and Camden. New Brunswick is the largest campus.

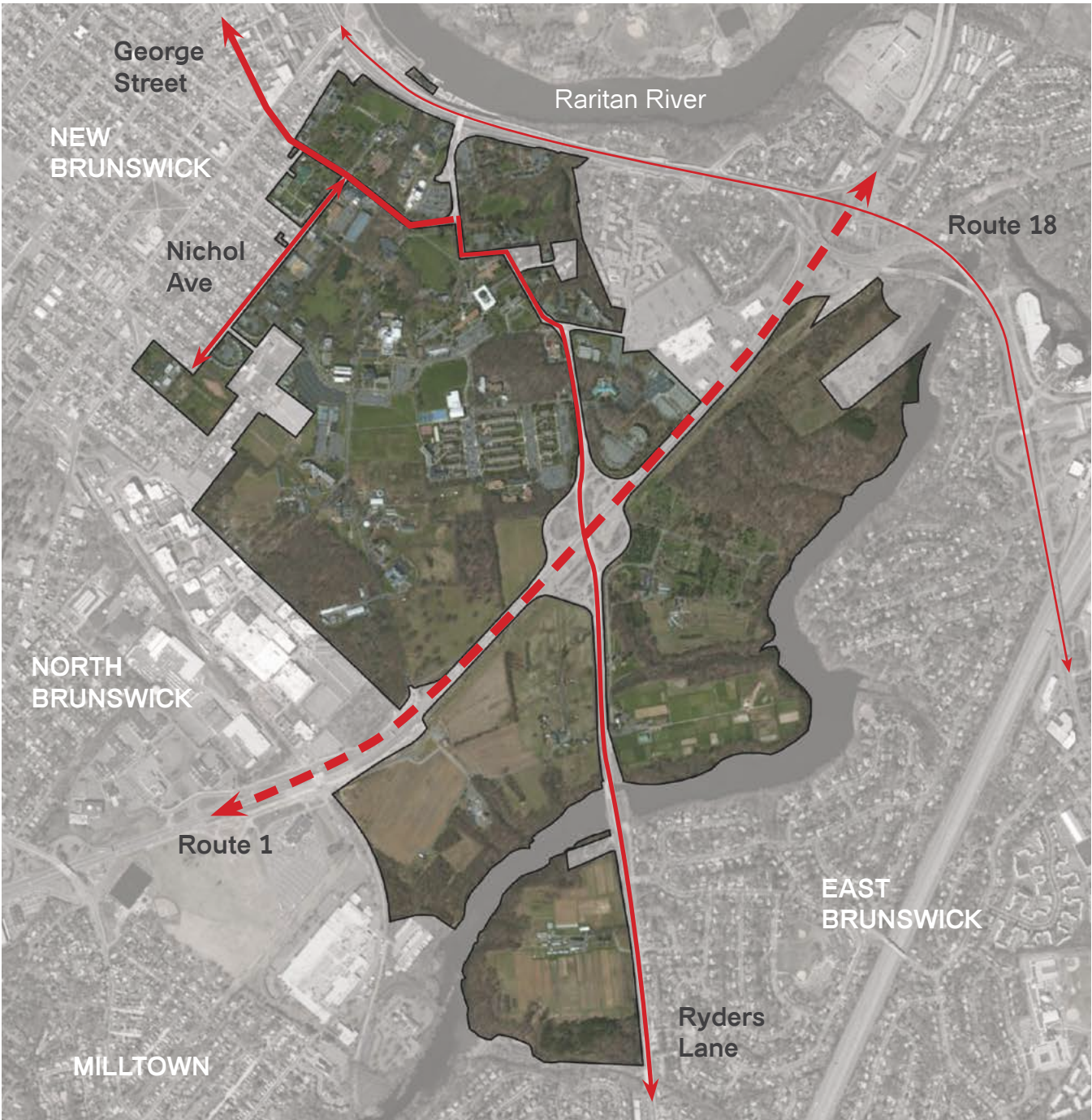
NEW BRUNSWICK CAMPUS



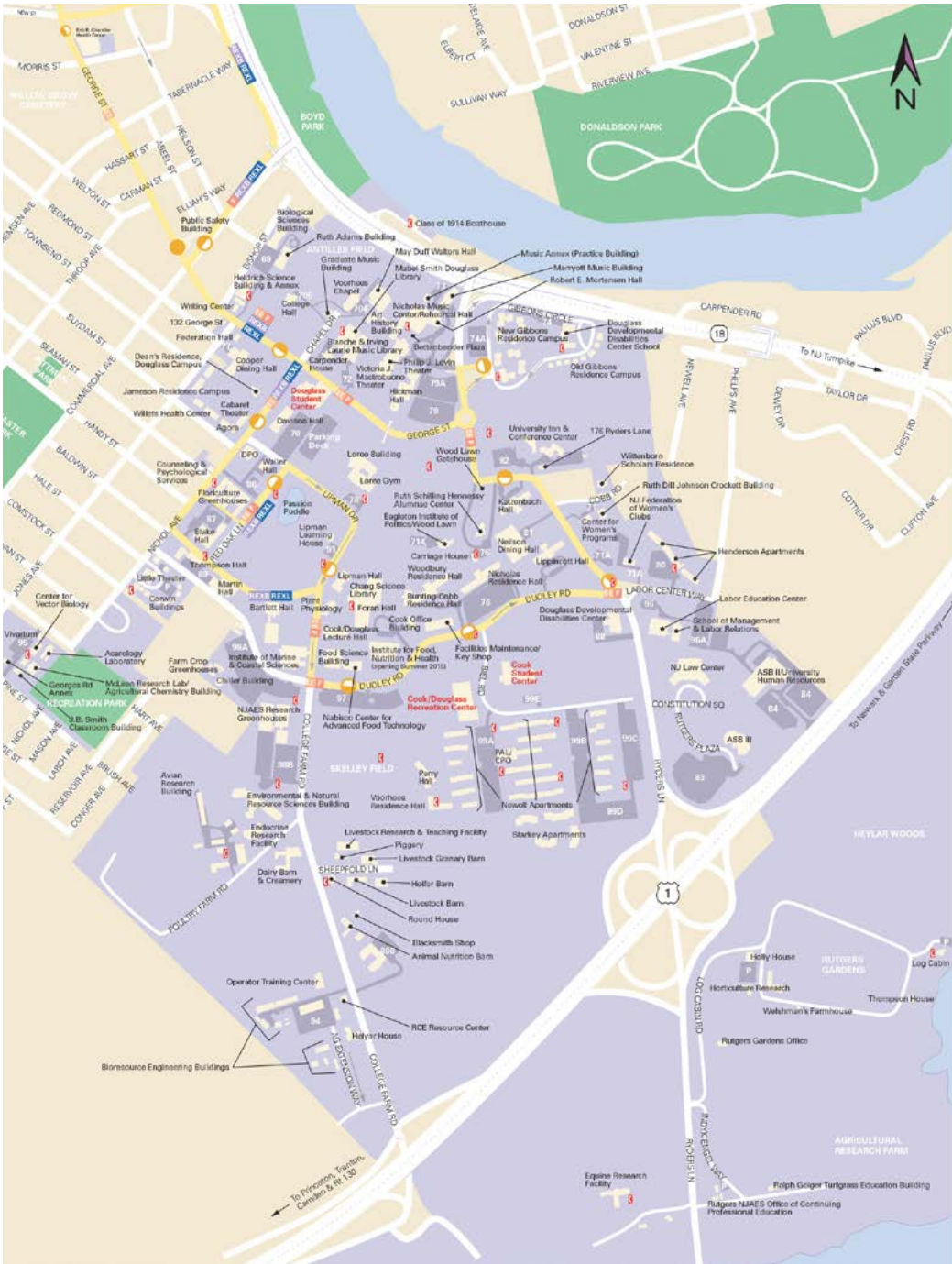
Rutgers-New Brunswick is further broken down into four campuses: Busch, Livingston, College Avenue, and Cook/Douglass. Busch and Livingston are located north of the Raritan River in Piscataway. College Avenue and Cook/Douglass are located south of the Raritan in New Brunswick.

Map from Rutgers University Maps <http://rumaps.rutgers.edu/printable-maps>

COOK/DOUGLASS CAMPUS



The majority of the development on the Cook/Douglass campus is located in its northwest region. The campus is bisected by Route 1. Currently, the Rutgers bus system only serves the part of campus northwest of Route 1, and not the other side to the southeast. Other major roads that help define the campus are George Street, Nichol Avenue, and Ryders Lane.



There is no easy access to the parts of campus south of Route 1, which causes issues with awareness and access to these places. The official campus map, shown above, does not even include the southern edge of campus, which exemplifies this issue.

Map from Rutgers University Maps <http://rumaps.rutgers.edu/printable-maps>

CAMPUS CHARACTER: COOK + DOUGLASS

As the name implies, the Cook/Douglass campus is comprised of two distinct, yet connected campuses. Each campus has its own unique history and identity. However, over time, the two campuses have merged into a single entity of the Rutgers-New Brunswick campus.

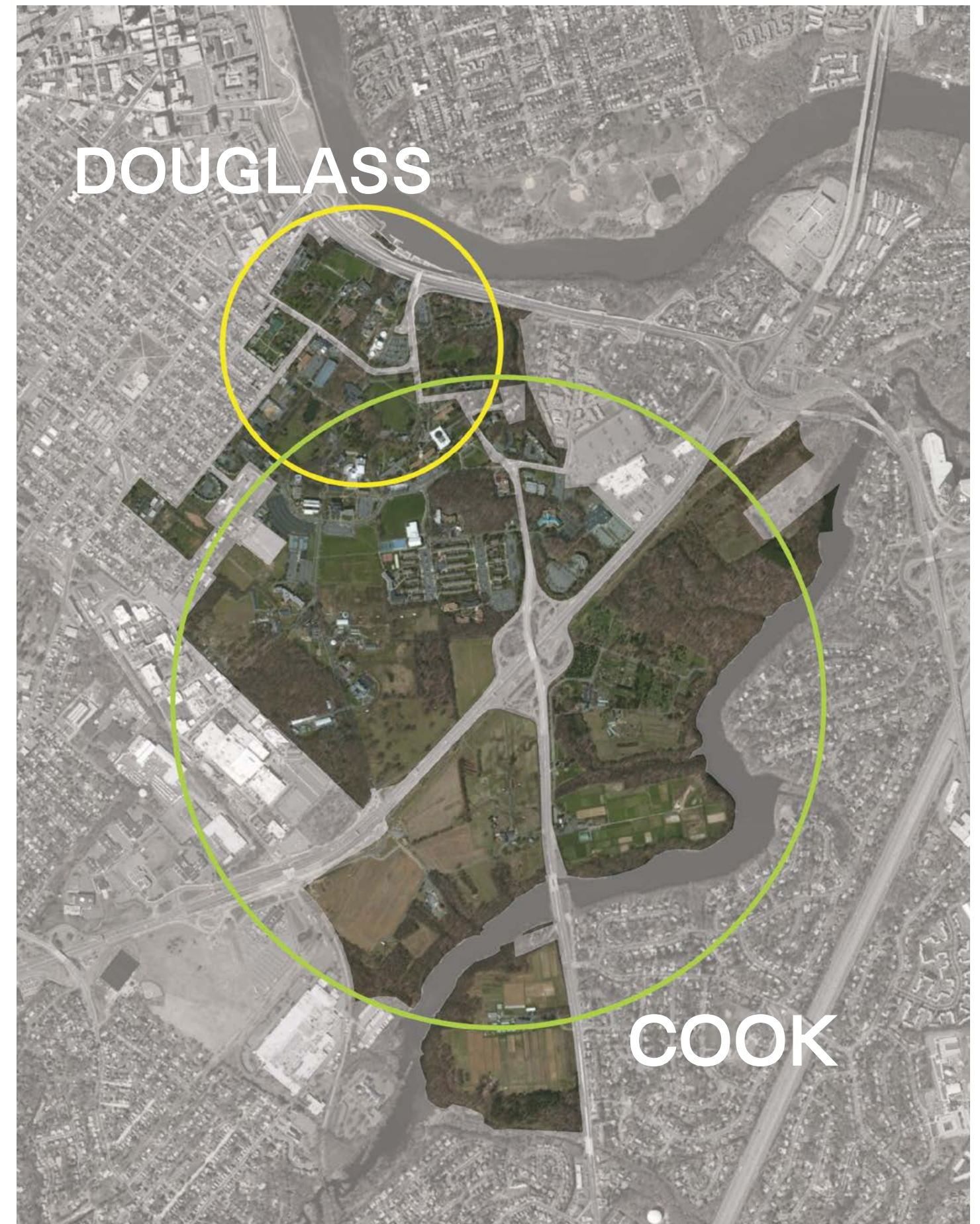
Cook Campus is home to the School of Environmental and Biological Sciences (SEBS). SEBS has its roots as the New Jersey Agricultural College, founded in 1864. After becoming the Rutgers Scientific School, the school then became Cook College of Rutgers University, and was recently renamed SEBS. Douglass College was founded in 1918 as The New Jersey College for Women. In 2007, it was officially merged with Rutgers University, and the Douglass Residential College was created to maintain the Douglass legacy on campus.

Currently, the Cook and Douglass Campuses are often grouped together as a single entity due to their close proximity and undefined boundaries, as exemplified by the map on the right. While each campus possesses some unique features - i.e. Douglass Campus has Voorhees Chapel and Cook Campus has the farms - both are otherwise similar visually. This also contributes to campus users perceiving them as a single unit.

Besides providing educational and sustainability benefits, living laboratories offer an opportunity to connect with the differences of each campus. Living labs can be designed so that they respond to the distinct feel and history of the campus they are created on. Such design interventions can enhance the sense of place of each campus.

A more in-depth look of the history, unification, and distinction of the Cook and Douglass Campuses can be found in *Designing with Water* by Rebecca Cook (see Appendix C).

Map to right: Based off of a map by the Center for Remote Sensing and Spatial Analysis at Rutgers University.



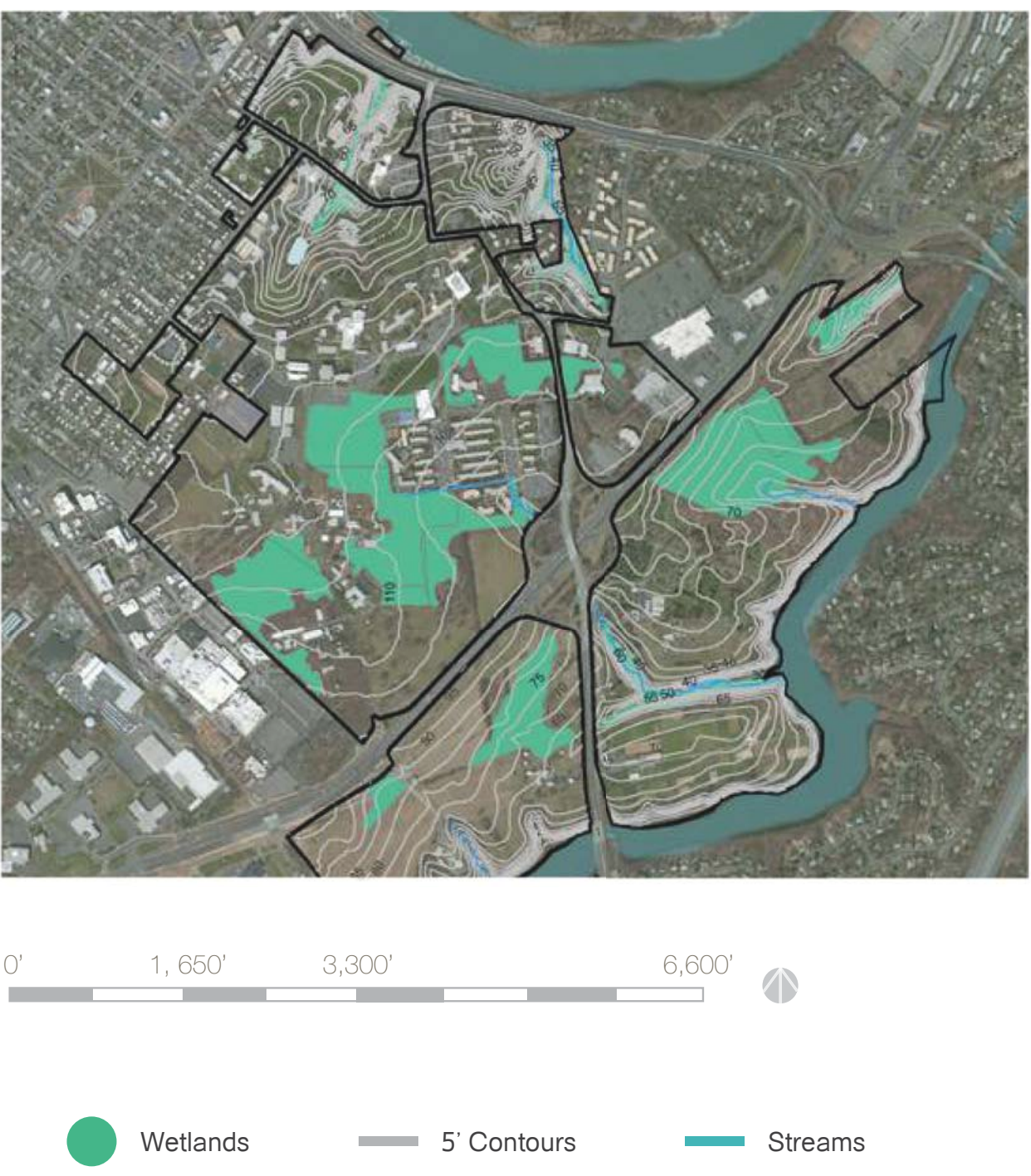
Campus Land Use



The Cook/Douglass campus can be further subdivided into different “lifestyle uses” based on what that region of campus is mainly used for. The Academic Center and Community Core act as the heart of campus. Zones along the edge of campus are mainly underutilized, and could be future sites of living laboratory projects.

Map by Michelle Hartmann. From *Social Space and Sustainability on Cook/Douglass*. April 2014.

Campus Wetlands, Streams, and Contours

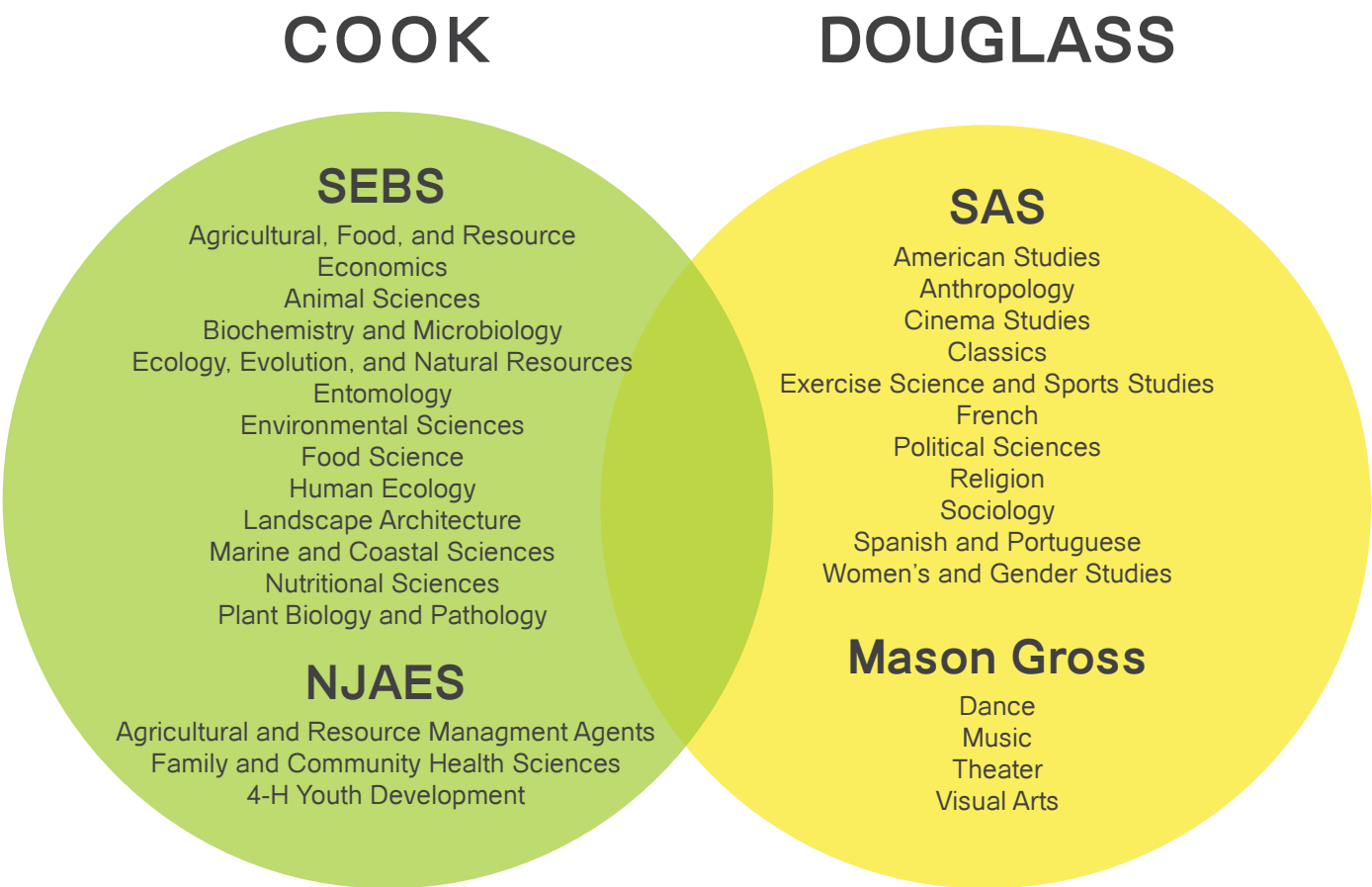


A lot of areas on campus are classified as wetlands but do not display the typical characteristics of wetlands. A living lab project could help restore some of these wetlands where appropriate. More maps and information about the Cook/Douglass campus, including landuse, land cover, and watershed boundaries can be found in Appendix C, Cook/Douglass Campus Background.

Map by Rebecca Cook. From *Designing with Water: Stormwater Management on Cook/Douglass*. April 2014.

COOK/DOUGLASS PLAYERS

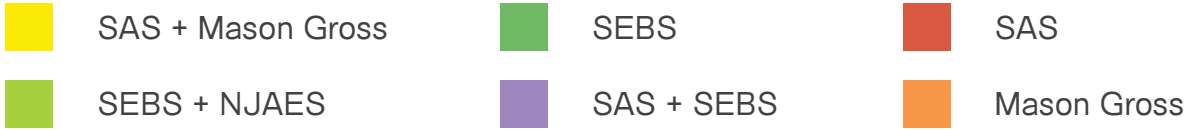
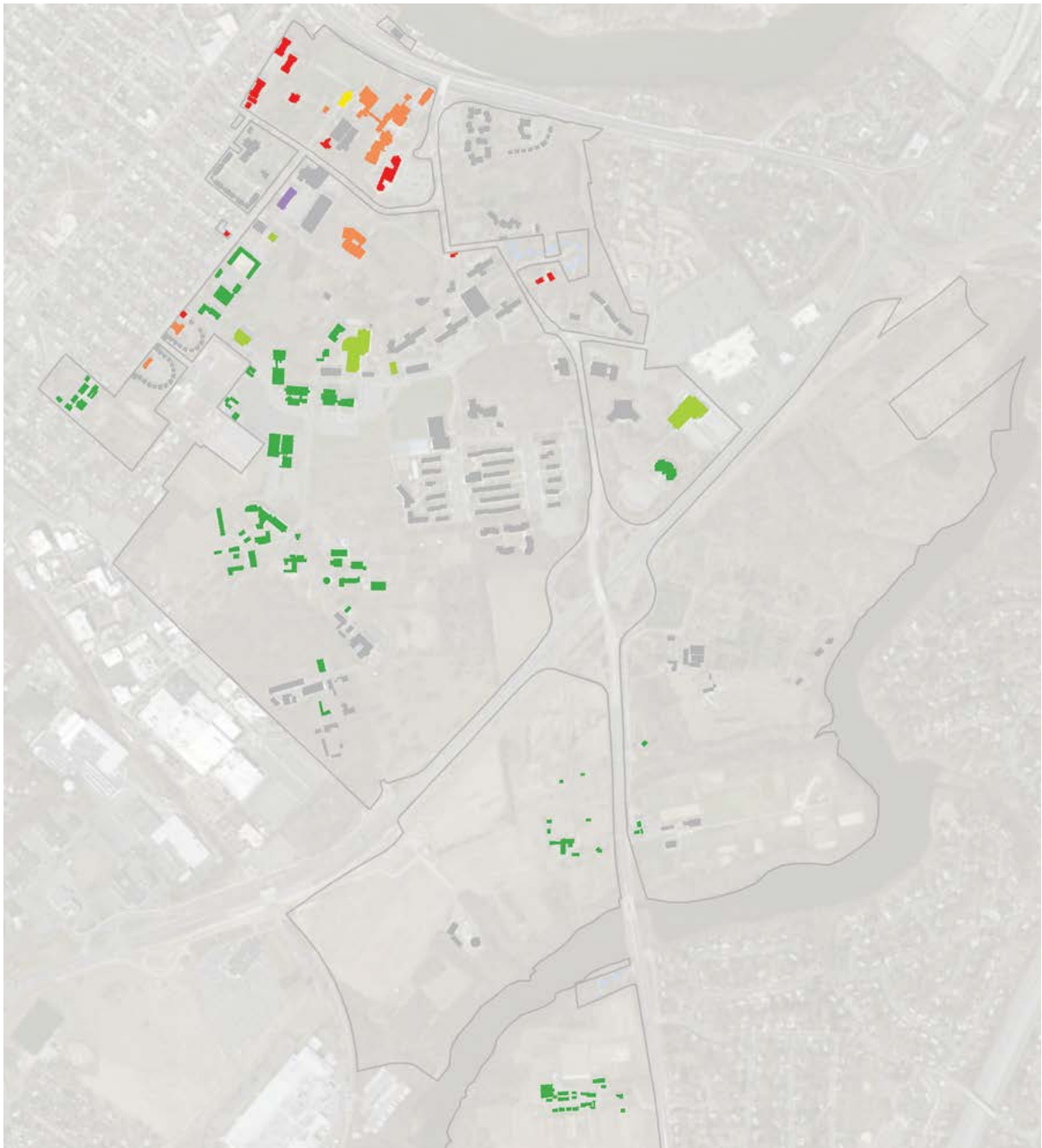
ACADEMICS ON CAMPUS



Due to the nature of what they teach, departments in the School of Environmental and Biological Sciences (SEBS) have great potential to connect with living laboratories. Department missions include common elements of education, research, outreach, and giving back to community. Living labs can address all of these commonalities. The New Jersey Agricultural Experiment Station (NJAES) has different legal mandates, but living labs can also help achieve their goals of research and outreach to educate and serve the people of New Jersey.

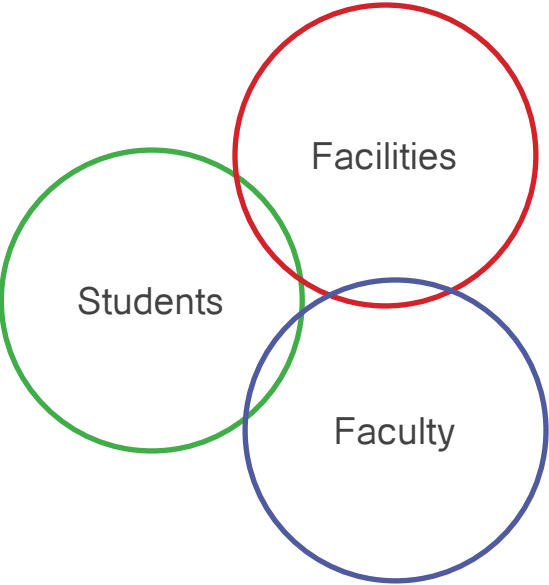
Departments in the School of Arts and Sciences (SAS) and the Mason Gross School of the Arts have a less overt link to living laboratories in the traditional sense, as they have less potential for research and teaching on campus. Still, they can benefit from improvements to campus made through living labs. Living labs also provide opportunities to foster more interdisciplinary thinking between the humanities and the sciences. For example, Mason Gross students could incorporate art and performance into living labs, as well as use art to convey sustainability messages. The humanities offer a way to break down barriers and create a larger sense of community than scientific research alone.

Academic Building Use



The division of academic buildings also show the academic divide between the Cook and Douglass campuses. SAS and Mason Gross are concentrated on Douglass, while the majority of SEBS and NJAES buildings are on Cook. Living labs offer a way to bridge this physical divide depending on where they are located on campus.

GROUPS ON CAMPUS



The main user groups of campus are the most heavily involved in what happens on campus and how the campus is used.

The diagram below analyzes what groups and organizations are involved with circulation, materials, and identity of Nichol Avenue of the Cook/Douglass campus. As evidenced by the diagram, Rutgers Facilities is a major player with maintenance on Nichol Avenue. Their role carries over to the rest of campus, making Facilities one of the most significant groups on campus in terms of grounds management.

Diagram by Jenny Burkhalter, Arturo Hernandez Sangregorio, and Josh Mieloch from the Nichol Avenue Praxis Studio, Spring 2014.

BY THE NUMBERS

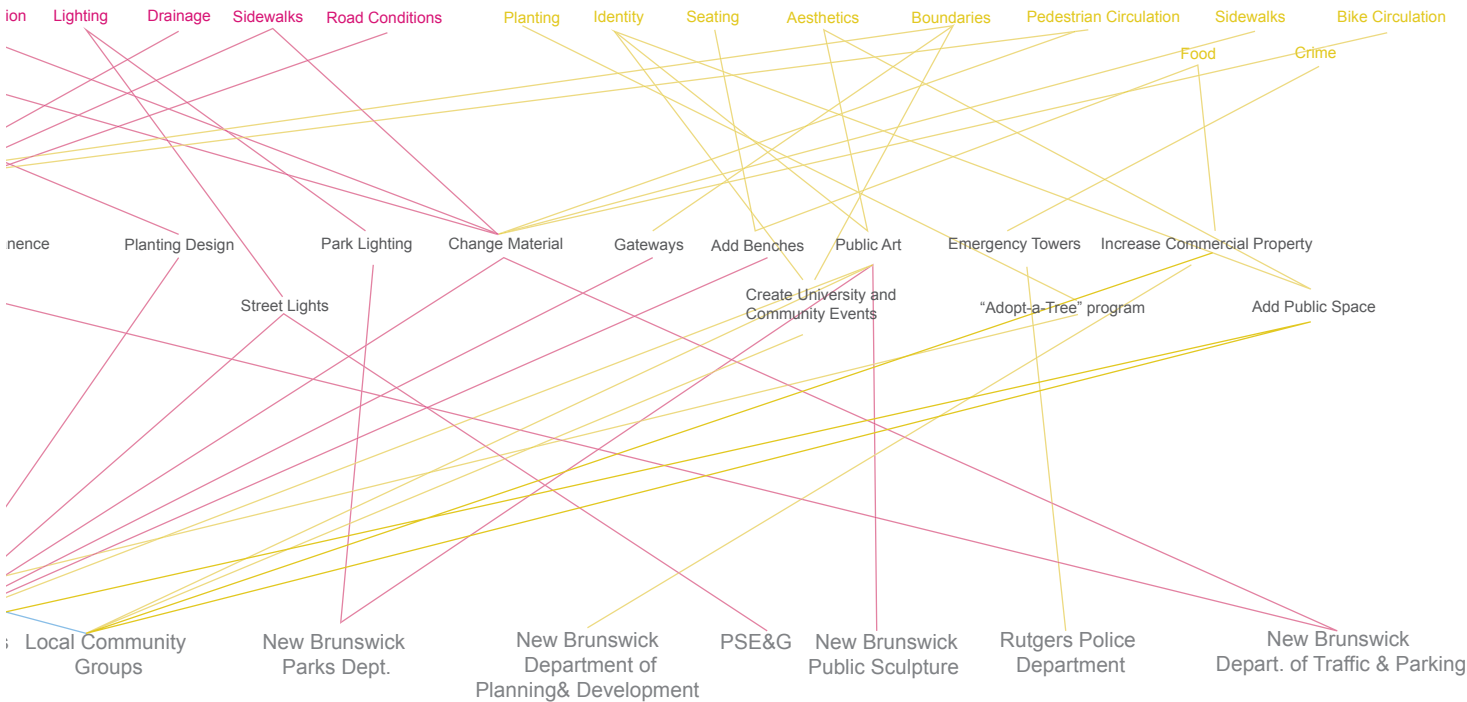
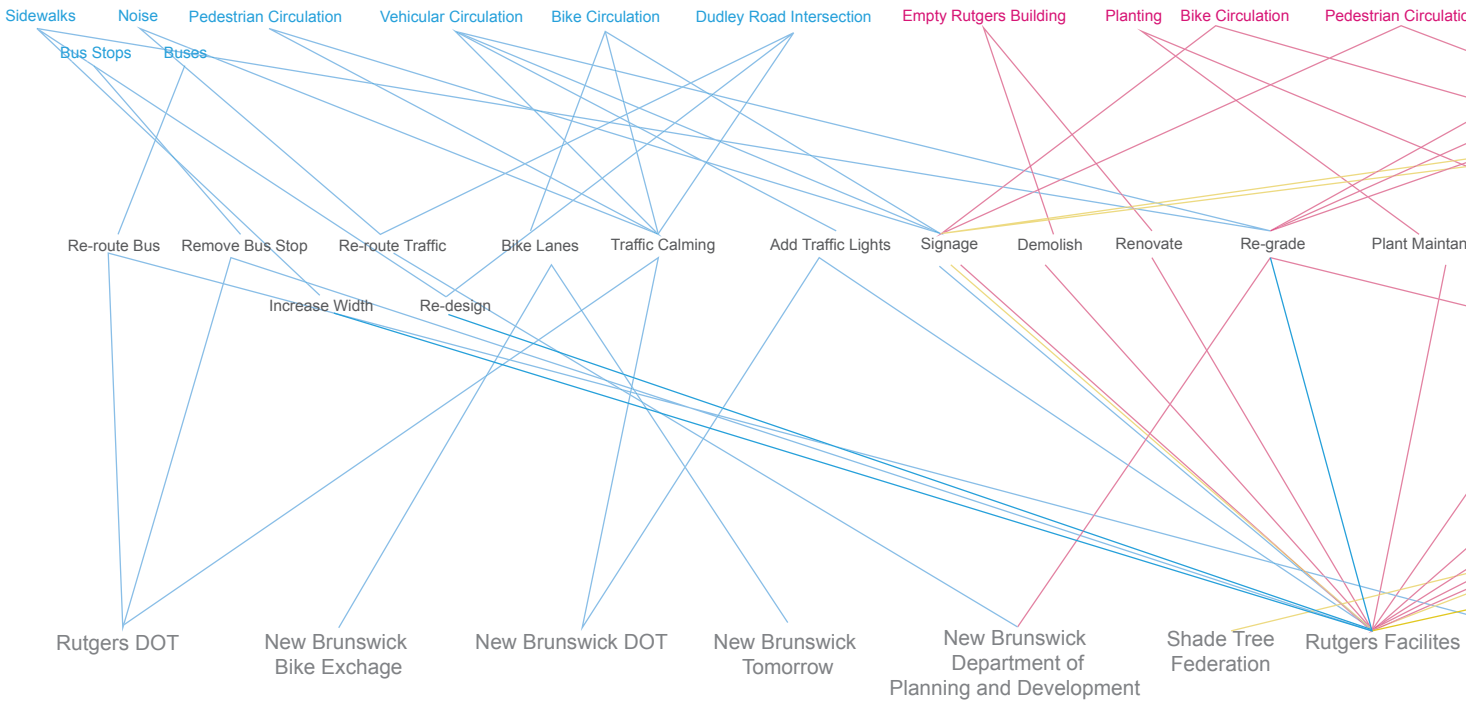
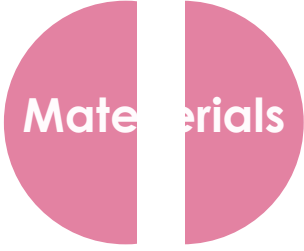
315+	3,432+	400+
Full-time faculty*	Full-time undergraduates*	Clubs and Organizations*
31	47	9
Academic Departments**	Centers and Institutes**	Facilities Units†

* School of Environmental and Biological Sciences ** Cook/Douglass Campus † University-wide

Sources:
Office of Institutional Research, Fall 2014, via <http://sebs.rutgers.edu/about/bythenumbers.asp>
Centers & Institutes. Rutgers University. Accessed March 2015. <http://newbrunswick.rutgers.edu/research/centers-institutes?list=campus>
About UFCP. Accessed March 2015. <http://facilities.rutgers.edu/about-ufcp>



MAINTENANCE RESPONSIBILITIES



CAMPUS USERS

Daily Users



Students: Commuters and Residents

Students are the primary users of campus. They can have direct involvement with living laboratories for classes, research projects, or clubs. Students can also be indirectly involved with living labs by passing through or by them during their time on campus. Student involvement with living labs can help inspire a stronger connection with campus.



Faculty

Faculty are the secondary users of campus. They are usually here for a longer time span than students. Faculty have the opportunity to use campus for research or to enhance their classes, and are the crucial user group for the creation and running of living labs.



Staff of Facilities and Capital Planning

Users in this category have different experiences with the campus depending on what they do. Regardless, they represent a critical player in living labs to guarantee that the labs are maintained over time and work with existing systems. Additionally, living labs represent opportunities for staff to work more with faculty and students, and to get more people to understand the value of Rutgers Facilities.

Campus users are people who use the campus in some way, whether it be teaching, recreation, walking, or visiting. Daily users are people who use the campus almost every day, and include students, faculty, and staff. Occasional users are on campus less frequently, and include alumni, the New Brunswick community, and friends and family of other users of campus. **Living laboratories would mostly target and involve daily users**, but can provide educational opportunities for occasional users.

Living laboratories should seek to balance the needs of all users, though their primary focus should be on the daily users of campus. Living lab designs should consider how users navigate to, through, and from campus, how users spend time on campus, and

Occasional Users



New Brunswick Community

Unlike most students, community residents have the opportunity to use campus year-round; however, many do not, besides children using areas for recreation. Living labs provide opportunities to educate the community about what is going on at Rutgers and draw them onto campus. Since a large portion of the surrounding population is Hispanic, signage for the living labs in Spanish could help reach a wider audience.



Alumni

Alumni help fund Rutgers. Living laboratories can help create a stronger alumni network that are willing to give more back to the University: if involved in a living lab as a student, Alumni may come back more frequently to see how the project is progressing, and may be willing to help fund similar projects.



Family and Friends of Regular Users

Friends and family of other users represent a very diverse group of different ages and educational backgrounds. They may visit only a few times a year to several a semester. As such, these users are not as familiar with the campus and may not understand what is happening with living labs on campus as easily as daily users. Living labs that do not detract from wayfinding and that have simple signage would be most beneficial to this group.

how users interact with the campus over time. More detailed information on student and faculty/staff time spent on campus can be found in *Sustainable Social Space* by Michelle Hartmann. Additional descriptions of campus users and more detailed information on how these users interact with campus over time can be found in *Designing with Water* by Rebecca Cook (see Appendix C, Cook/Douglass Users and Use Patterns).

Living labs with appropriate signage can show all users what is happening on campus in terms of teaching, research, and innovation. As an ultimate goal, **living labs can get all users to see the campus as a living place**, not as merely something to walk through, inspiring a greater sense of campus stewardship.

INTERVIEWS

In order to gain a better understanding of existing living laboratories at Rutgers University and to gather input for future living labs, I interviewed several members of the Rutgers community during the Fall 2014 and Spring 2015 semesters. People interviewed include professors, academic deans, and Rutgers Facilities and Capital Planning staff. In addition, I also interviewed a few students who are currently working on living laboratory projects on campus.

There was a strong focus and thus interview bias toward members of the School of Environmental and Biological Sciences (SEBS) on Cook campus because of SEBS's easy applicability to living laboratories. I started the interview process talking with a few deans, department chairs, and undergraduate program directors to gauge initial interest, applicability, and ideas for living laboratories on campus. From there, additional interview subjects were gathered through snowball sampling. Interview subjects were asked during their interview for suggestions of other people to be interviewed. The majority of interview subjects were found using this sampling method.

Some common questions for interview subjects were how they currently use campus or off-campus for teaching purposes (or if they know of any ways this is happening), and what challenges they currently face. They were also asked for potential ideas for expanding teaching opportunities and living laboratories on campus, and what some associated challenges might be. Many interview subjects were also asked more specific questions based on the subject's position at Rutgers University. While there were specific questions, interviews were allowed to progress and flow as a conversation as much as possible, instead of a question and answer format.

The following data and analysis presented in this chapter is based on the interviews conducted over the Fall 2014 and Spring 2015 semesters. Notes from all interviews and a list of uninterviewed suggested contacts can be found in the Appendix of this report.

Definitions

The chart on the next two pages is a summary of interviews conducted with Rutgers deans, professors, directors, and Facilities staff. Because the interviews with students and people outside of Rutgers asked different questions, they were not applicable to the chart and are not included.

Teaching - assessment of the use of space both on and off campus for educational purposes
Use of On-campus: spaces on campus/part of the Rutgers campus
Use of Off-campus: spaces not part of the Rutgers campus, may or may not be affiliated with the university
No uses mentioned: no spaces were mentioned during the interview

Issues - issues mentioned during the interview that affect the creation, implementation, and management of living labs, both existing and potential
Cost: (lack of) funding, investment; often linked with labor and maintenance
Labor: having the people to promote, build, and run the living labs
Maintenance: maintaining the living labs over time, both physically and programmatically
Communication: communication between departments and services at Rutgers, with those outside the university and with the community
Other: any other issue that was mentioned that would affect living labs

Existing Sites - any site that currently functions as a living lab as identified in the interview
Potential Sites - any site that could become a living lab as identified in the interview, or potential enhancements to existing sites

Interview Subject	Teaching			Cost	Labor	Maintenance	Communication	Issues Identified	Existing Sites	Potential Sites
	Use of Campus	Use of Off-campus	No uses mentioned					Other		
Rick Ludescher	yes	yes	no	--	--	--	yes	access	Rutgers Gardens; farm; EcoPreserve	campus arboretum; outdoor growing; Carpenter Estate; Raritan River; farmer's market connections
Bob Goodman	yes	yes	no	--	yes	--	yes	lack of activism	campus; Heylar Woods; HMF	campus, incorporating turf program and other classes
Cynthia Daniels	yes	no	no	--	--	--	--	historical considerations; maintaining campus identity	none mentioned	campus as a whole
Laura Lawson	yes	no	no	--	--	yes	yes	need for a structure; continuity	campus as a whole	campus as a whole; Student Sustainability Farm; IFNH; parking lots; green infrastructure opportunities
Wolfram Hoefer and Laura Lawson	yes	yes	no	--	yes	yes	yes	teaching material needed	campus; farm	spaces on campus
Richard Alomar	yes	no	no	yes	--	--	yes	lack of vision and power	behind Blake Hall; campus; Nichol Avenue	greenhouse; campus
Henry John-Alder	yes	yes	no	--	--	--	yes	where to start?	campus; EcoPreserve; Rutgers Gardens; Helyar Woods; Raritan River Watershed; RU Field Stations	invest into existing; gully between Loree and the parking deck
Rick Lathrop	yes	no	no	--	--	yes	--	advertising/engagement	EcoPreserve; Heylar Woods; campus	EcoPreserve; Carpenter House; ecorestoration on campus; woods behind the CCC and next to the farm
Bruce Crawford	yes	no	no	yes	yes	yes	--	access	Rutgers Gardens; EcoPreserve	Rutgers Gardens; EcoPreseve; connection between
Jason Grabosky	yes	no	no	yes	--	yes	yes	lack of power	campus	campus as Tree Campus USA; plant communities
Jean Marie Hartman	yes	no	no	yes	--	yes	--	concerns with community	campus (sampling)	campus: as expo, plant showcase, outdoor classrooms, more animals
Peter Gillies	yes	no	no	yes	--	--	--	adapting to living lab	farm, campus, IFNH building and courtyard	IFNH building and courtyard
Larry Katz	yes	yes	no	yes	yes	--	--	lack of motivation	NB Community Farmer's Market; Ag offices throughout NJ	Nichol Ave; Raritan River!
Karyn Malinowski & Kenneth McKeever	yes	yes	no	yes	--	yes	--	lack of awareness/visibility; lack of access to some areas; lack of recognition	Red Barn; Ryders Lane farms; farm; showcase events; RU farms throughout the state	expanding research done (by CES) at the farm
Daniel VanAbs	no	no	yes	yes	--	yes	--	none	Raritan River basin (for internships); NB community?	Raritan river basin; connection with internships; campus and sustainability; campus as a design lab; RU energy, waste, etc policies; connection to research methods class?
Max Haggbloom	yes	yes	no	yes	--	--	--	commitment over time	farm; Passion Puddle	more campus sites for microbio classes; Harvard Soil Project-likeness; more with Passion Puddle and farm; interdisciplinary opportunities; stormwater connection
Beth Ravit	yes	yes	no	--	--	--	yes	keeping people engaged; living labs are complicated	farm; EcoPreserve	Raritan River; stormwater opportunities; campus as a whole; more with EcoPreserve
Peggy Policastro	yes	yes	no	--	--	--	--	lack of awareness	Rutgers Dining Facilities; New Brunswick restaurants; IFNH	none mentioned
Lena Struwe	yes	no	no	--	--	yes	yes	awareness; need of a different mindset	campus as a whole; Herbarium; parking lots; Cook Organic Garden; greenhouses; Rutgers Gardens	demonstration permaculture garden; bird and bat houses; more with forests on campus; different campus environments
Steve Kristoph	yes	yes	no	yes	--	yes	yes	lack of labeling; soil issues	campus as a whole wherever there are plants	campus as an arboretum; edible plants
Mary Nucci	yes	no	no	--	--	--	yes	none	campus as whole	covered areas; enhancing plantings and spaces; better path use and study; self-guided tour
Jen Shukaitis	no	yes	no	--	--	--	yes	building relationships takes time	farmer's markets; New Brunswick	educational farm; food hub
Clint Burgher	yes	no	no	yes	--	--	yes	lack of awareness of farm; disease transmittance; research and teaching conflicts	farm!!!, Ryders lane farm	use farm more for other departments?
Bob Chant	yes	yes	no	--	--	--	--	time conflicts with faculty	Raritan River, other rivers	more opportunities on the Raritan River
Clinton Andrews	yes	yes	no	--	--	--	yes	political ramifications; privacy with human subjects; quasi-experimental nature	New Brunswick; campus buildings; surrounding NB area	more buildings at Rutgers; more people involved with data collection
Rebecca Jordan	yes	yes	no	--	--	--	yes	internal coordination; existing spaces that meet teaching needs	Passion Puddle; Rutgers Gardens, Heylar Woods; New Brunswick	gardens by dorm buildings; getting students more engaged with activities on campus
David Ehrenfeld	yes	yes	no	yes	--	yes	yes	wanting to appear high-tec	campus as a whole; Passion Puddle	native plant gardens; signage; a class about the campus; integrate existing Community Supported Agriculture
Steven Handel	yes	yes	no	--	--	--	yes	tradition of campus landscapes (lawns)	wildflower lot on Livingston; greenhouses; Herbarium	campus areas that do not have to be lawn/campus as a whole
Chris Obropta	yes	yes	no	yes	--	yes	yes	different values; limited knowledge; class coordination; overcoming existing standards	campus as a whole; areas in need of green infrastructure interventions; patio and rain garden outside of ENR	plantings on campus; porous paving sidewalk by Helyar House; bioretention rain garden system on College Farm Road, more interdisciplinary projects; meadows; green infrastructure projects and related research
Grounds Management Team	n/a	n/a	n/a	yes	yes	yes	yes	who will continue	Passion Puddle; Rutgers Gardens; EcoPreserve; Experiment stations	experiment areas/away from main part of campus; behind Heylar House
Seth Richter & Josephine Greyson	n/a	n/a	n/a	yes	--	yes	--	addressing environmentally sensitive areas	none mentioned	gorge by Douglass library; Newell/Starkey stream; Loree gorge; campus parking lots; point source building drainage; nearby Antillies field; helping address stormwater management issues; using soil
Frank Wong	n/a	n/a	n/a	yes	yes	yes	yes	connected aesthetics?	plants on campus	spots with erosion problems; taking the lab for trees further; stormwater connections
Nicholas Emanuel	n/a	n/a	n/a	yes	--	--	--	getting from point A to B	none mentioned	opportunity to connect curriculum with dining service sustainability
Michael Kornitas	n/a	n/a	n/a	yes	--	yes	--	balance of return-on-investment	solar farm and solar arrays; IFNH building (LEED Silver)	mechanical systems on Cook; campus vs campus energy competition expanded to dorms; sustainability dorm or student center; metering buildings for monitoring energy; opportunities with current projects

Interviews by the Numbers



Interview subjects revealed a number of ways the campus is already being used as a teaching tool. They also identified numerous possibilities for living laboratories on the Cook/Douglass campus and a few for Rutgers as a whole. Both the existing and proposed living labs are discussed in further detail in the following chapter.

Faculty Use of Campus for Education



Frequency of Challenges Mentioned in Interviews



The above categories are not mutually exclusive. Percentages reflect if the category was mentioned in the interview at all, not if it was mentioned over a different category.

In the interest of time and for the purposes of data collection, I focused my interviews mostly on people who already use the campus in some way, rather than trying to interview a wider pool of subjects that may or may not use campus. As such, data from my interviews is skewed toward people who use campus as a teaching tool and should not be taken as representative of the Cook/Douglass or overall Rutgers communities.

LIVING LAB CHALLENGES

Living laboratories are complex. They involve a lot of players and oftentimes a lot of moving parts. As such there are a lot of potential issues with living labs, ranging from the original implementation to maintenance over time. Multiple challenges to existing and potential living labs on Cook/Douglass were identified in my interviews. I grouped these challenges into eight general categories for further analysis.

Despite these challenges, the majority of people interviewed expressed a strong interest in living laboratories. The potential benefits outweigh any anticipated difficulties.

Awareness

- Lack of awareness/visibility issues with:
Rutgers Gardens
Rutger EcoPreserve
Cook Farm and Ryders Lane Farms
Equine Science Center
Of what is happening on campus (for students, faculty in other departments, etc) (no signage/information)
- May unintentionally disrupt or destroy projects or living labs if not aware
- Public concern over projects, due to lack of knowledge of the project

Communication

- Need for a dialogue between all players involved, especially Facilities!
- Lack on internal coordination currently
- Disconnect between Rutgers Cooperative Extension and Facilities
- Limited communication on current happenings (relates to lack of awareness)
- Need outreach to student body (currently no signage, need to create awareness)
- Understanding the needs of operations staff

Mindset

- Changing the mindset of the Rutgers community
- Need for activism
- Need a deeper university commitment
- Engaging people's interest and involvement initially and maintaining it over time
- How to get people motivated?
- Different values between Rutgers Facilities and Planning staff and some efforts on campus
- Introducing the new to an old campus
- Conflicting interests and time for students, with differing levels of care
- Creating a sense of ownership/stewardship
- New Brunswick community not too open to Rutgers (different demographics)
- Adapting to living labs is a cultural hurdle

Feasibility (Funding and costs)

- Where does the funding come from, and how much will be needed?
- Cost of implementing living lab projects
- Cost of maintaining projects
- How to deliver and expand services with limited resources
- Less money means less people/staff
- Cost of materials for living labs
- How long for a return-on-investment?
- Financial sustainability
- Cost of educating Facilities (Cook College programs expensive with their limited funds)
- Finding funding can take time

Implementation

- Where to start? There are lots of things to do/fix/enhance/change
- How to start? How do you get from Point A to Point B?
- Lack of vision and power
- Dealing with red tape and political issues
- Need buy-in from administration
- Need someone to lead and persist - who will manage and coordinate living labs?
- Difficulties in getting people to do things they don't know about or know how to do
- Time constraints of faculty (with research they do not have as much time to plan classes) versus time commitment and effort of living labs/using campus
- Lack of resources
- Lack of coordinating class times
- Timeline doesn't match between classes and Operations/Facilities
- Potential conflicts with Facilities
- Political ramifications
- How to overcome the challenge to cross department lines and work together?
- Where is the space for living labs? Need to consider environmentally-sensitive areas
- Other places already exist that compete for space and uses
- Projects take time to establish
- Establishing a cross-university team and developing a rapport with the team so that they see themselves as a group, not just individuals

Function

- How much control is possible? For research, test plots, etc. on campus
- The quasi-experimental nature of some living lab research - you can't control all variables, and it requires more attention to research design
- You need the teaching material for living labs to work
- Deer management?
- What if the lab fails? There will probably be failed attempts, so what then?
- Separating research and teaching
- Need for constant support for a living lab website

Maintenance and Continuity

- Current maintenance concerns with existing living labs, the Equine Science Center, the Busch and Livingston Stormwater Master Plan
- New maintenance practices likely (need to educate staff, overcome existing standards)
- Lack of staff
- Living labs should be sustainable over time
- Continuity: how will you sustain the project over time?
- People move on and there is a lack of follow-up
- It should not be left as Facilities' problem

Appearance

- Retaining independent identities of Cook and Douglass campuses
- Creating unity on the campus
- Potential to enhance historical connections
- Fear of parental and outside complaints over appearance of campus
- How will the living labs work and look together?
- Conflicts with quintessential campus look of lawn and trees
- Conflicts with maintaining curb appeal (green, clean, and weed free)
- Projects take time to establish (and may look unkempt in that time)

Safety

- Farm: disease transmittance concerns
- Safety vs. ecology (and in general, education; specifically about rot plots)
- Regulatory compliance with state, local, university codes and regulations
- Involving human subjects requires IRB approval and thus advanced planning - need to balance privacy and information needs
- Transportation and access to the Rutgers Gardens and Ryders Lane farms - No safe/easy way to walk there

Interview Takeaways

What roles can living laboratories play on the Cook/Douglass campus?

- 1 The Cook/Douglass campus is a home to many students, and as such, has the opportunity to teach students in their everyday lives outside of class, and enhance their connection to campus.
- 2 Living labs can increase awareness of what is going on the Cook/Douglass campus for students, faculty, staff, and the outside community.
- 3 Linkages between departments and disciplines for the same living lab site serve to prepare students for working with others from different backgrounds in the real world.
- 4 Living labs can create a sense of ownership and stewardship towards the campus and the environment.
- 5 There is a significant opportunity to enhance existing living lab sites on Rutgers campuses, such as Rutgers Gardens and the Rutgers EcoPreserve.
- 6 Living laboratories represent a potential to change the current missing link between what we know (our faculty expertise) and what we do on campus.
- 7 Through living laboratories, the Cook/Douglass campus has the potential to serve as a model for the state of New Jersey and connect to its responsibility as the state's land-grant university.

How can you implement living labs on the Cook/Douglass campus?

- 8 The Cook/Douglass campus is already used as a living lab by many classes. However, it can be greatly improved for better functionality, more users, and a better student experience.
- 9 For living laboratories to be successful at Rutgers, a structure needs to be developed and methods of open communication between faculty, students, and Facilities needs to be established.
- 10 Facilities are responsible for maintaining the Cook/Douglass campus, and can make or break a living lab project. Thus, it is crucial to communicate with and involve Facilities at all steps in the living lab process.
- 11 Creating and enhancing living labs at Rutgers is stymied by labor, cost, maintenance, the lack of communication between those involved, and the current mindset of most members of the university.

The opportunities outweigh the challenges associated with living laboratories.

LIVING LABS ON CAMPUS

As detailed over the next several pages, numerous living laboratories in some form or another already exist at Rutgers University. I knew from firsthand experience of only a few classes that used campus as a teaching resources, so I was pleasantly surprised to discover that more is being done on campus than I initially expected. Still, ample opportunity exists to improve on these existing uses and add new ones. The subsequent living lab proposals have come out of my interviews and my own experiences on the Cook/Douglass campus. Suggestions on how to overcome some of the challenges with living laboratories and how to create a master framework for a living lab program on campus conclude the chapter.



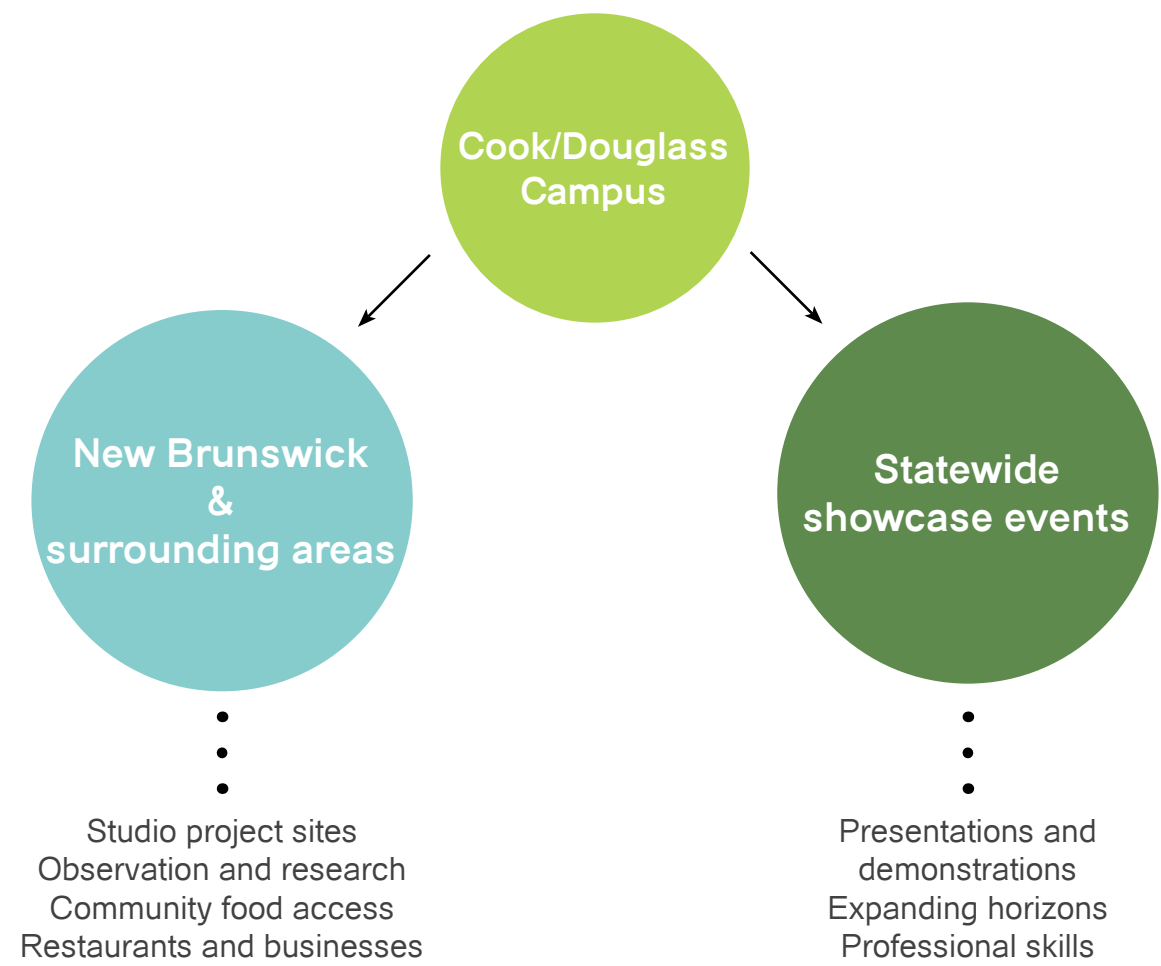
Pictures, clockwise from top right:

Studying accessibility challenges on campus
New Gibbons courtyard site visit
Shiloh Community Garden construction project
Arbor Day 2013 tree planting demonstration
Herbaceous Plants class at Rutgers Gardens
Retaining wall project on Passion Puddle

All photos by the author.

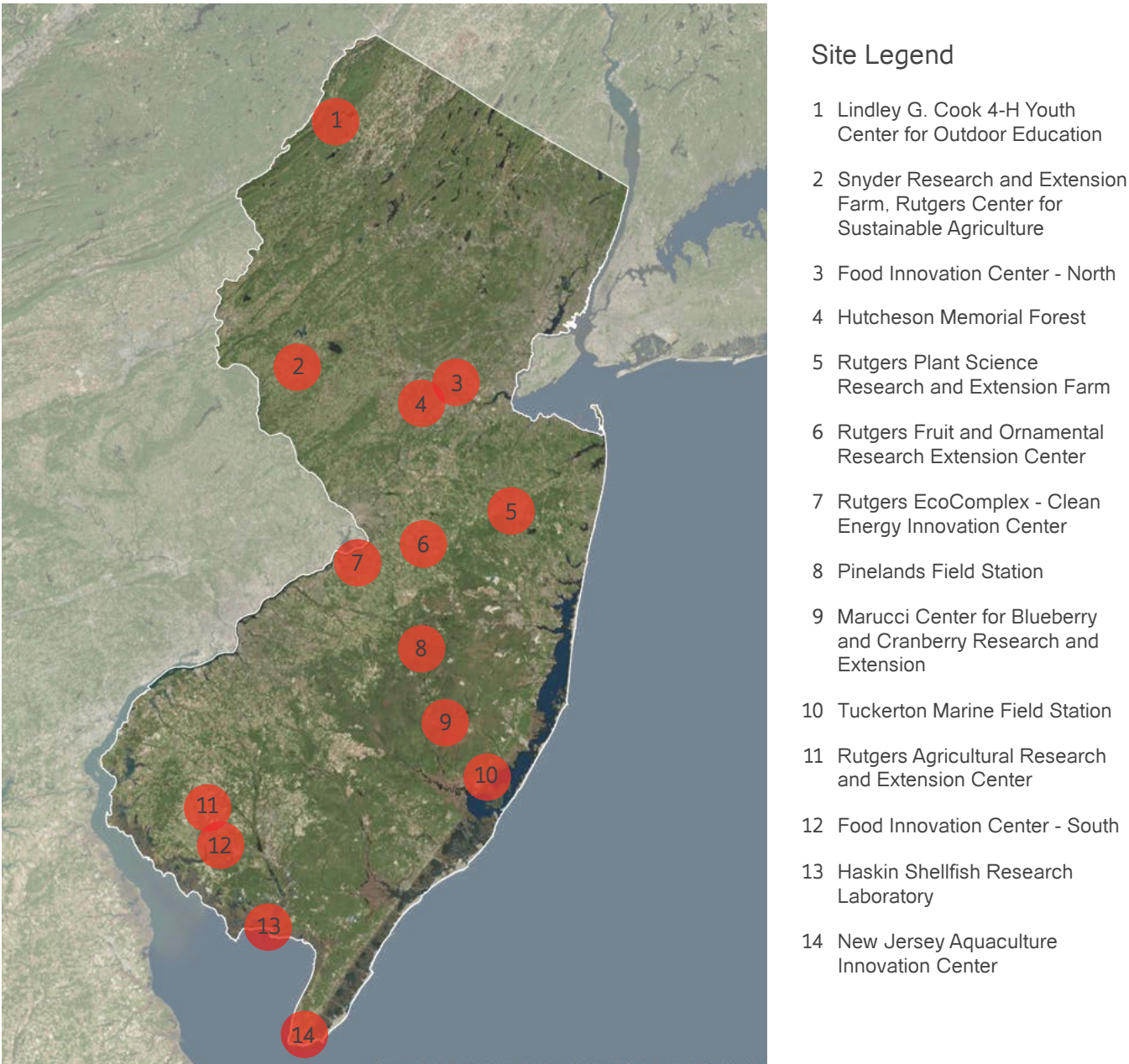
EXISTING LIVING LABORATORIES

Key Non-Rutgers-Affiliated Off-Campus Living Labs



On a larger scale, a few off-campus sites not affiliated with Rutgers are used for teaching. The city of New Brunswick, for example, is used for some projects at the Bloustein School and Planning and Public Policy, and for Extension Office projects through the New Jersey Agricultural Experiment Station. The Department of Human Ecology faculty and students in the Environmental Policy, Institutions and Behavior major are working with the New Brunswick community on food access issues. Nutritional Sciences also uses restaurants in the city. Numerous showcase events around the state are used as living laboratories for some departments, including Animal Science.

Key Rutgers-Affiliated Off-Campus Living Labs



Several sites affiliated with Rutgers, but not a part of campus, are frequently used as living laboratories. These include the Hutchinson Memorial Forest (typically classes in the Department of Ecology, Evolution, and Natural Resources and also used for research), Rutgers Field Stations (used by their various associated departments), and NJAES Off-Campus Stations throughout New Jersey (used by Extension Offices).

Key Existing Living Labs on the Cook/Douglass Campus



Specific Locations on Campus:

- 1 Chrysler Herbarium
- 2 Raritan River
- 3 Rutgers Dining Facilities
- 4 Floriculture Greenhouses
- 5 Passion Puddle
- 6 Behind Blake Hall
- 7 Nichol Avenue
- 8 New Brunswick Community Farmers Market
- 9 Institute for Food, Nutrition, and Health (under construction; opening Fall 2015)
- 10 Cook Organic Garden
- 11 Cook Farm
- 12 Rutgers Gardens and Helyar Woods
- 13 Ryders Lane Farms
- 14 Hort Farms and Student Sustainable Farm

Throughout Campus:

- Plants on campus
- Campus-wide sampling
- Species identification (BioBlitz)
- Parking lots (weed studies)
- Areas in need of green infrastructure interventions

Jason Grabosky's Main Class Walks

Not Pictured (all on Livingston Campus):

- Rutgers EcoPreserve
- Wildflower lots
- Solar farm and solar arrays

The Cook/Douglass campus is currently used by several professors as a teaching tool. A notable example is Jason Grabosky, who has several scripted campus walks he takes his classes on around campus. A few of his main pathways are shown in the map to the left. Considering the amount of classes that take place on campus, however, **the campus is highly underutilized.**

A few professors on Cook/Douglass also use locations on the Livingston campus as living labs, notably the Rutgers EcoPreserve, wildflower lots, and Rutgers Solar Farm and solar arrays (as these are on a different campus, they are not pictured on the Cook/Douglass map).

More information and photographs of some of the key existing living laboratories on campus can be found over the next few pages.

What is Happening on Campus

The following information about what and how existing living laboratories on campus are being used comes from my interviews and from personal experience of my time as a student at Rutgers.

Rutgers Gardens and Helyar Woods

Many classes use Rutgers Gardens and Helyar Woods, but it is hard to know all that goes on there. Plant and plant identification classes are frequent users. Other classes include Ornithology, Environmental Education, Air Photo Interpretation, Intro to Environmental Design, and Material Tectonics. Some research is also done at the Gardens and Helyar Woods. However, lack of awareness and lack of easy transportation to the Gardens limit its full potential as a living laboratory.

Rutgers EcoPreserve and Natural Teaching Area

The EcoPreserve is heavily used by Principles of Natural Resource Management. The preserve offers a variety of habitats for experiments and hands-on learning, as well as opportunities for management and restoration projects. It is also used for GPS training, Numerous other classes, student groups and clubs, and Rutgers Outdoor Recreation utilize the preserve as well.

Raritan River

Several classes currently use the Raritan River. Parasite Ecology collects samples out on the river, and if funding is available, a Bryne seminar on NJ and NY Waterways will go out on a boat and also collect data. The Human Interactions with the Coastal Ocean course uses the Raritan as well. There are also student internships with organizations and agencies in the Raritan River basin through the Raritan Scholars course.

Campus Buildings

The Rutgers Center for Green Building researches occupant behavior and habits versus adaptive responses at the Bloustein school. One way they do this is through occupant counters on the doors of the Bloustein building. In addition, Jie Gong in Civil Engineering is testing algorithms at various Rutgers Buildings for the assessment of building safety using LiDAR. Mike Muller in Mechanical Engineering is using campus as a teaching lab to study energy use in buildings.

Rutgers Dining Facilities

On the Cook/Douglass campus, Rutgers Dining Facilities have a partnership with the Nutritional Sciences Department. Their facilities are used for the Quality Food Production course and a Bryne Seminar. Various student groups and classes also tour the Dining facilities and talk to Dining staff.

The Institute for Food, Nutrition, and Health

The Institute for Food, Nutrition, and Health is currently in its last phases of construction. Once the building is complete, it will serve as a living laboratory in several ways. The Healthy Eating Courtyard is meant to teach healthy eating habits and will be the site of some experiments in which certain aspects of the courtyard will be adjusted to see how students react. IFNH will also feature a living EcoWall in the building, open concept labs, and open office space. It also serves as an example of a LEED Silver building.

The Farms: Cook and Ryders Lane

The farm on Cook Campus is deeply tied with the Animal Science program. Each animal on the farm has an associated practicum. The farm is also used for the Animal Nutrition lab, Comparative Anatomy, Production Animal Management, Farm Management, and Animal Fitting and Showing. Many more courses use the farm for a class or two. For example, some biology and ecology classes use the farm for a few labs, and Environmental Microbiology uses the fistulated cow's rumen. There is also a teaching herd of horses on campus (the Rutgers University Teaching Herd, or RUTH) that include a few foster horses. The Equine Exercise Physiology Lab is a huge learning experience for students with its full working horse skeleton model and horse treadmills. The Ryders Lane farms offer a unique opportunity for equine research, but like the Gardens, they also face challenges with visibility and access. A lot of research occurs on the farms, but the research animals are separated from the teaching animals to avoid disrupting research and transmitting disease. The farms on Ryders Lane are also home to the Rutgers Hort farms, with turfgrass research (Hort Farm II) and the Student Sustainable Farm (Hort Farm III).

Campus as a Whole

The Cook/Douglass campus is currently used by a plethora of classes. Several plant classes use the campus for plant identification. Some areas on campus are used for Landscape Architecture Construction classes or as sites for introductory studios. Campus is also used as a study site for Environmental Design Analysis and Social and Cultural Aspects of Design, as well as for field research by Mary Nucci's class. Field Ecology uses current campus conditions as clues to unearth the past history of campus. Jason Grabosky has 20 scripted campus walks he uses for teaching classes like Urban Forestry. While his walks are flexible and respond to the current conditions of campus, a few important spots include the gorge by the Douglass Library, the woods by Helyar House and woods by the farm. Chris Obropta uses areas on campus in need of green infrastructure interventions to discuss what green infrastructure could benefit the area and how it could work for his Bioenvironmental Engineering classes. The campus is also used by Geomatics and GIS classes, including Air Photo Interpretation. One class is even building a campus species list (the Flora of Rutgers Campus). Several classes also take samples on campus.

...And Many More

Several other places in and around campus are currently used as living laboratories. These include Passion Puddle, Nichol Avenue, the Chrystler Herbarium, the Floriculture Greenhouses, the Cook Organic Garden, and campus parking lots. Passion Puddle is used for sampling and sampling demonstrations, by Marine and Coastal Sciences, and the area is used for surveying and plant classes. The New Brunswick Community Farmer's Market and community gardens in New Brunswick are used by NJAES as teaching opportunities and living learning environments for food education and food access. Out on Livingston, the solar farm and solar arrays host tours and presentations for classes and other schools.

My Living Laboratory Experiences On Campus



Studio Project Sites:

- 1 Bettenbender Plaza
- 2 New Gibbons Courtyards
- 3 Rutgers Gardens and Helyar Woods

Construction Project & Teaching Sites:

- 4 Shiloh Community Garden
- 5 Floriculture Greenhouses
- 6 Behind Blake Hall
- 7 Passion Puddle

Other Project Locations:

- 3 Rutgers Gardens and Helyar Woods
- 8 Cook Student Center

Throughout Campus:

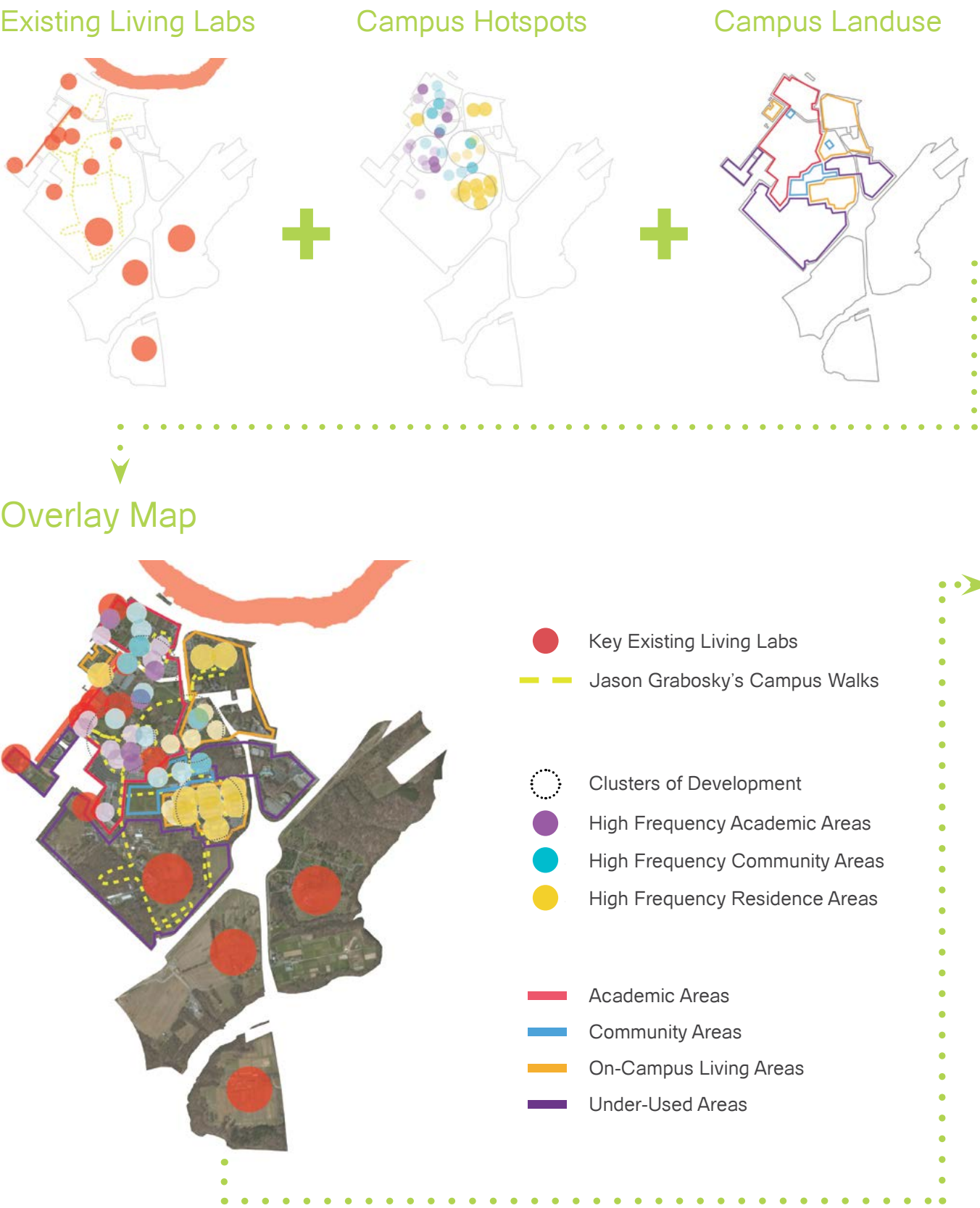
- Plants on campus
- Observations of campus users
- Campus accessibility
- George H. Cook Thesis research and proposal

- Jason Grabosky's Urban Forestry Walks
- Studio project path at Rutgers Gardens

As a landscape architecture student, I have been lucky enough to utilize the Cook/Douglass campus in many of my classes throughout my four years at Rutgers. Some examples include studio projects in Bettenbender Plaza (next to the Nicholas Music Center), in the New Gibbons courtyards, and at Rutgers Gardens. I have also heavily used Rutgers Gardens (highly used area in red) and plants around the main part of campus for plant identification and education classes. My construction classes have used several locations on campus for teaching and for project sites. These include Passion Puddle for learning surveying, grading, and retaining walls, behind Blake Hall for building projects, and the Floriculture Greenhouse and Shiloh Community Garden in New Brunswick as project locations. Jason Grabosky frequently used campus as a teaching resource for many Urban Forestry classes. Another one of my classes also heavily used campus as a tool to learn about accessibility and how people use space. Finally, I could not forget how I utilized the campus as a main resource for this thesis on living laboratories.

Things I learned on campus were easier to recall each time I passed where I learned. I enjoyed this method of reinforcing what I learned, as a lot of information has stuck over the years. I would love to see more people using the campus as a teaching tool, but even more so, I would love to see the use of campus expanded into a full-scale living lab and have more living laboratories on campus. The campus is currently used as a teaching resource, but it has the potential to be something greater. More students should be able to benefit from experiential learning and other opportunities presented by living labs like I have.

ANALYSIS



Campus Potential for Living Laboratories



For my analysis, I overlayed my key existing living laboratory map with the campus hotspots developed by Michelle Hartmann and Jessie Woods and with Michelle Hartmann's campus landuse map. Using this information, I developed a map that classifies the campus into different zones based on their potential to support living laboratories.

Much of the under-used edge has the potential to be developed into living labs. While not associated with any highly frequented area of campus, a few spots on the edge can serve as hotspots for teaching and research among multiple disciplines and majors. At the core of campus, there is also the potential for similar hotspot living laboratories. These correspond with current areas of high use on campus to serve a larger number of people. The remaining transition zone can include separate, smaller-scale living labs that connect with the larger network and offer specific learning opportunities.

Bridging Existing and Potential Living Laboratories



A significant step exists between using the campus as an isolated teaching resource and as a full-scale connected living laboratory. The majority of what currently exist on Cook/Douglass as living laboratories are more on the teaching resource side of the living lab spectrum. However, there is the potential to enhance uses of existing living labs on campus, utilize more spaces on campus, and create new opportunities to fully exercise the potential of the campus.

In order for this transition to occur, multiple challenges will need to be addressed. A transition strategy can help effectively mediate this process. First and foremost, interest for improving and creating new living laboratories needs to be created. Through my many interviews, I have begun to generate some interest, but it is up to others to continue the push. By engaging members of the campus community, from students to faculty to staff, the conversation about living labs can continue and grow. It is extremely important to foster communication between everyone involved with living lab projects, whether existing or proposed, to help ensure their future management and success. A framework should be established to help with some of the aforementioned tasks and to help ensure the success of a living lab program. For any living lab to make a difference, students must be involved. This will require classes to be updated to incorporate more living laboratory opportunities. Other challenges will also need to be addressed during the transition.

Living Lab Typologies

Potential living laboratories for the Cook/Douglass campus can be separated into two categories: enhancing existing living labs and creating new living labs. The creation of new living laboratories can be further subdivided based on the scale and effort of building the living lab. These distinctions result in three typologies for potential living labs on campus:

Enhancing Existing: This typology contains all improvements to existing living laboratories. Improvements include physical enhancements, better connecting existing services and areas to curriculum, and creating more awareness of living labs on campus. Enhancing existing living labs can help gain initial traction and support for the creation of new living labs on campus.

Simple Interventions: This typology concerns the creation of new smaller scale living labs on campus. They are less costly and require less time to be established. As such, they are easier to implement. Simple living labs are the best option for pilot projects of new living labs. They can work out what the best method to create new living labs on campus is with less risk than larger projects because of their smaller sites and shorter time frames. Simple interventions can help gain traction and support for more living labs on campus. This typology can start changing the conversation of how people see campus to open up avenues to larger interventions.

Grand Gestures: Large scale and long-term living laboratories are included in the last typology. They are more intensive, more costly, and more risky, making them more difficult to implement, especially early on in transforming the campus into a fully-connected living lab. Grand gestures should not be one of the first new living lab projects. Because they are so intensive, they will be most successful once a living lab program is supported.

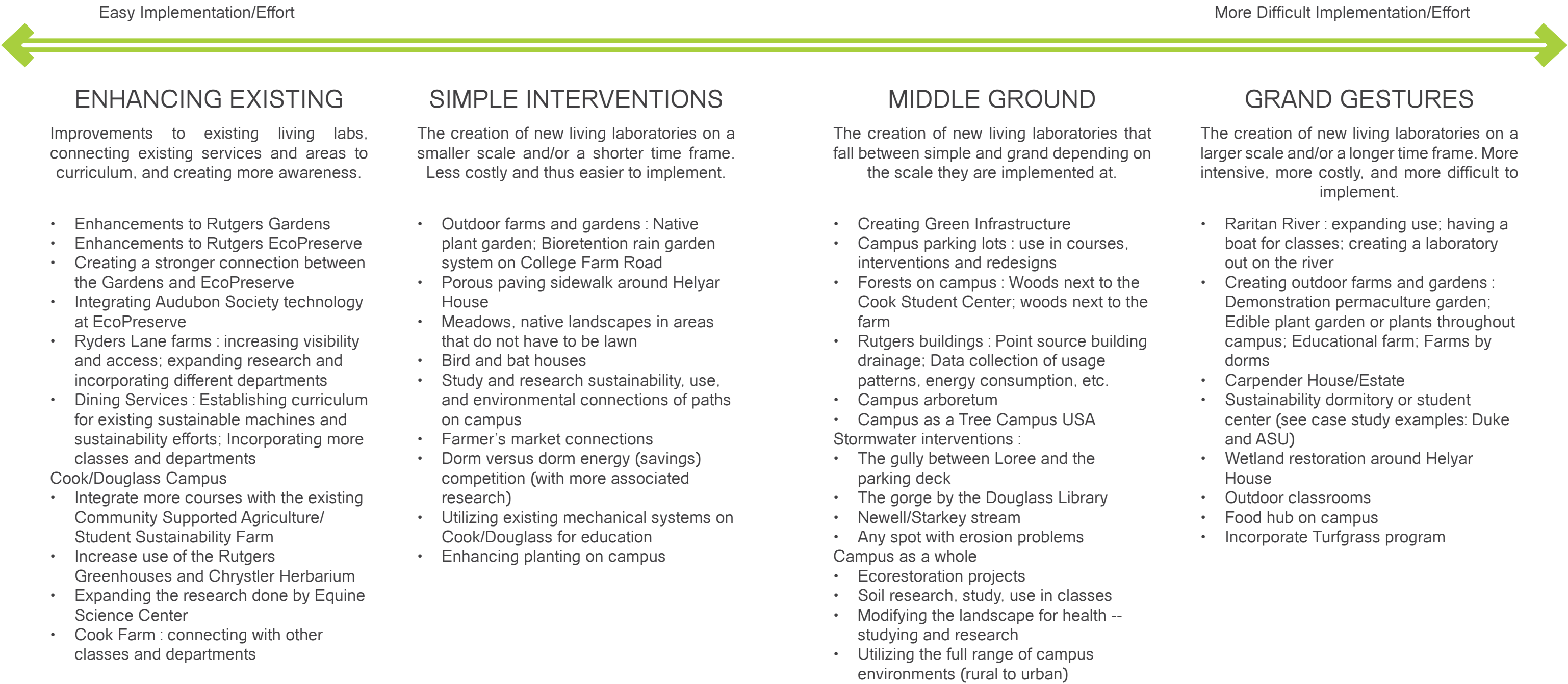
Living Lab Sizes

Living laboratory sites can vary in size, from a garden on campus to a building to the campus-wide landscape. Generally speaking, living labs come in two size categories:

Nodes: A node is a single spot, area, or stop. They are of a smaller size and may be used by only a few classes. They are more likely to be Simple Interventions. An example is behind Blake Hall.

Hotspots: A hotspot is a main area that can be used by many classes where many objectives intersect and overlap. As hotspots will involve many players, they are more likely to be Grand Gestures. An example is Passion Puddle.

POTENTIAL LIVING LABORATORIES



ACROSS ALL CATEGORIES:

- Passion Puddle
- Signage for living laboratories
- Incorporating more departments and programs into living labs across campus

The above proposals are from my interviews and based on the research I have conducted throughout the year of working on my thesis. **They should not be taken as the final or the only ideas for living labs on campus.** Future George H. Cook Scholars, students, faculty, Facilities, and other members of the Rutgers community are encouraged to further develop the pieces of this Master Plan as part of independent projects, class projects, or other work.

Potential Living Labs on the Cook/Douglass Campus



Enhancing Existing:

- 1 Chrystler Herbarium
- 2 Raritan River
- 3 Rutgers Dining Facilities
- 4 Rutgers Greenhouses
- 5 Passion Puddle
- 6 Behind Blake Hall
- 7 Cook Organic Garden
- 8 Rutgers Gardens
- 9 Ryders Lane Farms
- 10 Student Sustainable Farm



New Living Labs:

- 11 Carpender Estate
- Stormwater improvement projects:
- 12 Douglass stream
- 13 Loree stream
- 14 Helyar House
- Forests on campus:
- 15 Woods next to the Cook Student Center
- 16 Woods next to the farm



Potential Hotspots:

- 2 Raritan River
- 13 Loree stream
- 11 Carpender Estate
- 5 Passion Puddle

Throughout Campus:

- Campus parking lots
- Green infrastructure projects
- Path systems
- Rutgers Buildings
- Meadows and native landscapes
- Campus as an arboretum

This map shows some potential locations of living laboratories on the Cook/Douglass campus. Existing living labs are shown in red. Potential living labs are shown in blue. These locations reflect some of the ideas from my research and interviews. The white line shows the beginning of a possible network connecting some of the living labs across campus.

A large percentage of campus has the potential to be utilized as a living laboratory. Living laboratories in the **campus core** correspond with some of the campus hotspots identified by Michelle Hartmann and Jessie Woods. These labs are visible to more people, but can be disturbed by more people. Labs in the core may face more pressure to conform to the traditional appearance of campus. There is also opportunity for living laboratories on the **edges of campus**. They have more freedom in their appearance and can utilize currently unutilized campus space. However, they may be more difficult to access. For example, locations south of Route 1 may be difficult for many students to get to and require further solutions.

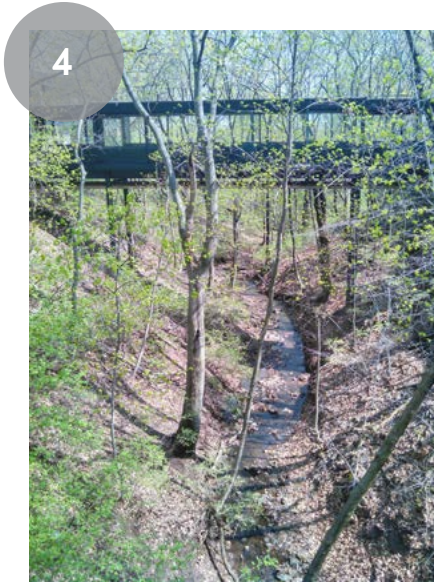
This map represents a starting point for further development of a Master Plan for living laboratories on campus. Over the summer of 2015, I am continuing my work with living labs and hope to develop a more detailed map of potential locations on campus. A more detailed map can serve as the stepping stone for others to develop more specific living laboratory projects of their own.

Locations for Living Laboratories

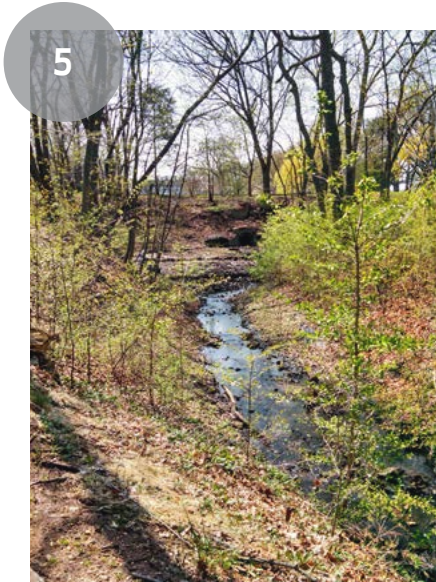


These photos show the current conditions of some existing living laboratory and potential living laboratory locations on the Cook/ Douglass campus. Once again, these should not be taken as the only locations for living laboratories on campus, but as a snapshot of the variety of locations that can be utilized for living laboratories.

All photographs by the author.



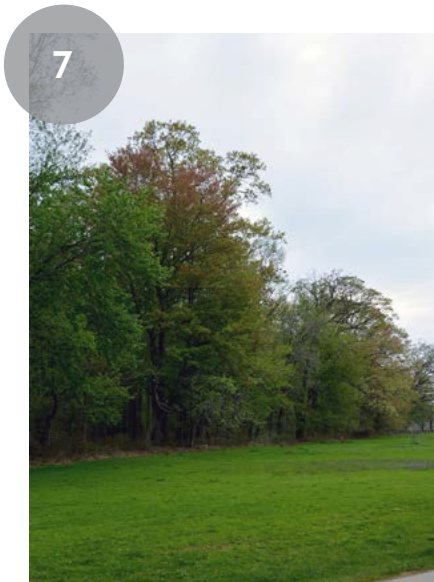
DOUGLASS STREAM CHANNEL



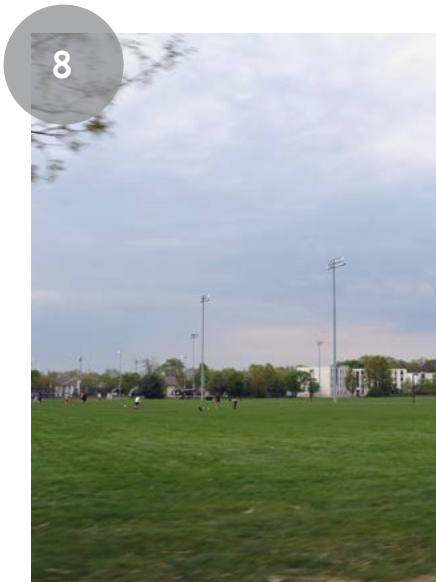
LOREE STREAM CHANNEL



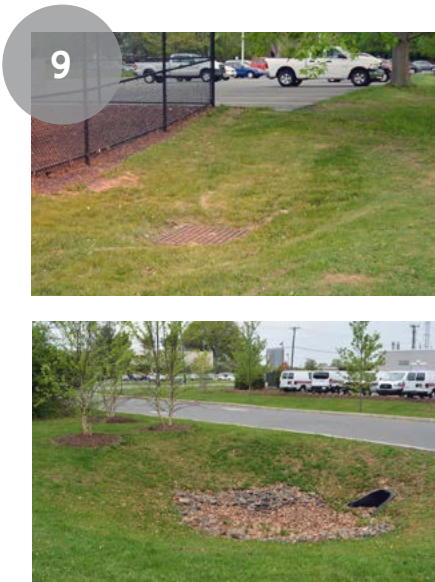
HELYAR HOUSE



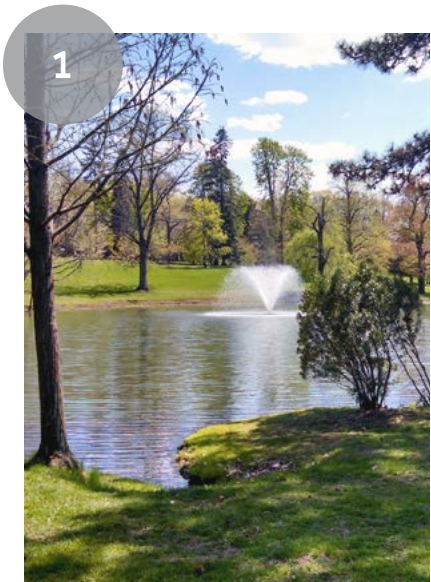
WOODS NEXT TO THE FARM



SKELLEY FIELD



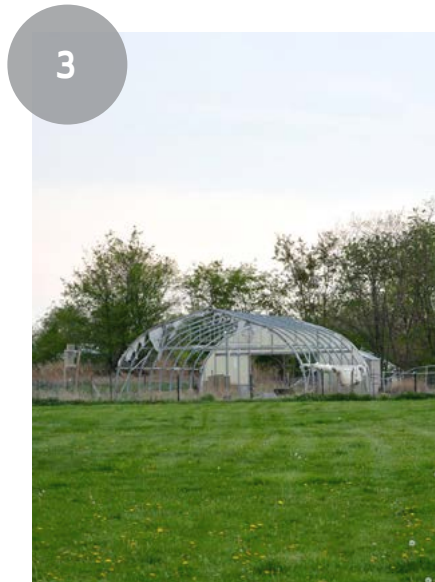
DRAINAGE AREAS



PASSION PUDDLE



COOK FARM



COOK ORGANIC GARDEN

The next set of pages outline in more detail two proposed living laboratories. Information and ideas in the proposals are based on my research, interviews, and personal experience.

Campus as an Arboretum

BACKGROUND AND CURRENT USES

As a whole, the campus is currently used for identification for many plant classes. Because of the large variety of plants, campus is also used for an arborist test. Very few plants on campus aside from those at Rutgers Gardens are labeled. The few exceptions on the main part of campus are some plants in the garden outside of Foran Hall and one old White pine tree outside of the Regina B. Heldrich Science Building on Douglass Campus. There is a lack of many plants on campus that are being taught in classes that could enhance campus environment.

Several colleges around the country have an arboretum as part of their campus and can serve as case studies for transforming Cook/Douglass into an arboretum. Two examples are the Scott Arboretum and Swarthmore College and the Henry Schmieder Arboretum at Delaware Valley University.

PROPOSAL DETAILS

We already have a wide selection of trees on the Cook/Douglass campus, so we are not too far from turning the campus into an arboretum. Several additional species could be planted on campus to be used for classes. Most importantly, plants will need to be properly labeled. The label would include the common and scientific names of the plant, the plant's country of origin, and the plant's accession numbers with a dogtag label for backup. For the campus arboretum to be used both as a teaching resource and a testing location, the campus could implement selective labeling. Only one or a few of each plant species is labeled, so that the labeled plants could be used for teaching and the unlabeled ones for testing. This would require that there is a minimum of two of each species on campus. For existing and common species, this is not a problem, but this may be a challenge for rarer species and species added to the campus.

The campus arboretum could be connected to the existing Greenhouses and Chrysler Herbarium for a richer plant experience. Mapping and online resources could be added and a monitoring program could be implemented to support the arboretum. Aside from plant classes, several other groups would be able to use the arboretum as a living lab. For example, microbiology and entomology could study the difference in communities under different trees. A department could be established to take care of the plants that could offer credit, internship, or work opportunities for those students involved in caring for the arboretum.

Calling the campus an arboretum could help change how campus is viewed by the community and inspire a greater sense of campus stewardship. Through the process of becoming an arboretum, the Cook/Douglass campus could also become a Tree Campus USA.

SITE CHALLENGES

- The site is the entire campus, meaning it is a large location with a variety of microclimates and a larger area to manage
- Potential for vandalism and stealing of tags
- Maintenance of plants (could be incorporated into a class or internship), especially over the summer
- Lack of Facilities staff, resources, and staff knowledge in caring for plants
- Current mindset of the campus community could stymie action towards an arboretum
- Will a campus arboretum have a negative effect on Rutgers Gardens?

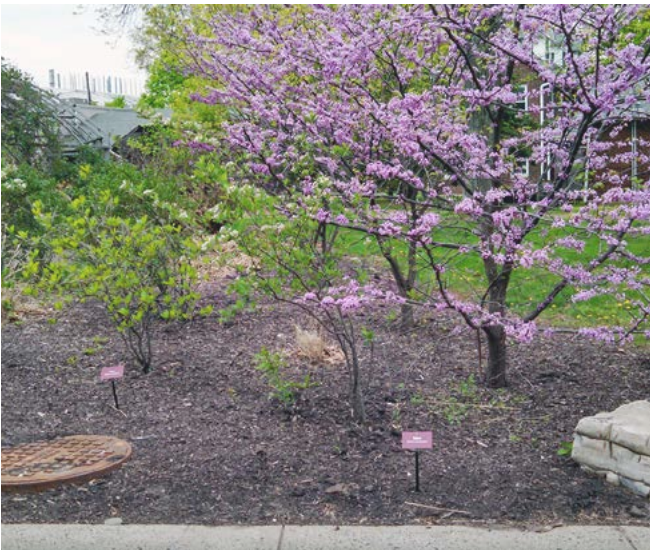
CURRENT EFFORTS

Despite the high interest for transforming the Cook/Douglass campus into an arboretum, there is currently no concentrated effort to do so. For a research project, an undergraduate student is mapping trees on all Rutgers New Brunswick campuses, taking pictures and geolocating the trees to eventually put the information onto a website. This information could provide a starting point for making the campus into an arboretum.

Transforming the campus into an arboretum would be relatively cheap to implement and already has some support. While there would be some challenges to resolve with maintenance, it will definitely be highly utilized by many classes and organizations, and could positively change how people view the campus.



Labeled White Pine on Douglass Campus.



Labeled garden outside of Foran Hall.

Carpender Estate

BACKGROUND AND CURRENT USES

Construction of the Carpender House was started by Sydney Carpender in 1911 and finished in 1913. The house was purchased by Rutgers University in 1965 and is now the Rutgers University Inn and Conference Center. Two students - Eliot Nagele and George Brnilovich III - are currently working on plans to redesign the space around the Estate. Eliot is working on a Master Plan for the approximately 20-acre site, while George is focusing on the Arbor Trail through the site. More information about the Carpender Estate can be found in George Brnilovich III's thesis.

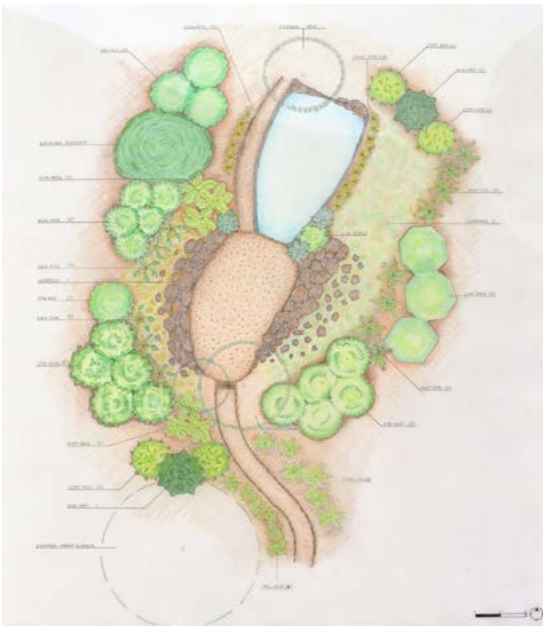
PROPOSAL DETAILS

George Brnilovich III is proposing a redesign of the Arbor Trail along with a Master Planting Plan for the site. His design addresses the two pools and retaining wall area along the trail. He plans for his design to provide education opportunities for Landscape Architecture, Landscape Industry, Ecology, and Art. One way is through design-build studio opportunities. There is also the potential for "rot plots" along the trail - spots where dead trees are allowed to stay to teach the ecology of decay - but there are concerns with safety and liability. He hopes the site can be fully utilized as a living laboratory.

Eliot Nagele is developing a Master Plan for the Carpender Estate. Like George, he also sees the area as a potential living lab with opportunities for active learning. Some examples are ecology and meadow research, construction projects, and species identification.



Trailhead and small pool planting plan. By George Brnilovich III, 2015.



Large pool and gathering area planting plan. By George Brnilovich III, 2015.

SITE CHALLENGES

- Awareness of the Carpender Estate and Arbor Trail
- Deer management
 - This could possibly be addressed by fencing or other methods
- Potential lack of maintenance
 - The site had been restored before but efforts fell through because of no maintenance for the project
 - The Inn has to contract out to Rutgers for maintenance because they are not a part of Rutgers Ground's jurisdiction

CURRENT EFFORTS

George, Eliot, the Inn, a few classes, and a few student organizations have been working on clearing trails and making new trails on the site. Eliot has been working with a Landscape Architecture graduate student to make signage for the site. Signage in key places will inform the campus community of the Trail and that you are allowed to walk the grounds of the Inn and use the trail.

For Rutgers Day in April 2015, the Inn had an open house, with tours of the Inn and former Carpender Estate, as well as tours of the Arbor Trail. Signage was put up around the area to inform people about the open house and the existence of the trail.

In order to keep his project moving forward, Eliot is forming an Advisory Committee for his Master Plan. The Committee would meet once a year to twice a semester to work towards implementing his plan. The Advisory Committee would also work with a Student Committee composed of different departments and clubs to help mobilize the student body for events for the Inn and create awareness of the project.



Arbor Trail Sign at Trailhead. Photo by author, 2015.

ESTABLISHING A LIVING LABORATORY FRAMEWORK

Establishing a framework is crucial to the success of a living laboratory program. All of the schools from my case studies had some sort of a framework that ties into living labs. The Lawrenceville School's living labs are connected to their Green Campus Initiative. Arizona State University has a Campus Living Laboratory Network. The remaining three case study schools have living lab frameworks that are connected to overall campus sustainability: Duke University has Sustainable Duke; Portland State University has a Living Lab Project Team that works out of their Sustainability offices; and finally, the University of Minnesota has the *It All Adds Up* sustainability campaign. In order for living labs to be successful here on the Cook/Douglass campus, we must also take steps to implement a framework.

Potential Frameworks for Cook/Douglass

There are several possibilities for establishing a framework for living labs on campus. Like ASU, we could have a program that is directly geared towards living labs. At the outset, this may be difficult to get Rutgers administration to see as a worthwhile initiative. However, like the majority of the schools from my case studies, we could have a strong sustainability program that is deeply connected with living laboratories. Currently, Rutgers has a Committee on Sustainability, but it is not very well known and their website is very outdated. While the Committee has had success in making Rutgers more sustainable in what it purchases and better at conserving energy, there is huge potential to connect this committee with living laboratories. It will mean more work for them, but a separate team can be formed within the Committee whose sole focus is on living laboratories. This is similar to Portland State University's Living Lab Project Team that works out of PSU's Sustainability offices, which shows that such a framework can have much success.

Small Steps for Critical Connections

Regardless of the overall framework that is established for living laboratories on Cook/Douglass, **there is the critical issue of better integrating living labs with students and faculty on campus.** This is a crucial connection that cannot be overlooked. Several ideas were presented in my interviews that offer ways to form and strengthen these connections. Taken individually, all of these represent relatively small, though not necessarily easy, steps to implementing a successful framework on campus. Taken as a whole, they are a starting point for transforming the campus into a full-scale, fully-utilized living laboratory.

Connect with Internships

A few challenges with living laboratories are how they will be built and who will manage them over time. One potential solution is to connect living labs with internships. The interns can help build a living laboratory and future interns can help manage and maintain the project.

Connect with the Sustainability Minor and Sustainability Classes

This is an excellent way to connect students and faculty to living laboratories, especially with living labs that address sustainability and if a living lab framework for Rutgers is built out of the Sustainability Committee. Sustainability classes could be involved with living labs each semester, through which students will get real-world experiences in sustainability issues and potential solutions.

Connecting to Rutgers Policies

Living labs can become integrated with Rutgers Policies for energy, water, waste, and several others. This can help make living labs become important to the university, not just for student education, but to help achieve policy goals and develop innovative solutions for challenges faced by the university.

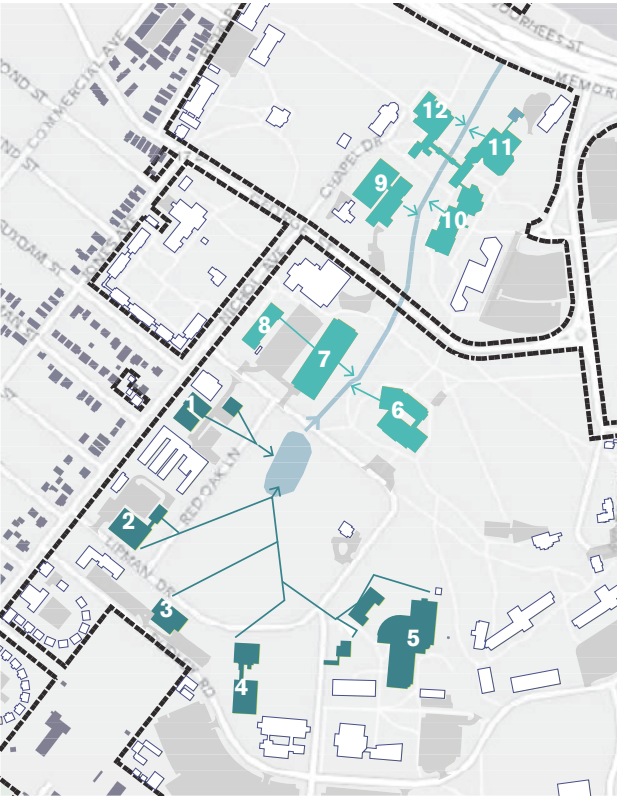
A Class for Campus

One of the more interesting ideas from my interviews came from David Ehrenfeld. He suggested the possibility of having a 1-credit class for freshmen in SEBS that would teach them about the Cook/Douglass campus. This would be a great way to show students all of the opportunities available on campus, as well as any living labs on campus. Logistically, it would be extremely difficult to do a tour of campus with all freshmen at once, so students could be broken into sections. Each section would have a different time for a tour of campus led by a different faculty member. The remainder of the class could be a mix of self-guided tours of campus and online research into the Cook/Douglass campus and living labs.

Larger Living Laboratory Connections

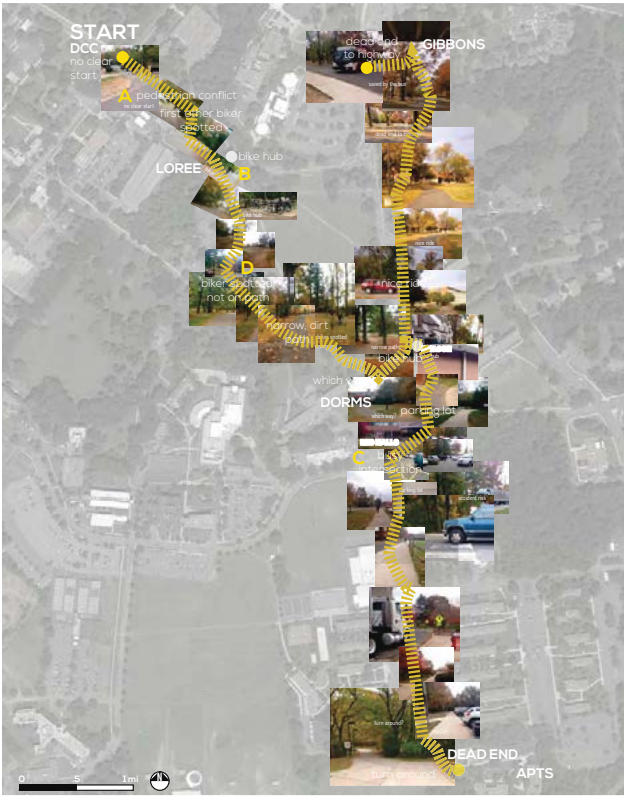
As mentioned in one of the key takeaways from my research and case studies, living laboratories can be more successful if they are connected with other objectives on campus. A few of these larger objectives include stormwater management, resiliency, and sustainability.

The theses of Rebecca Cook and Jessie Woods have begun to analysis current campus sustainability in terms of stormwater and transportation. The findings and proposals presented in their theses can be integrated with future living laboratory proposals.



A detailed look of the underground pipes and general drainage of the campus core. Information on the current conditions and methods of managing stormwater on campus can be used in the creation of living lab stormwater projects.

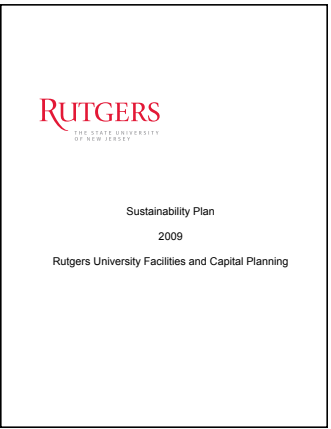
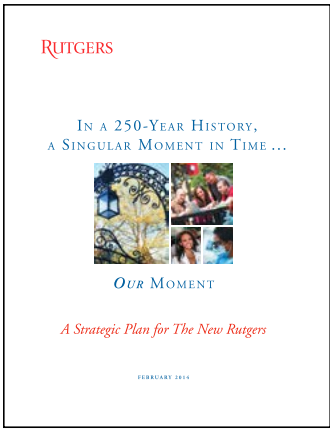
Map by Rebecca Cook. From *Designing with Water: Stormwater Management on Cook/Douglass*. April 2014.



Experiential mapping of a bike route on campus. Information on the current methods of transportation on campus and their associated challenges can be used to inform living lab projects that address or incorporate transportation issues.

Map by Jessie Woods. From *Sustainable Transportation Strategies and their Applications in University Design*. April 2014.

Another takeaway from my research and case studies was the importance to work with and augment existing systems. Living laboratories on the Cook/Douglass campus should seek to work with what is already in place or what is being planned. Some current documents that should be acknowledged in living lab proposals include the Rutgers Strategic Master Plan, the Facilities Sustainability Plan, and, as a reference document, the Busch and Livingston Landscape and Stormwater Master Plan. Cook and Douglass are currently in the planning process for their own landscape and stormwater master plan, and the Rutgers Physical Master Plan should be released in by the summer of 2015. Both documents should also be acknowledged once they are complete. In sum, any and all resources should be looked into when planning a living laboratory project.



Living Labs and University Goals

As outlined in the University's Strategic Plan, Rutgers has four strategic priorities moving forward:

- Envisioning tomorrow's university
- Building faculty excellence
- Transforming the student experience
- Enhancing public prominence

The experiential learning offered by living laboratories represents a way to help transform the student experience. Through opportunities for faculty research, they can also help promote more excellent faculty. Living labs can also increase awareness of what is going on the Cook/Douglass campus for students, faculty, staff, and the outside community, and thus increase its public prominence. The Cook/Douglass campus has the potential to serve as a model for the state of New Jersey and connect to its responsibility as the state's land-grant university through living laboratories - an excellent way to become a truly great university, both for Rutgers itself and in the eyes of the public.

CONCLUSIONS

Revisiting the Key Questions

What roles can living laboratories play on college campuses?

Living laboratories can play a huge role on college campuses, enhancing sustainability and providing more opportunities for education and research. Students can become more connected to their campus through living labs and develop a greater sense of campus stewardship that carries on to their professional careers.

How can you implement living labs on college campuses?

While there are many challenges to implement living laboratories on the Cook/Douglass campus, they are outweighed by the plethora of opportunities. Working to enhance existing systems and creating a framework are two key pieces to successfully implementing living labs on campus. Living laboratories address several of Rutgers's goals presented in their Strategic Plan and provide the chance to better the University and its student experience.

Implications of Research

The creation of living laboratories on the Cook/Douglass Campus has the potential to greatly enhance the campus. They can serve as a place to bring faculty and students together in an engaging way and create new opportunities for research. Living labs can add to the unique character of the Cook/Douglass Campus and set precedents for other campus at Rutgers. Additionally they can serve as examples of sustainability on campus. With the recent success of the *Our Rutgers, Our Future Campaign*, the university has millions to put toward students and learning, campuses and facilities. Living labs define that intersection between students and campus. The potential for living laboratories has never been greater, but the ball needs to get rolling. My research can provide the University with valuable analysis into living labs and their application for the Cook/Douglass Campus. This research has a huge opportunity to help improve campus for all.

On a larger scale, ecodistricts of sustainability, such as college campuses, can serve as gateways for making their surrounding communities and cities more sustainable (Beaudoin, Developing, 2013). In the case of Rutgers University, starting living labs on one campus to engage sustainability opens up pathways for similar efforts to be made on other campuses and continue into New Brunswick and Piscataway. While far in the future, such changes can enhance the surrounding communities and attract more people and funding to Rutgers and New Brunswick.

Future Steps

Starting out, my hope was that my thesis would be the beginning of discussion about living laboratories on the Cook/Douglass campus. However, as I've worked on my thesis, it has grown into a much more than I ever thought it would be. Over the summer of 2015, I will continue to work on the bigger project it has developed into, creating more detailed ideas and locations for potential living laboratories, setting up group meetings, and working to implement some of the ideas presented in this thesis. As part of this work, I will be creating a website with information from this thesis to inform more people about all the teaching currently utilizing campus and all the possibilities for living labs. The website will also serve as a portal for communication about future living lab projects and promote collaboration between different groups at Rutgers.

The ideas presented in my thesis and the eventual website should not be taken as the final or the only ideas for living labs on campus. Future George H. Cook Scholars, students, faculty, Facilities, and other members of the Rutgers community are encouraged to further develop the pieces of this Master Plan as part of independent projects, class projects, or other work

Lessons Learned

My thesis was not much of a traditional landscape architecture design thesis. Still, I have learned many things throughout this process that apply to landscape architecture:

First, I learned more about the inventory process and that there will always be more information available than you can get in a short time period. Numerous interviews helped to get the ideas starting and communication lines open, but there were only so many interviews I could do as one person over the course of two semesters. As such, there were a lot of people I was unable to speak to and a lot of potential information I was not able to get.

I also learned how to pool together a wide variety of ideas into a cohesive plan. None of my previous studio projects had this much information going into it, so it was a great learning experience to have to synthesis all of this information together to make the best plan possible.

Most importantly was learning how to work with a community (in this case the Cook/Douglass and Rutgers community) in order to better understand their needs, wants, and challenges. Through all of my interviews, I have learned the importance of having a conversation with people about their needs and ideas instead of just asking them a few generic questions. For this project, it helped me to customize a living laboratory plan for the Cook/Douglass campus, but this can be applied to all of my future projects as well.

And finally, it takes time to get any type of project or effort completed, but you need to start somewhere.

Final Conclusions

As a graduating senior, there is only so much that I can accomplish in beginning to establish a framework for living laboratories on the Cook/Douglass Campus. I hope to leave a small legacy with this report that can help fuel future efforts for living labs at Rutgers. I also hope the future website will serve as a way to generate interest in living laboratories for Cook/Douglass and the larger Rutgers campus. I hope I have encourage people to take the opportunity to improve their campus for the better and feel more connected to their university.

A view of Passion Puddle and Martin Hall from Lipman Drive. Photo by author.



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APPENDIX

A Interview Notes

Deans

- 1. Cynthia Daniels
- 2. Bob Goodman
- 3. Laura Lawson
- 4. Rick Ludescher

Professors and Directors

- 5. Henry John-Alder
- 6. Richard Alomar
- 7. Clinton Andrews
- 8. Clint Burgher
- 9. Bob Chant
- 10. Bruce Crawford
- 11. David Ehrenfeld
- 12. Peter Gillies
- 13. Jason Grabosky
- 14. Max Haggblom
- 15. Steve Handel
- 16. Jean Marie Hartman
- 17. Wolfram Hoefer and Laura Lawson
- 18. Rebecca Jordan
- 19. Larry Katz
- 20. Steve Kristoph
- 21. Rick Lathrop

- 22. Karyn Malinowski and Kenneth McKeever
- 23. Mary Nucci
- 24. Chris Obropta
- 25. Peggy Policastro
- 26. Jen Shukaitis
- 27. Lena Stuwe
- 28. Beth Ravit
- 29. Daniel Van Abs

Students

- 30. George Brnilovich
- 31. Eliot Nagele

University Services/Operations

- 32. Nicholas Emanuel
- 33. Michael Kornitas
- 34. Frank Wong
- 35. Rutgers Facilities
- 36. Rutgers Planning

Outside Rutgers

- 37. Fletcher Beaudoin
- 38. Sam Kosoff
- 39. Ari Novy

B Suggested Contacts

C Selected References

- Cook/Douglass Campus Background
- Cook/Douglass Users and Use Patterns

Cynthia Daniels

Professor, Department of Political Science; Associate Dean of Douglass Campus, Douglass Residential College

talk to the Douglass Residential College staff: they do more with hands-on student activities

Her role:
creating activities for students to engage with each other
educational + entertainment + intellectual stimulation
get students out of the classroom
film and speaker series
*helps to interact with others you normally wouldn't interact with

Cook vs Douglass Identities and creating living labs:
the two campuses have distinct and rich histories
**let them retain their independent identities
can still be collaboration and engagement between them
bring the political and activism of Douglass to Cook
social activism training
connecting with environmental and agricultural issues
bringing the farm to Douglass

Challenges for Douglass:
needed aesthetic enhancements
historical considerations

Bob Goodman

Executive Dean of Agriculture and Natural Resources; Executive Director of the New Jersey Agricultural Experiment Station

current uses of campus:
classes: surveying, Dendrology, Geomatics/GIS
passive: studying, class outside
research: at Heylar Woods, Hutcheson Memorial Forest
recreational uses
his vision: "the campus as landscape"
distinctive enhancements
Master Plan: all these things - demography
more connection to river
show what we do, purchase
demography of trees -- need to restore
incorporating microbiology, mycology, others besides horticulture
ignoring leading turf program
no pervious paving
missing link between what we know and what we do
could be a more sustainable campus
activism is needed, etc.
more communication between "silos"
surprisingly no trash left during big events (some level of care by community and visitors)
student government -- what could administration do to enhance campus?
issues with Facilities

Laura Lawson

Dean of Agricultural and Urban Programs

Her goal as a Dean:

open up agriculture to a larger concept of agriculture - how it shapes people's lives -not just farming

example Ag and Food Systems major has potential for more help with food systems, marketing, etc.

making ag more accessible through experiences on campus

already used by Landscape architecture classes for plant classes, trying to make a Green Lab

Avenues for experiences on campus:

Student Sustainability Farm (CSA) - Brad Hillman; Hort Farm III

the farm is getting by but it could be expanded into curriculum and potentially into the Rutgers Gardens

» Rutgers Gardens as a major learning lab in the future

shuttle that is part of new Master Plan will help get students to the Farm and Gardens

IFNH

issues with maintenance of the current landscape plan with Facilities (high slope of pollinator meadow)

opportunity for us to take responsibility for it instead, but we have to make sure we are committed to it

difficult for departments to take on such responsibilities, thus...

**crucial to develop a structure for Living Labs to work

whose office would this run out of?

a Sustainability team could be responsible for monitoring and maintenance, getting credits and/or pay

she would work with faculty to make sure that the labs would be incorporated into classes

Rutgers and sustainability: while Rutgers is becoming more sustainable with their purchasing, we have a long way to go for landscape sustainability

creating the window of opportunity between running campus like a business, getting things done versus education and experimentation

living labs can create a way to open the window

Other challenges with living labs:

***continuity - who will continue the project over time? how to sustain it over time?

» need for a deeper university commitment

labeling the campus as something -i.e. an arboretum, a living lab - could help have decision-making not be solely about maintenance

already have a lot of plants on campus, not too far from being an arboretum;

could add labels, mapping, online resources, monitoring

example: stream project by Newells and Starkeys

check in with the head professor each year to make sure they are still doing the

project or if not, that they have someone to continue it

University of Minnesota living lab review team model

interesting model that could help at Rutgers

start at smaller SEBS/campus level

need to consider how much we are going to make decisions based on maintenance

good to incorporate thoughts and considerations from Facilities, but should they have the power to veto a project based only on the fact it might be difficult?

Dean level for getting things done

Landscape Industry:

so many potentials for green technology to be incorporated on campus and to teach students

about it » opportunity for Facilities to hire students because of their training

not there yet because the program tends to be undervalued

living labs can help make it not just about maintenance, but much more

If unlimited budget:

create a car-free, walkable campus with a bike culture

bus from Highland Park (along Raritan Ave) to Cook or College Ave campus

fresh, good food available on campus with information about seasonality, etc.

fun at a farmers market, student energy!

strong sustainable farm and a culture around food issues

addressing cross-cultural diversity

limit stormwater to the Raritan

green roofs and other green infrastructure

issue challenges to Rutgers community to see if they can complete them

transform parking lots into amazing spaces

goats, sheep could be on Passion Puddle for mowing

currently, a gap exists between university research and implementation

we need a more open dialogue between theory and reality and willingness to experiment

Rick Ludescher

Dean of Academic Programs, Rutgers School of Environmental and Biological Sciences

Interview #1

MINING the possibilities/orthogonal ways to use the landscape in different ways: different approaches/categories of ways (arboretum/active intervention/completely social, social observation, etc.)

Definition: any academic use of the landscape; how do we extend that?

Narrow but deep tradition—plant library

Culture of attachment to the outdoors

Daily activity of campus is enhanced

SEBS 12 Departments list + Extension (NJAES: ARMA, etc.)

Student clubs, student poll through FB; start FB page for student ideas

Living Labs:

Outdoor growing (Plant Science, Ag & food systems, Landscape Architecture): UPD & Chair (same)

Rutgers Gardens, Farm (logistical issues & pedagogical): no bus, no safe way to walk there (not a classroom walk)

Transportation issue

Huge acreage and tremendous potential

Jason Grabosky: arboretum

Carpender Estate: open-ended potential—Ecology & Evolution (ecological management; streambed becomes lake & unofficial dump—Environmental Science---environmental analysis of it: take samples of it to determine, GIS: initial mapping & proposed; informal or formal laboratory

Process of turning it into a living lab & then what you do with a living lab

Environmental Analysis, remediation, ecol. Analysis, intervention, invasive species removal

UPD & Chair interview & then snowball from there

Experiential Learning

Microbiology

Biochemistry?

Institute of Coastal and Marine Sciences

Food Science: lab is thousands of students go to class to develop ice cream for Ag Field Day.

Why not for other events?

Dairy plant on campus (Davis, Wisconsin)

Nutritional Science: how do you modify the landscape to encourage walking more: to class, vertical circulation vs. ramps

Living Soil

Head of Department and UPD: joint meeting

Initial survey to gauge level of possible thinking

Oregon: campus & botanical garden; Evergreen College; David Orr's campus

Specific uses of a specific type (Jason's arboretum)

Passion Puddle (ICMS: practice space for instrumental methods)

Raritan River should be included: how do you get there? Rutgers bus? Public Safety stop on EE

Revamp boathouse for presentations

How to effectively use the site: synergies with boats & academics

Party Room/ Event Space: RU Foundation's Signature space (2nd floor to be built)

Oscar Schofield: planning proposal to turn Raritan River into teaching laboratory

COOL Lab is observation lab w gliders, CODAR (land based radar to monitor wind for coastal ocean-land interface to integrate engineering with marine science)

Ecological Preserve (Lathrop uses it as a laboratory: fold it into the academic curriculum~ on bus stop)

Whole Raritan basin is teaching lab: ecology & evolution, environmental sciences

Also history of New Brunswick; pollution of river

Farmer's markets: permanent farmers market, provide space & advertising—connect to marketing, plant science, influence on human behavior (Peter Gillies : IFNH as Living

Laboratory w restaurant

SEBS Bike program

Connection of students to experiences, viewpoints, knowledge: education per se everywhere.

Woman who ran café at Grinnell College in Iowa: approach to running café: her real job was to informally mentor and advisor for UGs—on a daily basis sent people to get assistance.

Tape it, asking for permission, to transcribe it; have conversation

Is there software to transcribe it: \$ for GHC or RDL

Keep journal to record things

Not just specific ideas that people have vs. how do we provoke people toward living laboratories

Kind of community activism (not in the administration)

Connect people to each other: organize group talking?

The more you can get them excited about the idea: light the fire

Dog Party! Go Dog Go PD Eastman

ASLA

NJASLA

Article about how to think about campuses: where do you write that for?

Case study—think about his: it could make your place better--

Analysis?

How you get to the ideas

This is not about environmentalism: effective use of outdoor resources (the underutilized outdoors)

Strategic plan & Master plan: those peoples' visions

Facilities

Interview #2

farm--connection and visibility

OUTPUT IDEAS

report: GHC version, summary version

*enabling structural and framework changes

overlaying to find HOTSPOTS
hotspots mean opportunity for maximum impact, more bang for your buck, easier to justify cost
enabling other projects--independent, connection with GHC and Honors College
help other campuses as well
the time for change is now!!

bike path through the gardens proposed, line of funding from DOT? (disturbed RU land when working on Route 1, so possibly funding bike path)
Redesign of College Ave
10 year or more process, quad feel
bridge to connect campus with the river, and the EcoPreserve with campus better
THINK IN THE LARGER SENSE

Report will be like a Master Plan
contain: concept/definitions, vision, summary of current conditions, connection to bigger Rutgers picture, analysis and proposals
SEBS-Bloustein-Raritan River Initiative
prove there could be value

If possible: what courses use the site? How many people in the course? how often does the course run? » to see how many students are/can be impacted
» helps with budget and financing
**Return on Mission* (instead of return on investment)
paying to maintain campus anyway
milking what we have
MINIMAL DOWNSIDES to living labs
facilitates, meeting points
offer suggestions on creating space & place -- where, what they look like
building NODES
tweaking, making the right changes
pieces of my Master Plan as future projects, studies, studios
the creation of a living lab is also a living lab in and of itself
how does this become a model for other campuses??
a WORKING LANDSCAPE
wired outdoor spaces? outdoor WiFi?
roofs, windbreaks, passive solar » extend the season of outdoor use! (since mostly here in colder weather)
bus stop with passive solar and classroom on back?
Typologies:
low key nodes » more elaborate & costly hotspots

Henry John-Alder
Department Chair; Ecology, Evolution and Natural Resources

Existing EENR out-of-classroom teaching sites:

- Dendrology: gardens, campus
- Plant diversity: ID across all campuses
- Natural resource management and a few other classes: Rutgers EcoPreserve
- Tuckerton Field Station
- Pinelands Field Station
- Field Ecology: Plainsboro Preserve and a lot of other (varying) places
- Parasite Ecology: Raritan River Watershed (collecting samples)
- Haskin Shellfish Research Laboratory

importance of hands-on learning, can't do everything online
Passion Puddle is a drain, lots of nasty stuff in there, just keep it ornamental (don't necessarily make it a living lab site)
enhance the campus's use as an arboretum (i.e. label things!)
invest into the existing--enhance Helyar woods, the EcoPreserve (signs and trails, etc.)
gully between Loree and the parking deck could use a redesign, currently a degraded stream channel with lots of opportunity
opportunity to engage with community (of New Brunswick)
-would require a cross-disciplinary effort
-opportunity to have people consider RU that weren't considering college at all?
-some engagement is happening now with food drives, farmers markets, etc. (a lot more than 10 years ago)
lots of things to do/fix/enhance/change.....where to start?

Richard Alomar

Professor; Landscape Architecture Department

RU Physical Master Plan - Sasaki Associates

Strategic overview, Facilities website » results from campus survey

want to highlight green space, livingston eco preserve and passion puddle

Living labs

VILLANOVA!!!

Mississippi University (wetland created)

Look at stormwater management plan for Bush and Livingston

Read Jan Gehl: How to Study Public Life (social aspect very important for spaces)

Use of landscape...

- Construction classes

- Nichol Ave -- important need for designers to experience the community of their site;

differences between mapping and maps, what's a line on a map may not be perceived as such on the ground

Project with Toby:

- small site scale stuff is Toby's, bigger picture scale is Alomar's

- the intersection of social space, management (i.e. transportation and stormwater), and

learning suggests a good area for intervention

- space as intervention (versus a just a thing as intervention)

State Universities....

- originally land grant universities, importance of agriculture

- Ag Experiment Station: conversation between theory and learning

- Co-op Extensions: info from experiments to public

- both part of a cyclical communication between ag station, co-op and public

Could campus function as an experiment station?

- what is the degree of possible control? most test plots very geometrical and controlled,

vs amount of control possible on campus

- time frame? both short term and long term possibilities (example: greenhouse used for

LA classes over the next several years)

If money was unlimited.....

- important to look at the big picture

- C/D is currently a hodgepodge of different things, so creating unity would be important

- currently, not similar enough to be cohesive, not different enough to be creative

The different players:

Facilities, the Deans/Administration, Departments and Faculty

currently little communication between everyone, i.e. Facilities changes something

overnight, no one knows why or that it was going to happen, etc.

- the need for a dialogue between everyone!

- consider a combination of things, linkages between departments for the same living

lab site (i.e. one department measures A, another department uses the data for B, another

department uses B for C and so on and so forth)

- also linkages to the RU and surrounding community!

Key of exploring and reading the landscape (like in times past) for learning

- oxygen levels in Passion puddle ex: ecology records the O levels, Mason Gross design sculptures that reflect the changing O levels, passersby at the bus stop wonder what they are, notice them changing, then find out and learn something

1994 Facilities Master Plan

- not much has been done from it, lack of communication and central power in a way

Problems with implementation

- lack of vision, power, funding

- doing a guerrilla move (just doing x without contacting y) can lead to problems

however, the power of people in a space/community can overcome bad design--that is why creating dialogue, informing people, getting people to use space is very important!

talk to Art, Jenny, Josh about events on Cook -- diagram from Nichol Ave studio

- only a few players involved in setting up most events, Facilities is one

Clinton Andrews

Professor and Associate Dean for Planning and New Initiatives, Bloustein School of Planning and Public Policy; Director, Rutgers Center for Green Building

Classes that use campus as a living lab:

Methods of Planning Analysis 2 Class

- required class for Master of City and Regional Planning
- component of the class is to gather data and make a place-based hypothesis
- have to appropriately design research to test hypothesis
 - people observations - times, frequencies, whom, etc. - how often should you visit, for how long, how do you know when you've gotten enough data?
 - photo scans and comparisons for vandalism, graffiti comparisons, etc.
- *uses the surrounding area (New Brunswick, Highland Park, even sometimes Edison), not just Rutgers property (students pick the place)
 - even done research on Rutgers buses

Studio Classes

- create a product for a client, sometimes this client is Rutgers (every 5-10 years)
- example: studio created a new vision for the College Ave campus, which connected to the design competition for the new Master Plan

Current living lab research:

Center for Green Building

- applied research, HUD, NSF, other foundations and state grants for funding
- research occupant behavior in buildings
 - » can inform building design (designers don't have this type of data)
 - » also useful for security, building managers, and other practical things
- habits versus adaptive responses
- Rutgers is a great living lab for this research
 - example: occupant counters on the doors of Bloustein
- a variety of research questions can be answered at Rutgers (you don't have to go elsewhere)
- not only gathering data to describe behavior but also researching ways to persuade and change behavior
 - examples: light switches at Bloustein; hidden vs inviting stairs for stair use
 - what are the limits? when to switch to structural interventions?
- lots of opportunities for quasi-experiments
 - i.e. compare stairway use between Bloustein and Mason Gross but would have to account for a variety of factors in users, class timing, etc.

Implementing the Strategic plan and living labs:

- need to invest in instrumentation
 - NSF grant at Bloustein for occupant counters; can also install instruments in buildings when they are being constructed

engage architects and Facilities

Currently active in the living lab movement:

- Dunbar Birnie: Material Science and Engineering; driving usage and solar energy
- Jie Gong: Civil engineering; assessment of building safety using LiDAR
 - quick way to model buildings, blocks, cities
 - testing algorithms using Rutgers buildings
- Mike Muller: Mechanical engineering; energy use in buildings
 - using campus as a teaching lab
- Center for Advanced Energy Systems

Committee for Sustainability

- still active at Rutgers, meets monthly, but has not updated their website
- current chairs: Kevin Lyons and Michael Kornitas (Facilities)
- working on increasing sustainability on campus: more green buildings, more events
- getting Rutgers involved in AASHE (Association for the Advancement of Sustainability in Higher Education) but a lot of metrics are involved in their sustainability program
- serves as a way for Rutgers faculty and Facilities to meet and interact

If unlimited budget:

- more buildings would be instrumented to understand more building conditions
 - » data posted to an open source portal
 - example: Penn State Navy Yard
- easy to do for new buildings or when installing new building systems
- develop a way for people to easily opt-in to have their movements tracked for a day (like an app for a smartphone)
 - » research usage patterns of space
- consolidate the campuses - they are too widely dispersed now, could have everyone in New Brunswick
 - would increase walkability
 - would need a very strong vision
- NJHEPS (NJ Higher Education Partnership for Sustainability) has had sessions on living labs

Challenges:

- involving human subjects requires IRB approval and thus advanced planning
 - need to balance privacy and information needs
- the quasi-experimental nature of some living lab research
 - requires more attention to research design
- political ramifications

Clint Burgher

Director, NJAES Animal Care Program; Research Farm Manager, Department of Animal Sciences

Teaching on the farm:

each animal associated with a practicum (sheep & goats, horses, cows)
~20 students in each practicum with 10 staff on farm, 7 assist with teaching

Animal Nutrition lab (~100 students)

Comparative Anatomy (~25 students)

Production animal and farm management classes (12-15 students)

currently class feeding pigs, weighing feed, calculate feed efficiency, rate of gain, compare male vs female, compare different feeds effect

Animal Evaluation class for NESA

Animal Fitting and Showing (Ag Day showing class, ~300 students total)

*lots of other classes use the farm for a class or 2 (above use it more consistently)

some Biology, Ecology classes use the farm for a few labs

fecal samples and parasites

fistulated cow (Dr. Jesse's rumen fluid; Microbiology)

Outreach component:

Junior Breeders (ages 10-18, ~200-250 kids): different programs with different animal

Farm tours: 5,000+ grade school kids, with some more in-depth tours for older kids

Animals:

Horses: currently there are 30, 3 used for Mounted Patrol

Mounted Patrol a form of education/experiential learning

recently started a teaching herd on campus

3 horses fostered - up for adoption through different agencies

farm increases public awareness and exposure of the foster animals

opportunity to bring in other breeds to Rutgers

Sheep: all teaching; lambing scheduled based on semester (so lambing will happen when students are here, instead of over winter break/summer)

Cattle: owned by University of Delaware; RU and UD have a joint herd with shared resources between Experiment Stations; primarily used for teaching

Importance of the farm:

Animal Science is the largest major at Cook

greatly enhanced because of the farm, would not be as successful without it

Challenges:

farm is open to the public

disease transmittance concerns

Rutgers Day concerns

Winter and the public: animals have indoor/outdoor access, many choose outdoor, but the general public doesn't know that so the farm gets calls about the animals being outside in the cold

**separating research and teaching animals (to avoid disrupting research, disease concerns)

Rutgers Farm and the larger picture:

would be open to incorporating other departments and classes

the more the merrier!

but paperwork might be needed depending on the use

coordinate with farm if coming into pastures, wanting to do experiments

communication is key! make sure that everyone knows what is going on,

things are coordinated

Roundhouse: used for teaching; Mason Gross filming project

some photography, filming, outreach, done at farm

other outreach: cow filmed by National Geographic on Passion Puddle

Summer course for vet students?

need experience with large animals » week long training program

not worth full cost of a summer course » \$400 for a week instead?

part of Continuing Education program? opportunity for them

workshops for public

Ryders Lane farm:

bioswale put in 5 or so years ago for research (runoff from farm, etc.)

active research on stormwater runoff fizzled out because of change in personnel

» reflects general issue with people moving on and lack of follow-up

» more success with living labs/similar projects if incorporated into a class

RCM budgeting

what the University is moving to; majors budgeted based on tuition money for their program

farm: SEBS + Experiment Station, but get money from being a part of SEBS

If unlimited budget:

new equipment

new facilities (barns, etc. from the 1930s, not designed for current purposes) » make

them more universal for future needs

would be willing to work with other classes for studies/help with new buildings

Other class connections:

Michael Westendorf's classes:

ideas for projects, example: labeling of Rutgers meat

got into selling campus meat because of a student project

Burgher went through securing all the necessary permissions

brings in additional money to the farm

*extending the budget while teaching students

Route 1/Ryders Bike path:

meeting about last Friday

how do you cross Ryders Lane?

tunnel or bridge seems inevitable but money concerns/needs funding

want to increase the number of classes at and exposure of the Gardens

working out the path through the farm (initial proposed path used by tractors, horses)

cow tunnel requires going through pastures

some funding is available

don't want to dead end path if something is done (dead end = won't be used)

Awareness of the farm:

don't know how to get the word out

150 acres of uses and potential

easier to stick with what you know (in terms of other classes using the farm)

visibility is a challenge

Bob Chant

Professor, Department of Marine and Coastal Sciences

He teaches two classes that use the Raritan River:

Byrne Seminar: NJ and NY Waterways

SEBS freshmen, use collected and available data to make a simple water quality model; when funding is available, go out on Raritan in a boat and collect data; get students to look at data from a scientist perspective

Human Interactions with the Coastal Ocean

see what students view as the ecological trajectory of the river system, i.e. is the river cleaner now or in the past? » serves as opportunity to bring in other education topics, data

had a real time sensor out on the Raritan in the past, but it eventually broke and there were no funds to fix it

could go deeper with the Raritan in certain classes, but other water systems serve as better examples for some things

would like to use the Raritan River more but has challenges with time and funding getting more people to use the Raritan/reaching a critical mass of people » synergy

different groups, classes, etc. talking, collaborating, inspiring each other

long history of the River can be incorporated better

If unlimited funding....

lab out on Raritan, possibly at the boathouse or even a trailer

opportunity for real-time measurements and analysis

boat for classes! part of a river lab course?

each class has permission for a certain number of rides?

central depository for data and activities on the Raritan

a lot of existing activities, currently fractured/not connected or communicated

possibility of an Annual Student Symposium on research done on the river?

need a continued dialogue to move forward

pool of instruments to use (not just one of each?)

how do you make sure students learn?

with his classes, he makes sure his students come out with a skill

Website: a great idea!

have a place for a depository of data on it?

» portal for educational activities on campus and on the Raritan

site will still need constant support

lead to opportunities to dovetail classes, research, etc.

link portal with the EPA Raritan River project

large potential issue: time constraints of faculty

research faculty often split classes to have time for research; don't have as much time to plan classes as they would like

Bruce Crawford

Professor; Director of Rutgers Gardens

Education and the Gardens:

- EcoLiteracy program for pre-college kids
- vegetable garden has been a success
 - downfall has been cost of running it

The Gardens and college students:

- TRANSPORTATION ISSUES
 - not everyone knows it's there/lack of knowledge about the gardens
- Internship has been successful
 - downside is the cost of the program (it's a summer class » pay for credits) but 6 scholarships are offered
- Relation to Central Park Conservancy has been very successful, now beginning to branch out to others

Challenges at the gardens:

- don't always know who uses the gardens or what goes on (i.e. research)
- if you know the users, can better gear the gardens to classes
- helpful in demonstrating the difference between Landscape Architecture and Landscape Industry

High school groups and Eagle Scouts also do projects at the gardens

Adults and the gardens

- originally designed to educate the farmer NOT the public
- currently facing issues with signage - cost of tags, stolen/damaged tags
- goal is to teach more
 - \$5 walk and talk tour series, \$50 classes, Garden to Kitchen Chef Series

Volunteer Supported Agriculture!

Plant sale is also an educational tool

Future at the gardens:

- Rover! - have the students build it then use it (engineering connection?)
- Connection with the EcoPreserve?
- design/build classes, construction classes
 - good opportunities for learning how to build, but challenges with getting students and time (good example of success: Sandhills Community College, Pinehurst, NC)
- better access for elderly and disabled, etc.: currently challenging because of lack of paths and walking trails through the gardens (paving limited to the road, missing most of the gardens)

Facilities maintain the buildings at Rutgers Gardens

If an unlimited budget...

- walk through time! to better connect, understand time, large amount of years, etc
- employ more gardeners = more likely to see someone to talk to while visiting the gardens, better chance for a personal connection
- WOW factor of some sort -- a bridge over the stream by the bamboo?!
- walking through a leaf, root

helping to overcome plant blindness

has to be FUN for all ages

Hopes to integrate students into plant prep/propagation for the plant sale

Gardens were funded in the past through RU

different mission between now and then, no longer funded

Connection ideas:

bike path system, bus system, an overpass?

It is the RUTGERS gardens, not just the SEBS gardens, so it should be connected to other schools and departments within Rutgers (i.e. geology, computer science, and engineering)

David Ehrenfeld
Professor, Department of Ecology, Evolution, and Natural Resources

resource: <http://discovery.rutgers.edu/events/2012/davidehrenfeld.html>
Swarthmore College (campus as arboretum)

current education is too much technology focused, and too little hands-on/experiential
students don't know many practical things, e.g. how towns work, how to grow vegetables,
how to fix a bike, basic finance skills

past courses with practical focuses: Interesting and Edible Plants, Interesting and Edible
Meats

opportunity to do more experiential learning on campus
have students experience biology on campus
**help to overcome not seeing what is right in front of you (plant blindness)

Last Child in the Woods

Ideas for campus:

courses with more field trips - vans, etc. currently expensive so not many courses have field
trips
more courses in practical education - tapping our Extension courses!
stymied with finances and high-tech appearance

Sustainability

has to be real: not just talk, but action

farm is here, why not teach students how to grow food, how to can, etc.
entomology course on raising bees is very popular and practical
important to sustain the practical element of courses

Community-Supported Agriculture on campus, but not very integrated currently

His classes:

start with using campus for teaching, then progress to the rest of New Jersey
benefits of using campus: everything, everyone is already here; don't have to ask permission
to use it

using current campus conditions for clues to the past
frequently done in his field ecology class
examples: a spruce tree's two leaders showing that it had been cut recently; Osage
orange trees showing a historic farm boundary; the current ground floor of Food Science was
originally planned as the basement but because of the high water table, the building could not
have a basement; Passion Puddle naturally sloped because of its glacial history but it has tile
drains because of the high water table

If unlimited budget:
stop building
plant a few native plant gardens
maintenance » set up endowment for gardens to ensure they are maintained over time

plaques to explain what you see on campus
both plant identification and information and discussion signs
the more you explain the better
possibility for a 1 credit course about the campus? would be required for all (SEBS?)
students to take, but the challenge would be the large number of students
both formal and informal ways to learn about campus

Peter Gillies

Professor, Department of Nutritional Sciences; Director, New Jersey Institute for Food, Nutrition and Health

IFNH - first time in 25 years a new building constructed on Cook

- A cross-University institute
- design: building that will still be modern in 5-10 years
- help students understand real world work

Rutgers = existing old facilities, new R&D not reflected well
Reflected in new IFNH: open concept labs and open office space - shared space, how the IFNH was designed (includes his office)
conference rooms

Multiplicity of use

- healthy eating courtyard = educational! teach healthy eating, no soda
- A Living Lab!
 - adjust things to see how students react; *learn, adjust, experiment*
 - watch people prepare food, learn how to cook
- new lab space as a living lab as well
- Children Center for Nutrition Education Research
 - teach kids and families better cooking
 - food/cooking camps over the summer with tours
- debate about gardens in and around building
 - practical issue of maintenance, probably will be just grass
- however, there will be a 2-3 story living wall in building (EcoWall)! » message of connection between plants and people » educational opportunities
- food services being run by dining services
 - interest in sourcing local but not sure if they can yet
- farmers market held in front of building?
- new ways to use the courtyard

- glass, overlooks the farm
 - connection with farm
 - *subliminal connections*
- not many issues so far but....
 - parking extension conflict
 - staircases, walking
 - adapting to the open office (vs. private offices)
- “cultural hurdle”, still have special workrooms for privacy, not totally solved yet
- experiential building
- financial issues - space equation for spaces used by multiple people
- different looking building: issue of introducing the new to an old campus
- *people, physical, cultural and change*

Jason Grabosky

Professor, Department of Ecology, Evolution, and Natural Resources

- Interview #1:
 - 20 scripted campus walks
 - *campus as a home*
 - theater and teaching
- Grand Plan
 - walks North to South with plant communities, conifers parallel East and West
 - teaching better outside or bringing it inside
 - will run into problems, better here
- *endow grounds department
 - importance of management
 - building internships
 - *stewardship and the urban land ethic*
- few in power to say yes
- hard to do stuff on a limited budget
- respect Facilities!!
- Land-grant university responsibilities
 - being a leader
 - applications and relevance
- importance of the image of landscape
- “wagon or money” - individual to start the ball rolling
 - more inertia now
- Tree Campus USA, future GHCook Thesis opportunity
- Challenges:
 - financing and more importantly, investments!
 - faculty and the idea of land grant - what is the current role?

- Interview #2
- drew main walking/teaching routes on campus
- most important spots for him:
 - gorge - radical topography, shows a different habitat
 - woods by Heylar House and farm -- forest stand (how trees grow in forest vs street)
- specifics change/adjust with each walk from year to year
 - example: bus stop-brick and salt infiltration with this winter
 - *picking things up along the way*
 - *responding to the campus! » change from year to year » like a game
- Antillies Field: view and seating -- doesn’t use it as much as he used to
- State Champion Oak Tree behind Newells/Starkeys
- woods by CCC not really exploited
 - student had died around there, avoided for a time, now just not really used
- anything has to work for Facilities for it to work for us
 - maintenance! (again, who will maintain it when student/professor is gone?)
 - Facilities as a PARTNER, not forced/dragged into it
 - find a champion on Facilities!

Max Haggblom

Professor and Chair, Department of Biochemistry and Microbiology

life science = most research in laboratories

research component in his department

Environmental microbiology

polluted sites, Arctic vents, other off-site stuff, not really anything on campus

*use the farm for the fistulated cow's rumen

Passion Puddle as a demonstration system

methane in sedimentation re-creation example

sampling, sampling demos in class

Ideas....

Environmental Microbiology: Passion Puddle as a detention basin

other stuff depends on the broader research question

Passion Puddle for other demonstration purposes

using the farm more

understanding farm microbiomes

again, dependent on faculty research

Harvard Soil Project

could be a similar interdisciplinary project here

would fit in with a lot of his classes

If unlimited budget....

improving the landscape: both for aesthetics and biology

improving stormwater management

things happening in soil that affects stuff downstream (research project?)

*establishing joint capstone projects!

soil of managed environments, effect of urbanization, ecosystem services, gardens, etc.

engage students in multi-year series of courses

can be fun for faculty

CROSS-CUTTING THEMES

microbiology and health link: diet in terms of food for our body's microbes

Problems:

time commitment

what do faculty, etc. get out of it? how does it fit in with the research focus? is it worth it?

money and request for proposals

funding sources

multi-year fellowships, bring questions into upper level classes

Microbial ecology: could use the campus as a large focus

****using the campus as a way to engage cross-disciplinary thinking***

engaging different Departments through students

inter-department group projects

how to keep people's interest and involvement over time?

Similar issue in research labs: learn, research, graduate, repeat with next student

**need a behind the scenes structure

example of lab course as exploratory: figuring it out yourself, not just being told

using what they leave to build the next

always having some year overlap (i.e. juniors and seniors, or bringing in juniors toward the end of their junior year to something seniors have been working on)

***leveraging the project around a theme

using projects/sites together to make the most out of it

ex: microbiology being able to jump into to something being done (evaluating soil conditions for plant suitability?), adding to the data that another group can then use

having faculty help out and jump in....having one person start and manage a site with additional faculty, possibly students, etc., adding research questions

requires a lot of communication

**living labs: a unique experiment that can teach both students and faculty (thinking outside of the box more, working with other departments more, taking advantage of what they have)

stormwater is a huge component

linking George H Cook projects

building on the small college closeness aspect of SEBS

the student perspective

connect to the Honors program?

How does it enhance the student experience?

NSFREU = National Science Foundation Research Experiences for Undergraduates

Living labs would need money, but it's out there, like the above funding

Steven Handel

Professor, Department of Ecology, Evolution, and Natural Sciences; Director,
Center for Urban Restoration Ecology

Research suggestion: Asphalt to Ecosystems - schoolyards to educational landscapes

Campus for classes:
last fall used a weedy wildflower lot on Livingston
 experiences in how to study meadows
 need more meadows/similar spaces on this side of the river (improvement over mowed lawns)
Plant Ecology: greenhouses, Herbarium trip

*campus is currently poorly managed as a teaching resource
 campus could be an outdoor classroom for many professors but challenge is the current tradition of mowed lawns not very conducive to teaching
 campus could become a MODEL SYSTEM for institutional landscaping, ecological services, beauty, enjoyment, educational value
 » huge opportunity to serve as a model for many others throughout NJ
 cheaper than mowing lawns/traditional landscaping (supported by much literature)

Plants:
shrubs on campus are typical horticulture species, but there could be more natives
 i.e. barberries planted at new football stadium
 limited influence of educational staff on plantings at Rutgers (include or no???)
 opportunity to reflect natural heritage, more sustainable
challenges with communication with Facilities: wildflowers mowed down accidentally outside of Plant Physiology

huge opportunity for learning on campus
Rutgers can save money
connection for students studying landscape management (internship possibilities)
could connect to a huge number of classes: plant ecology, restoration ecology, pollination ecology, field methods, community ecology, population biology, entomology courses, pest management, plant physiology courses, and more
possibility for experiments on campus
institutional need: getting faculty involved with the design and maintenance of campus
 » chance to inform better practices on campus

Challenges:
need outreach and communication to the student body
 example: there is a rain garden outside of CDL but no sign so no one realizes what it is represents a lost opportunity: if we can explain value of functional landscapes » students serve as emissaries for greater value of landscapes
brochures

Doug Tallamy: value of native plantings

If unlimited budget:
would need an initial investment but more natural landscaping will save money over time
define areas that need to be mowed lawns, have other areas transformed into native landscapes
make foundation plantings more native
 would help secure and enrich surrounding areas such as Heylar Woods (currently facing threats from invasive species)
 shaded areas: woodland flowers and ferns
 example: Drew campus fern garden
invite faculty to find design areas for specific educational needs
 research with plants and climate change
Passion Puddle: don't need all the lawn; add in more shrubs and wetland plants (opportunity to limit geese)

opportunity for Rutgers to show leadership in New Jersey
 making landscapes more educational
not just science: also connect to humanities: art (no one draws grass lawns), photography, English (inspirations), math (studying growth)
 » engage with Mason Gross!
connections with native plant nurseries and SITES
Sustainability Committee: how involved are they with landscape (versus just materials and purchasing)?
Landscape Architecture: could help improve foundation plantings?
need more awareness of Rutgers Gardens, but difficult to get there
their department: Los Angeles schoolyards transformation plans

Jean Marie Hartman

Professor; Department of Landscape Architecture

Uses of campus: sampling, Environmental Design Analysis, Bryne Seminars, Arbor Trail
Urban and community forestry program; ties together campuses
outdoor classroom
 good idea but implementation concerns
programmatic uses for campus
plant blindness – how to use campus to help overcome it
whole campus set up as exposition
 *need for maintenance and care
Learning community for outdoor spaces
 design implementation and maintenance?
 funding?
labeled and unlabeled specimens, potential for an app
Landscape Architecture Plants potential projects
Would like more native herbaceous plants (but would require care)
interactions not conflicts
Involving the outside community....
 some unwelcomeness present
 would invite members with space but drug concerns
 signs and other things in Spanish
school gardens?
flora and fauna
 balance charismatic and education
 had more animals on campus -- 4-H extension
hands-on soil education
easy demonstration for learning opportunities
Different loops
 good for visitors
 need something more sophisticated for students
faculty involved with clubs
*getting someone to lead, persist

Wolfram Hoefer

Undergraduate Program Director, Department of Landscape Architecture

Laura Lawson

Department Chair; Landscape Architecture
(positions at time of interview)

Living labs: how are they used? what is the teaching material? » You need the teaching material in order for it to work
Barriers to living labs
 -Facilities and political issues
 »Talk with Facilities to see what problems they see, how involved they can be
The connection between faculty, students, and facilities:
 -Things may not get done because students leave, Facilities is not informed/involved (i.e. mowing over a rain garden because they didn't know what it was), professors may not have the time or may not be listened to, have to worry about their jobs
 -For things to work successfully need input from all
Possibility for a Sustainability Corps on campus/for SEBS? It had been suggested in the past, but didn't get anywhere
Use my advantage of being an undergrad (versus professor, administration or outsider): i.e. I won't be met with rolling eyes for suggesting certain things because I'm a student, will get farther than professors
Plenty of classes use the campus already like animal science and the farm, environmental engineering, urban forestry
 -Create color coded map for classes on campus? (color based on department or # of uses?)
Use my LA background to create spaces!
 -Some professors may have plans for what they want to do, I can use what I know to make them into spaces, connect them, etc.
Reach out to the extensions because they use campus as well
 Example: Jones Ave. farmers market
Julia Johnson: professor at University of Washington, might have done a study on living labs, check LAF website for a possible report
Sequence of maps: RU properties in all of NJ, to all SEBS properties, to campus
 -showing locations of learning/teaching spaces
 -studio locations as well?
 -show what was used once/occasionally to what is used permanently or show number of uses/number of times used
*A visual map can be helpful in getting people to loosen up and talk, engage conversation
Map application: political level
 -Mike Greenberg: communications and marketing (map can be put up on SEBS website, helpful to bring people in)
Set up a map!
 -Inventory map and later analysis map (location of spaces, and then if they're good or bad)

-Can help with developing a clear methodology of questions once you know what you need
Make sure I differentiate between transitory vs permanent living lab spaces in my interviews and on the maps!
Ask for pros and cons of the used spaces, organizational issues with them, etc.
Interview (or casually ask) different professors in the LA department locations they use for teaching outside of the classroom

Rebecca Jordan

Professor, Departments of Human Ecology and Ecology, Evolution, and Natural Resources; Executive Director of the Program in Science Learning

Classes that use campus:

Environmental Education

Passion Puddle and Loree stream/gully

Heylar Woods

talk with Rutgers Gardeners, discuss edible plants, community relations

at both places record biodiversity, condition changes (i.e. pre- and post- salt ? use at the Puddle)

conduct sustainability practices

case studies on campus (i.e. solar panels on Livingston)

most graduate courses use spaces off-campus

local example: New Brunswick communities on how they use nearby green space

Vision for campus:

Strategic plan for campus

considerations for where students live

facilitating better use of campus space and making it more appealing

improving stormwater management

****get students involved with the capital improvements**

students also involved in plant care, growing food

growing food by dorms?

Online brochures

Get students involved in the discussion of new buildings, and engage them as a part of activities on campus

will need more transparency, more care to involve students

cleaning staff: if you make what they do more visible, may create more student respect for them

classroom design

making recommendations, having student voices heard more on campus

Issues/Challenges:

****internal coordination****

hard to know who is in charge of what, who is doing what and when on campus

can be time consuming to find the right connection within Facilities to find out more information

limited by technical infrastructure - no central base

a website could serve as a great repository for living lab information

Raritan River: a great teaching source, a great resource; can help students connect with people-driven issues (environmental issues relate back to people-driven issues)

Masters in Science Education

Ravit Duncan: would have to be easier for her to engage in living laboratories
» time = resource » many professors might think it would be worth it to invest into living labs,
but red tape issues are discouraging
other places already exist that compete for space and uses (i.e. easier to visit a nearby
location that has something in place being taught rather than create that at Rutgers)

website is a great idea!
ways to move more people outside

Larry Katz
Director, Rutgers Cooperative Extension

NJAES - cell phone app!
student opportunities over the summer with Ag offices in different countries throughout NJ
land grant institution: *deep tradition, makes us special
New Brunswick Community Farmers Market
living learning environment, food education and food access education
Youth Development Program
STEM - teaching and learning experience
work with Ag agencies
most departments have an extension person: “Extension Specialist”
usually teaches practical courses
living lab connections
collaborative solutions between departments, etc.
Extension: bringing knowledge into community
Nichol Ave barrier! and potential
dream: connecting Rutgers and the community through food and arts; amphitheater for
programs
entertainment AND education
*connect with the community to show them resources available to them through Rutgers
Logic Model
makes NJAES special
assessing impact of their programs - education over time
impact of experience vs. just reading, listening to lectures
community gathers around ideas when they are respected (referencing urban communities
but can apply to the Rutgers community with living labs as well)
Challenges:
less public money means less people/staff
need to find new resources
how to deliver services while expanding services (still with limited resources)
“rising tides raise all ships”
NJAES working with Extension Specialists
food nutrition is here! urban gardening!
opportunities outweigh the challenges associated with living labs
students = credits = money
new revenue model - money stays within departments better » this means we can predict
the flow of money better than in the past
easier to do things than Cooperative Extension
challenges with motivation for Living Labs
should get enough people to be interested, but need to give/help people understand the
incentives
possibility for real world learning and case studies from freshman to senior year
i.e. the Raritan River can serve as a teaching space for all of SEBS

find a way to reach people
guidance towards self, help students adapt to university life, give them opportunities (not forcing)

Steve Kristoph

Part-Time Lecturer, Department of Landscape Architecture

Using campus for class: Landscape Plants

along the Puddle, nearby teaching facilities; basically the entire campus as long as the plants are there

currently 75% gardens, 25% campus, would like to have it more 50-50

current issues: labeling and lack of plants

*campus is an underutilized resource

plants for campus:

add to Puddle lawn; Martin and Bartlett hall; Food Science and Cook/Douglass Lecture Hall; closer to doors; IFNH

Challenges:

Newell/Starkey soil

maintenance needed: pests, pruning

lack of labeling - mixed blessing

can use campus for testing but not a best resource for students

best is selective labeling: one of a few labeled but not all » put in more than one of each species or cultivar for labeling and damage (minimum 2 plants, preferably 3)

If unlimited budget:

make a list of new plants for campus

properly labeling plants, new and existing: clear label with names, country of origin, and accession numbers with a dogtag label for backup

establish a department/group to take care of plants

lessen maintenance for Facilities and put plant care in the hands of those who want to learn

work on campus or internship opportunity

need a better relationship between classes, departments and Facilities

need a greater awareness of plants on campus and what else is going on here

get more happening here

arboretum?! (reference: Scott Arboretum at Swarthmore College)

Food Science and emphasis on edibles

paw-paws, cranberries, blueberries

*importance of communication

caring for plants! especially over the summer – who will do it?

Rick Lathrop

Professor, Department of Ecology, Evolution, and Natural Resources; Director of the Grant F. Walton Center for Remote Sensing & Spatial Analysis; Director of Rutgers EcoPreserve

full name is Rutgers EcoPreserve and Natural Teaching Area

used heavily by Principles of Natural Resource Management and as a case study for class

- variety of habitats

- experiments, hands on learning!

- management and restoration projects

also used by other classes, student groups and outdoor Recreation

- ROTC Training program

as well as by 4H groups, HS groups, boy and girl scouts

****Service learning!****

- Outdoors club, interns

Enhancements: outdoor classroom and improving trails

Recently, installed a new kiosk to inform more people about the preserve

Improvements for the preserve....

- Green building?

student projects have been helping, but there could be more informal educational opportunities

Preserve as a space to collect data, archive it, use it

Issues:

- parking -- weekends okay, weekdays tough because of RU Parking regulations

- visibility!

Friends of the EcoPreserve Group

could use more advertising

students always finding new/more things

CRSSA

- Heylar woods and the campus used for Air Photo Interpretation

- campus also used for GPS training (as well as EcoPreserve)

Cook Campus projects and ideas....

- Eliot's project at the Carpenter Estate

- tree mapping

- could have more ecodiversity on campus, perhaps some eco restoration?

- difficulty with keeping it maintained

- would need faculty to champion the project?

EcoPreserve conflicts:

- no care for many years before Lathrop

- vandalism issues

- good relationship with Facilities currently

- bunch of groups working together/helping with deer management (hunt)

potential for more classes to be using the EcoPreserve

incorporate arts, humanities, labs

woods behind the CCC and those next to the farm are opportunities!

if we don't use it, it's just a blank space for a building; USE IT OR LOSE IT

Master plan included an amphitheater in EcoPreserve

Karyn Malinowski

Director, Equine Science Center; Professor, Department of Animal Science

Kenneth McKeever

Associate Director, Equine Science Center; Professor, Animal Science Dept.

Equine Science Center

- students tag along to events » teaching opportunities

- Ag Field Day, Summer Showcase, etc. requires student help » more teaching opportunities

Red Barn - the Exercise Physiology Lab

- full working model horse skeleton

- students critical to getting things (studies) done

- HUGE learning experience

STEM education connection

also get experience with other things like publications, websites, blogs

farms = oasis in the middle of all the urban land

Ryders Lane farm

- lots of research!! very holistic

- separate experiments there, lots of opportunities

unique opportunities here at Rutgers students from other colleges come here for equine research!

see the real world

Equine Science Center make graduate students teach

Overall Challenges:

- money - need unique sources of funding

- had received dedicated state funding which was slashed to zero in 2010

- infrastructure: not so anymore, but had to upgrade A LOT to get where they are today

differing levels of awareness

- education process, getting the information out

environmental stewardship

Ideas:

- more visibility, need more people to take advantage of what's here

- Mason Gross - draw things at farm

- **better transportation**

- Ryders Lane farms face similar issues as the Gardens

- need to be better incorporated into the community!

Rutgers farms all over the state

If the Center had an unlimited budget:

- more courses, more graduate students

- ensure horses could stay on campus now and in the future

- *animals, people, time*

years ago was a challenge to keep the farm

- could all go away (now) if people change their minds

need to do things SMART for the future

justification of farm getting harder and harder over the years

*connection as a land-grant institution: *taking care of the state*

More issues:

- having to solve things with less money

- not everyone realizes the all work that Equine Science Center does

- » need to get the knowledge out, but it's a battle to do so

students have been great! & new website

maintenance - not happening, little money for it within Facilities

we have the highest number of horses per square mile in NJ!

*things here as a model -- could be more so with more money

If unlimited budget:

- hire the best faculty and grad students » become the best equine research center in the world!

- not just Equine Science but all majors and backgrounds as part of the Center

- would love more graduates for more research and more knowledge to spread to the community/more impact

- ****invest in people with passion**** (facilities are good for Equine Science right now....

as a connection to living labs, investing in people can help get the ball rolling and get the motivation, plans and money to build any facilities....)

Mary Nucci

Professor, Department of Human Ecology

uses campus for space (taking classes outside) and for field studies for finding info on

campus, field research

would like to be outside more

garden for class

Issues:

financial constraint for materials

don't see any conflict of uses

sharing the space

She's the only one that really uses the campus in the department that she knows of

Interest and engagement:

divide between people who are interested about science and those who think it's too difficult

for them to learn anything about

need clear language

make it relatable understand your audience*

give them enough to start with (wet their appetite)

Living Lab website:

a good idea!

critical for communicating

website as a living tool! **links to things you can do**

If unlimited budget:

Create signage for living labs

covered areas (for classes)

add plantings to enhance campus and educate students

create more spaces on campus

use paths more efficiently, environmentally and sustainably (research/study)

food for wildlife (birds, deer <would have to consider the effect food for deer would have

on plantings>), bird feeders

outdoor as something for learning

Wisconsin group: GIS + stories

» RU campus: app on phone for stories: history of site, research, uses, ecosystem

» self-guide tour, self-guided education

map campus as part of a class?

Can't see a negative reason for living labs

We're a part of a larger environment

getting people to see it » more respect, stewardship

Facilities trash story

**creating and fostering pride and ownership of campus

Chris Obropta

Extension Specialist in Water Resources, Rutgers Cooperative Extension;

Professor, Department of Environmental Sciences

Michelle Hartmann

Design Specialist, Water Resources, Rutgers Cooperative Extension

Classes and the campus:

Senior Design Class for Bioenvironmental Engineering

designed stormwater management practices for campus

designs from class not used by Rutgers

standard is to subcontract out for work on campus

Water Resources:

face difficulty in doing projects on campus, so they do projects off-campus because it is easier and offers

for classes, show examples of areas on campus that are in need and discuss what green

infrastructure could benefit the area and how they could work, but nothing is installed

University does not come to them for designs or advice about stormwater on campus

Potential living lab ideas:

collaboration between Bioengineering and Landscape architecture for campus redesign ideas and construction

Helyar House to Route 1: opportunity for a porous paving sidewalk with storage underneath, water out to detention basin

*represent an opportunity to help the environment and improve aesthetics on campus

bioretention rain garden system on College Farm Road

different disciplines working more together

currently hard to do because of lack of resources and lack of coordinating class times

(which would force professors and students to go out of their way to work together and times may not work for all parties involved)

would need administrative support - could help coordinate classes

commitment from university to support student and class projects

there is a large capacity for student involvement on campus

licensed professors could approve drawings for projects on campus

Challenges:

different values between Rutgers operations staff and some efforts on campus

maintenance

Busch and Livingston Landscape and Stormwater Master Plan: great plan, but is

currently not being maintained

disconnect between Rutgers Cooperative Extension and Facilities

hard to ask Facilities to do things they don't know how to do

» opportunity for Extension to teach Facilities

hard to get people to do things they don't know about or know how to do

i.e. older staff did not learn about Green Infrastructure in school so would be more hesitant to do a Green Infrastructure project
many things are not required by old laws that would be required for new construction now
regardless, Rutgers should take the initiative to reduce our environmental impact and be a leader!

Turf on campus:

balancing needed amount of turf with other uses
minimizing runoff from turf - helped by keeping the turf healthy
meadows as an alternative
need to change the perception of meadows as potential habitat for unwanted pests
could conduct a study to study the habitat created and how that affects undesirable pests
while meadows would need less mowing, they may not save as much money because they may need more seed or replanting
how long for a return on investment?
Green systems may not really reduce maintenance, and will require different maintenance than existing practices
the qualitative, ancillary benefits of green systems are hard to document
lots of work needs to be done on this subject
social aspect » opportunity to work with Human Ecology
measure how green systems affect changes in behavior, etc
people vacation to natural areas, showing that benefits do exist

also need to consider how students from different disciplines will work together
different approaches can lead to conflict but also innovation
a crucial opportunity for living labs preparation for working with others in the real world

learn from each other, and learn how to communicate with each other
need to break out of our silos
little knowledge of what is going on in other departments and organizations at Rutgers
**what are the incentives for professors to work together?
how to overcome the challenge to cross department lines?
» make it just a bit easier to work together
should not be too easy that anything can be done on campus, but easy enough that student and faculty projects can be considered
need to change the paradigm to “no, you can’t do something” to “you can’t do it that way, but let’s talk about how to do it another way”

Grounds and Buildings Committee
died off because of lack of ownership
felt like the success of projects were their responsibility, with no input from Facilities
hard to get behind a project when it feels like the University places little value in it
would rather spend resources investing in a different project off-campus that could have a larger impact

A living lab project review process and implementation could be done here at Cook more easily than other Rutgers campuses

a lot of students are looking for real world opportunities
problem is being stuck in existing ways and operating procedures
need to revisit existing operating procedures

Grabosky and Vodak teach people (Facilities) how to trim shrubs, etc
something similar could be done with students (maybe for 1 day/month)
problem is that it would require some level of funding
**benefit is that it would be a lasting memory and connection to campus
can help improve alumni donations

Deans can help bridge the gap and get Facilities on board

Faculty committee can be created to help continue projects after students graduate

Peggy PolICASTRO

Professor, Department of Nutritional Sciences; Director, Healthy Dining Team

Dining Facilities on campus:

- used to educate and enhance experience

- Quantity Food Production: use of dining facilities for class

- Bryne Seminar: how dining facilities are designed

- events: demonstration and fun

Off-campus teaching: cultural restaurants in New Brunswick

Issues:

- No current challenges

Dining Halls as labs for research studies

Formal assessment of awareness has not been done

Rutgers is big

- impossible to reach all students

interested students have opportunities to become aware

- incorporating psychology and other departments, events, and other outreach to reach the most students

Dining facilities and sustainability:

- trayless initiative

- microbial digester and pig barrels (food waste » pig feed)

If unlimited budget:

- huge documentary to incoming students on what Dining Services does

- increasing awareness on a larger scale, telling our story

Other dining connections:

Dining Facilities as a resource for students for interviews, information, etc.

Dining services student advisory boards

a lot of requests for tours, talking to chefs, etc. for various reasons either from student groups or classes

Institute for Food and Nutritional Health - Dining Services will be an essential part

- model for arranging an eating environment to promote healthy choices

- food + education + research

helping to achieve the goals of Rutgers through Dining Facilities

Dining Services came to Nutritional Sciences to develop a partnership

- point person/conduit to make relationship and bring things together

- maintain and cultivate it once the relationship is started

- both sides need a take/benefit

look at mission of department, could be a good starting point

need support from up top

Res Life communities as tie-ins to living labs?

- intersection of academics and res life

Jen Shukaitis

Senior Program Coordinator, New Jersey Agricultural Experiment Station

outdoor teaching spaces:

- farmers market

- gardens and children's gardens

- doesn't really use campus

- Women, Food, and Health class

- requirement to volunteer at an emergency food provider

- New Brunswick as an extended part of campus

- great feedback on experiential learning

challenge of online classes

- more opportunities for students to take but there are difficulties with lack of face-to-face

interactions

- experiential learning helps remedy this somewhat

her job:

- community nutrition education

- NJ FoodCorps overseer

- increase Extension presence in New Brunswick, bringing Rutgers to New Brunswick

- challenges:

- community hasn't been open to Rutgers

- it takes time to build relationships

- campus is a different demographic than New Brunswick

- NB Food Alliance: Breakfast After the Bell

- some initial conflicts

- now in kindergarten through 8th grade in NB schools

new minor in Community Health Outreach with an internship requirement

If unlimited budget...

- create a food hub: market + distributor (connected to the corner store initiative) + buy-in co-op, with a wide variety of foods to attract all

- educational farm

- people of all ages

- breakdown the disconnect between where people buy food and where it actually comes

from

- we have the space, need the dedicated people

Nurture Through Nature: Rutgers program with gardens at schools

Lena Struwe

Professor, Departments of Ecology, Evolution, and Natural Resources, and Plant Biology and Pathology; Director, Chrysler Herbarium

campus used more over time, used for research

BioBlitz

- run by her and her graduate students
- promoting to undergrad students this year (vs just grad students)
- associated website and app, working with iNaturalist
- goal: discover biodiversity all around you
- engaging the Rutgers community and extended Rutgers community
- **collaborative and communal - learning from people and things around you
- **fostering curiosity and discovery**

Flora of Rutgers Campus

- building a campus species list through class
 - biodiversity inventory
 - adding to the knowledge base of campus
 - comparing current and past flora
- link online but she does not know how much it is used

talked with Rick Lathrop about doing a project with invasives at the EcoPreserve

Tree Flora - undergraduate research project

- all Rutgers campuses
- trees photographed » website » eventually an app?

Rutgers Day

- weed outreach for the past few years

weedy plants in urban areas as a teaching tool

- plants in the parking lots of Rutgers

Weedy plants Bryne seminar

- also used the Cook Organic Garden
- tell friends about weeds for an assignment » “waves on water”
- changing the conversation, overcoming plant blindness

Herbarium:

- student research and curatorial staff
- *part of the history of the University
- not just campus but connected elsewhere

Ideas for living labs (no lack of projects or ideas):

- a demonstration garden: fruit trees, etc.
- permaculture garden: fruit, herbs, spices
 - » learn where food comes from, what the plants look like
- currently on research farms but not on campus
- something to walk through/past on your everyday travels on campus - not just lawn
- bird and bat houses
- forests on campus - no trails, who uses them?
- relate to other departments and majors

*there is plenty of nature on campus - incorporate it! get people to see it!

BioBlitz is helping to change that

Instill the **sense of campus as a living place**

range of campus environments from ruralish to urbanish that can be more utilized for study, classes, and research

Issues:

- working with Facilities: weed removal, clean vs. wild/natural look
- fear of parental, outside complaints over appearance of campus
- buy-in from up above
- awareness
- **mindset of Rutgers community
- faculty challenge: takes more time, effort to use campus; can be a risk

Rutgers Gardens

- idea of evolutionary component works well with her classes

General Biology

Greenhouses = underutilized!

- used by Fundamentals of Evolution
- teaching collection

Beth Ravit

Professor, Department of Environmental Sciences

Facilities construction disconnected from expertise on campus
 how to integrate expertise with decisions on building, landscaping, etc.?
 Christ Obropta and stormwater demonstration project
opportunities to incorporate things into class and campus
Examples...
 incorporating Raritan River into classes
 EPA's Environmental Education Grants
 innovative programs into funding, individual faculty
CUES vs Rutgers Office of Sustainability in terms of hits
*Talloires Declaration
 Rutgers is a signatory, no one knows!
 College Sustainability Report Card
CAIT = Center for Advanced Infrastructure and Transportation
again, why aren't we using our expertise?
more education examples....
 EcoPreserve
 software from NJ Audubon society » using tech » integrating it!
 how can classes help with the stewardship of the preserve?
 farm
 Beth takes her intro classes there
 fistulated cow
 can buy meat raised at the farm
“we’re in these cubbyholes” so others don’t know what is happening in other places on campus
 lack of communication and knowledge, not so much a lack of initiative
talks on how to enrich the educational experience
 **Senior year capstone project: more like real world stuff, get experience working on a
tangible project with people with different viewpoints than you to make a better product
 how will it fit in with credits? major requirements? etc.
Villanova pervious pavement
Cook/Douglass as a living demonstration for SEBS
**the disconnect is strong....
how do you translate technical knowledge into day in, day out stuff?
look at other Universities, college campus sustainability » what can be applied here?
 Princeton sustainability
Rutgers Energy Institute
 Energy Contest
 » a way to tap into other interests and improvements?
 a Healthy Eating Contest? (ways to improve healthy eating on campus)
University Community Grants
 money for projects with the community....would living labs work?
committee with Faculty, Facilities and students?
 ask Facilities if they’ve ever tried such a thing, and if not, then why not give it a shot!

“you’ve gotta wanna” » you will find a way if you want it
Issues....
living labs are complicated!!
 need to get people to sit down physically together for best results
need someone to manage it, coordinate and make sure things actually get done
engagement and keeping people engaged
respect factor and wanting to do it vs being told
addressing climate change and post-Sandy resiliency
Monitoring on campus

Daniel Van Abs

Professor; Department of Human Ecology

campus not directly used for his classes
Student internships with organizations and agencies in the Raritan River Basin
wide variety of issues; 8-15 students
Department of Human Ecology faculty (Environmental Policy, Institutions and Behavior major):
working with NB community -- food access issues
Rutgers energy policy & water policy & waste management possibilities
campus as a design lab
campus improvements
current improvements = no signage (i.e. pervious concrete)
student body
research methods
environmental communities
issues:
Internship: students need transportation for off-campus stuffs
also finding students with the right skills
living lab issues:
capital funding and *maintenance* (engage Facilities)
designed so that they can be used
University of Rhode Island - cutaway stormwater facilities for education
Where is there room for them?
Rutgers is large land owner (one of the largest in the state behind Fed and State government)
how is Rutgers serving as a leader of sustainability??
connection to sustainability minor
*potential to connect sustainability to a class/class looking at Rutgers sustainability team!
SEBS people working at Duke Farms
turn that service here
meeting with Raritan Basin
who's going to take ownership?!
where does it fit?
Living lab interest session
bring in outside person from another school campus's living labs to talk about what they've done there with other Rutgers people
*discussion to get the ball rolling

George Brnilovich

Student, Landscape Architecture

Project background:
-Site location: Carpenter House
purchased by Rutgers 1965, now the Rutgers University Inn and Conference Center
Sydney Carpenter had been involved with USDA new plant testing program
Arbor trail is about 20 acres
Rutgers University Inn and Conference Center
Deana Pagnozzi, Director: good resource for history, Inn information
separate budget from Rutgers
responsible for their own maintenance
Continuing Education Center for Adult Education
George's project/proposal:
Addresses the two pools and retaining wall area
Promotes education for Landscape Architecture, Landscape Industry, Ecology, and
Mason Gross art opportunities
design build studio opportunities
hands-on experience
New Brunswick History tie-in (Carpenter, Neilson, and Johnson families)
Things that need to be addressed:
deer management (fencing, other methods)
potential lack of maintenance
previous Arbor day planting mostly failed because of deer and lack of maintenance
Other possibilities:
revenue generation for the Inn?
homeless decrease with more use of the trail
security issues, mounted patrol potential
"rot plots," teaching the ecology of decay and letting dead trees stay
Liability issues; safety vs. ecology

Past Arbor Day planting: George was teaching people how to prune, how to plant because most did not know how. Even if there are people who want to help and volunteer they likely will need some training and help.

Eliot Nagele

Student, Environmental Planning and Design

Project site: Carpenter House/Rutgers University Inn and Conference Center

It is a part of Rutgers, but separate from the University

Carpenter House history:

built 1911, replaced an older building there

Sydney Carpenter married daughter of a Johnson (of Johnson & Johnson)

*Sydney Carpenter worked with USDA to test plants

House bought by Rutgers in 1965 and turned into the Inn and Conference Center

Eliot's vision:

an open recreation space, an escape from the rest of campus, where you have opportunities

to apply knowledge from class (i.e. finding a plant or fungus you learned)

as a place to go and do projects for class

construction, build trails for seating, a possible studio location?

****active space/ active learning****

ecology and meadow research

additional goals: make site safer with more use of the site

Current efforts:

clearing trails and making new trails

working with a Landscape Architect graduate student on signage for the site

example: sign by gravel walkway to know it's there and that you are allowed to go

in

developing a Master Plan for the site

helping plan Rutgers Day celebrations at the Inn

Rutgers Day at the Inn (instead of just a table on campus) to celebrate the Inn's 50th anniversary

tours in the Inn and on the trail

Frank Gallagher's Environmental Issues class to clear the trail

****site has been restored before but things fell through because of no maintenance****

trees labeled as part of a guided walk in the past

Inn has to contract out to Rutgers for maintenance (Inn not part of Rutgers Grounds jurisdiction)

****need a collaborative effort with all on campus for best success**

Plans to keep the project moving forward:

Forming an Advisory Committee: meet once a year to twice a semester to work towards

carrying out the Master Plan

consist of professors with interest in the site, Inn Director, Facilities &

Maintenance

Forming a Student Committee: work with the Advisory Committee; composed of

different departments and clubs (Students for Environmental Awareness, Alpha Zeta, etc.) to

help mobilize the student body for events and to get things done

Similar thesis issues: how will our projects continue once we graduate?

****maintaining interest****

need to keep things moving

list of projects reflect progression over time

Things to consider for my thesis:

FUNDING! the University has money, but how does it get to us?

how to get professors on board to actually do things, not to just talk

talk to the Inn about holding a meeting there

utilize the resources you have

Nicholas Emanuel
Director of Operations, Rutgers Dining Services

Sustainability and Dining Services:
Waste2-0 Food Waste to Water digester
 microbes eat food waste » liquid produced = zero organic waste
 have one at Henry's Diner and Busch Dining Hall
looking at a new compost system: The Rocket
no backup plan for pig farmer so need to consider all the solutions to make sure we keep the
minimum impact on the environment
also considering The Dragon:
 takes everything from the Somat, dries it, and burns it for energy
 can process roughly 20 tons a day

Dining Services and classes:
main connection is the Healthy Dining Team
 Peggy and students make sure menus have correct nutritional content
possible to connect classes and students with new and existing machines
 has been discussed in the past, still need to figure out where and how
Challenges:
getting from point A to point B
 funding
would love to have collaboration with professors and establish a curriculum, teach students
how the technology works

Communicating what dining services does to help with sustainability is hard because of how
busy dining services can be (feeding the student body is their primary concern)
 zero problem with incorporating students
 would love for students to be able to get something out of what Dining is doing
 no one is against what they are doing
 good press about it: National Geographic article about dining -- all the positives of what
Rutgers is doing right

Funding: Dining is already spending money, opportunity to reinvest money for existing
practices into new practices and make an impact on students

Dining doesn't create classes, so they would need professors to come to them with class ideas
a few classes do come through the dining facilities but limited collaboration otherwise
 its already here, just need to create curriculum around it
 who on Cook campus would be interested?
 are there grant opportunities?
Vegawatt - burns off fryer oil to help heat hot water, excess energy back into the grid
 one is producing energy on Busch, another is being installed at Neilson
 also take oil from the vendors in the Busch Student Center and College Ave Student
Center

Dining Services are doing this because it helps themselves, but there is no reason why
it can't also be used to help educate students about sustainability

Dining Services is a large part of sustainability on campus
 consider environmental impact, such as buying local when possible to save money on
shipping and reduce environmental impact
 could use composting containers, but they would be ineffective without a composter for
them
 they would need university help for such an effort
a sustainability class could work with all of these elements
 he would like to put a sustainable system such as The Dragon into the new dining hall
 initial costs but saving money over the long-term
 need the right people at the table
press about sustainability efforts by Dining Services could help more people become aware,
interested and wanting to work with them

Michael Kornitas
Director of Sustainability and Energy, Facilities Maintenance & Operations

Using the campus for education:
Busch and Livingston:
solar tours of solar farm and solar arrays
 also includes geothermal for the business school
 presentations for classes and other schools
Cook:
 chill water loop, mechanical systems have potential as a teaching tool
 IFNH building - example of a LEED Silver building
Rutgers EcoComplex: incubator for businesses to develop sustainable technologies

His role as Director of Sustainability and Energy:
 deals with all aspects of physical sustainability on campus
 uses LEED as a benchmark
 ensure sustainable construction techniques and practices when constructing new buildings

Rutgers Sustainability Committee:
composed of faculty, staff, and students
recently reconstituted under the new Rutgers president (old one had dissolved)
 benchmark where we are currently at with sustainability
 discuss what we can do in the future
in terms of landscape sustainability, they make sure to use native plants, have several low mow areas, incorporate pest management and material reuse

campus vs campus energy competition could be expanded to dorms, etc
 could have a dorm or student center that is sustainable and promotes sustainable practices
 could use social media to spread the word
 ideally sustainability would be practiced in a way that it can be researched

University of Minnesota living lab process:
we already have something similar here
 projects go to their design group that does a feasibility study
 the mechanisms are there already

Challenges with living labs:
**funding! - amount of funding depends on the project
 need to make sure that a project is financially sustainable
 funds for maintenance over time
 alternatively, can do projects that will eventually end but have minimum impact and resource use after they are completed

Facilities maintain Extension offices (ie currently updating the lights)

Resources to look into:
Facilities: Sustainability Plan
 a living document
Rutgers Climate Institute
Rutgers Strategic Plan

If unlimited budget:
 meter all buildings and equipment (so energy usage, etc, can be monitored)
 *battery storage for the solar farm

Stormwater on campus:
 mitigation studies » helped them save money by making changes and mitigate stormwater
look for opportunities to do things with projects that are already happening or will happen
 timing needs to work out
things ultimately come down to feasibility
 we are responsible for wisely spending the state's money as the state university
 money that goes to fund A can't go to fund B
 example: they would love to be able to use recycled greywater in buildings but the system is very expensive and has a long return-on-investment
 use that money toward other sustainable strategies
 **need to weigh return-on-investment and resources and find a balance

Frank Wong
Executive Director, Rutgers Planning and Development

Planning
 pipeline: Planning » Design and Construction » Grounds, etc.
his job: site planning
 stewardship of the land
discussions with professors and dean with campus as a lab
 Christ Obropta and stormwater
 instructional tool for students and other schools
Issues:
 varies depending on how it's made a living lab
 new stormwater treatment
 who will install/construct and maintain? special training may be needed
 more education and more work
aesthetics:
 quintessential campus look: lawn and shrubs, some trees
 how will all the living labs look together? how will they work together?
students only here part of the year
 they can't maintain projects all year round
 no connection with incoming students with existing, no attachment (developed over time)
 example: garden outside of Chang library
dynamic of a changing population
willing to listen to proposals and support ideas and research
Potential living lab locations:
 where there are erosion problems
 poorly designed spaces
lack of funding, lack of resources but not a lack of ideas
Deans office has a Facilities "liaison"
 problem » liaison » Facilities
website
 clearinghouse of land ideas
 clearance with Deans office/at the local level first
 does the Dean approve it? does Facilities approve it?
 useful for future students, good resource
Grabosky's lab for trees - can take it further
something that uses entire campus
 seamless, integrated, doesn't hit you in the face
what if the lab fails or goes out of control?
 who is responsible? Facilities?
*putting into practice what we teach
will probably be failed attempts
constant discussion between working within regulations and experimenting

Rutgers Facilities: Grounds Management Team

Main issue: As with any service organization there is simply not enough staff or discretionary funds to create the level of appearance Facilities would prefer.

Several living labs already on campus:

- Passion Puddle & Rutgers Gardens on Cook Campus
- Hiking and exploration areas on Douglass Campus off of the meadow behind the University Inn and Conference Center
- The Eco Preserve on the Livingston Campus
- Numerous storm water basins on Busch and Livingston Campuses
- Low mow meadows on Livingston

Facilities' main focus is on day-to-day maintenance of curb appeal on campus, (Green, Clean & Weed Free), so any projects that conflict with that can be problematic

The problems with establishing experimental growing areas on campus for Facilities are:

- Communication of purpose of area is not clear, often areas are established (Blake Hall and Corner of Red Oak Lane on Cook/Douglass for example)
- Students establish a project and when class or semester is over they leave and projects are abandoned
- Establishment of plants can take 2-4 years and during that time areas may look unkempt to the average visitor or potential students
- Grounds Staff are not all trained properly in plant recognition and in the past have unintentionally destroyed projects that are not protected or defined

It may be best to teach/establish living labs in experiment areas/less public areas, and away from the main part of campus that is supposed to stay attractive.

 This is an inconvenience for students, a problem that needs to be worked out. Facilities would need to be communicated with regardless.

Differences between Rutgers and Princeton in comparing the schools for living labs:

- Rutgers: public, limited funding, no renewable funds for development, lower staffing levels
- Princeton: private, unlimited funding, annual capital budgets for renewal, higher staffing levels, less acreage
- Similar issues need to be considered when comparing other schools with Rutgers

Over the past 4-5 years Facilities has gotten better at using more native species when planting projects are funded, and more maintainable landscapes are now the rule.

Labor and cost: Facilities have attempted to hire interns in the past but limited salaries usually discourage students from applying. Facilities would love to educate staff more through Cook College programs (turf grass, plant recognition, etc.), but the classes are expensive and limited funds are available to accomplish training.

Passion Puddle: Facilities does not use pesticides or herbicides around the Puddle (nor are they widely used elsewhere). Because the Puddle is a drainage basin, stormwater runoff on Cook/Douglass flows directly into it, and the Puddle collects a lot of debris (trash, bottles, leaves, etc.). This can cause problems as the Puddle drains into the Raritan River.

Facilities and living labs: Facilities worked with a graduate student recently on a weed study (two summers) in parking lots. Facilities strongly recommend using the area around the Heylar House as a living lab (wetlands). Nearby there is a rare flower specimen.

Facilities and the Rutgers New Master Plan: The Facilities Operations Group oddly enough did not serve on the Master Plan committee, even though they know the challenges of the campuses. It appears construction is planned for more of the wetlands on Cook which will require several environmental studies and will be difficult to accomplish.

Regulatory Compliance (codes, state regulations, local regulations) issues are often difficult to navigate when attempting to make positive changes.

Sustainability is a key focus within Grounds Operations. Considerations are:

- Maintainability (more trees?) (maintenance over time)
- There are thousands of trees of countless varieties on all of our campuses
- Our campus is used for Arborist Testing annually

Other considerations for establishing living labs:

- Who will continue with student projects after the student graduates?
- o In the past, it was left for Facilities to deal with, but this should not be the case.
- Potential conflicts between departments

Seth Richter, Josephine Grayson, and YiQiong Li
Rutgers Planning and Development

stormwater and landscape management
 Busch and Livingston plan
 Incorporate improvements into building projects
 look at larger context - holistic approach
 pockets of ecological areas
 no research done yet that Seth knows of
Cook/Douglass stormwater and landscape plan
 timeline doesn't match up » hard to mesh/make it work with classes, class projects
 better communication needed » reach out to planning!!
water resource engineers from China to learn about Rutgers' stormwater maintenance program
talks with Princeton for stormwater and management advice to them from us
SCUP
opportunities for reusing water
Issues:
 land: Agriculture and environmentally sensitive areas (in terms for constructing buildings)
 not where the money is
 need for enhancements
 how and where Master Plan will get done
Living labs....
 only constraints: organized group, who maintains it over time?!
 money for a dedicated crew?
Potential spots:
 gorge by Douglass library
 Newell/Starkey stream - not a Facilities top priority (health and safety first)
 Potential as a bioengineering project?
 Loree gorge
 lots of opportunities
 water + plants + dirt
dirt...creative and fun
 athletic and soils (making seating/amphitheater out of extra soil)
more opportunities:
Skelly field, Loree opportunities
point source areas and drainage issues » model for roof leaders » lots of small pieces »
applications for College Ave?
parking lots and water issues!
real world testing
doing something in a spot that's already being worked on/incorporate into other projects

Fletcher Beaudoin

Assistant Director, Institute for Sustainable Solutions, Portland State University

Details on the living lab program:

- Joint effort of faculty, students, and Operations connections facilitating moving towards PSU's Climate Action Plan
 - o Have not done much with water, but have done a lot with energy, materials, and travels in terms of sustainability
 - Using the faculty expertise on campus
 - Facilitating communication: letting students and faculty know about operations problems, and that operations know they can go to students and faculty for potential solutions
- Project process:
- Student or faculty interested in starting a project » they contact an Operations person and bring them into the project » relate project to Climate Action Plan » Living Lab review team reviews application and decides if project should be endorsed
 - If project is endorsed, it becomes sponsored: internships, other sources of funding are found for students » more specific details, including a budget, are planned out for the project » grant is released for the project
 - A system of checks and balances to ensure the quality and success of projects

It took about a year to get the framework for the Living Lab review team in place (a similar entity was suggested as part of the Climate Action Plan in 2009). From there, they did a few pilot projects and now they are fully on board and accepting applications for all projects.

Challenges of the living lab program:

- Establishing a cross-university team and developing a rapport with the team so that they see themselves as a group, not just individuals
- Understanding the needs of operations staff is critical and should be something to focus on early in the process
- Timelines between classes and Operations conflict
- Finding funding takes time

PSU's Sustainability Office is key to the Living Lab program. The sub-offices deal with curriculum, operations, and extracurricular activities. This cross-section of sustainability between the Sustainability Leadership Center and the Institute for Sustainable Solutions helps to ensure the program's success.

Most successful project is WALL-E (Waste Audit Living Lab Experience). It engages students and classes with auditing waste data that goes back to the Sustainability office for them to use and spur other projects.

In the past they had problems with projects being maintained or continued once a student or faculty left but now, their process ensures that this does not happen:

- They ensure that Operations staff is aware and on board with a project before it starts
- They ensure that there are resources for the project

- Focus on quality and longevity of the project over quantity

For funding, you can make the case at higher level administration as a means for saving money or making investments in the future.

Something similar is totally doable at Rutgers. Portland State University, also as a public university with not a ton of funding, has been able to make it work. You need to have conversations to get the ideas going and customize the process to your school. Build on the projects that have the most chance of funding, success and impact.

Other colleges that have living lab programs to look into: University of British Columbia; Lane Community College, Eugene, Oregon; NYU

Other advice for starting living labs:

- Look for people that have energy around the topic
- Start with a vision
- Engage people with workshops?
- Create a foundation for things to move forward!
- It is not something to be taken lightly, you need a concerned/concentrated effort

Sam Kosoff

Director of Sustainability, The Lawrenceville School

Sustainability objectives in kitchen and dining hall
 separate trash, compost, recycling, liquid
 consumers (the students, teachers) responsible for sorting, freeing employees to do other things (i.e. more time and more people to help cook)
New partnership with Waste Management
Food waste » vermiculture (worms) » “tea” for fertilizier
 not during winter (worms moved inside and still break down food but too cold to make the tea)
 science classes record data; possible experiment with making tea from leaf compost and comparing it with vermiculture tea (perhaps on two different 10 yard strips on football field)
Leaf composting program (used to be taken off campus, now part of system), with composting mounds on campus
Detritus collection » rent giant grinder machine to break it down into woodchips and mulch they will use around campus
Organic garden: small, would not be able to feasibly feed school with a garden, but is on a main thoroughfare of campus, so seen by many and provides a visual connection with what we eat
Student involvement:
 environmental sciences classes: utilize the campus as a living lab often, collecting data, learning things, etc.
 independent studies and projects, some involve the campus (a need for some students to leave a legacy)
 Sam’s sustainability class: more involvement with the students and campus, challenges them to add to the campus’s sustainability
Solar farm with bee hives!
 Private Purchasing Agreement, 30 acres, provides 90% of energy for Lawrenceville campus
 not as integrated into classes as Sam would like
Farm: School supported agriculture (vs the usual community supported agriculture)
Always looking for the next new sustainability thing....solar farm was talked about for a year but then talk died down, what’s the next thing to keep the conversation going?
ISSUES:
 labor, time, costs! and *maintenance with student projects*
 need for projects to be doubly sustainable, help with overall campus sustainability but also be sustainable themselves/low maintenance
Golf course: use their own fertilizer on it, Sam would like to turn it into meadows, or other more natural environment, but it is an important part of campus and used by the community; it could be a lot more sustainable
Pond: better now with more native plants than in past but still have issues because everything drains there
 rallying point for community to be involved with campus sustainability
 many classes and projects use the pond and stream
doing something meaningful, lasting, leaving your mark on campus on why many students

work with their hands creating something for projects
Andropogon plans: idealistic but not realistic; great ideas but will be tough to implement because of cost and attitudes
Student perception has changed for the better in Sam’s opinion (anecdotally, no data has been gathered)
 sustainability used a lot on campus
Green/sustainable-focused month (end Jan-end Feb)
 expose more to sustainability
 While most students know about sustainability, there are differing levels of care
 conflicting interests and time; limited “achievements” for sustainability (in terms of standing out for colleges)
islandschool.org
 Bahamas, place-based education, living a living lab!
 tough on students when they return, have lots of ideas but find them difficult to implement here/different culture/lifestyle

Andropogon report:
campus core is spot for “targeted, unthreatening interventions”
campus fringe, leftover and unnoticed spaces provide opportunities for more things to be done

Ari Novy

Executive Director, United States Botanic Garden

USBG similar to Rutgers Gardens

- plants and sustainability

didactic approach - plants for research and education

- traditional: broad range of plants

*role of recreation

- needs ownership of community

- hard if just didactic » need other programs, etc.

- welcomeness, accessibility

sustainability

- increased approach

- resource & human use

historic considerations (different than other places being at the Capitol)

lots of literature on interpretation

- National Park Service -- interpretation of knowledge

signage: not super successful because it is not read or read too quickly

- most who read signage already highly educated or interested

visitor feedback of USBG:

- not a lot about education (more gardens for pleasure)

- teachers: constructive feedback, refining education

hire outside organization to help with visitor interpretation

- Interpretive Master Plan -guide interpretive education

- visual cues processed first and take meaning from them

- challenges: people don't read or don't read English

experiments with 3 plants

- signage did nothing; but object association worked with 2 of 3

- interesting associating

- *best when people could bring their own knowledge with them » more motivation to learn

- choosing plants with the best success

- non-verbal cues, "whetting the appetite" to learn » opportunities for those that are more interested

Postal museum example

- Pony Express poster: **voyage of discovery rather than being talked at

Maintenance

- 60-70% budget is staff, lots of them maintenance

USBG: 70 people, half horticulture, ¼ maintenance, ¼ everything else

- only 9 acres and maintenance is still a tough issue

potential for PhD students and living labs....

- Universities: flat and thin hierarchies » often hard to unify

- meet a need that the PhD students (and others) would have

- science students who don't want to go straight to research (Ecology, etc.)

teachers: struggle to make education come alive, relatable

- General biology and ferns example

- **repeating and durable needs

not just want you want but also what others need

- political part of the process

- make people think it's their idea (Eisenhower quote)

- broad consensus parts

Facilities -- think from their shoes

- working WITH them

- how does it benefit them?

- sense of what's right

- *make them a partner, stakeholder

societal messages: maintenance not as important anymore?

** make people feel valued **

Suggested Contacts

*denotes how many additional times the person was suggested as a contact

- 1. Oscar Scofield, ICMS *** - COOL, plans to make Raritan a teaching laboratory
- 2. Bill Hallman *
- 3. Luke Drake
- 4. Nancy Cantor
- 5. Rutgers Master Plan development team
- 6. Suzanne Sukhdeo
- 7. Michael Sukhdeo
- 8. Kate John-Alder
- 9. Kevin Lyons *** - sustainability
- 10. Melanie McDermott
- 11. Tobiah Horton
- 12. Mike Deluca (Marine and Coastal Labs)
- 13. Xenia Morin - Assoc. Dean and Liaison for Sponsored Programs, Office of Grants Facilitation
- 14. David Tulloch
- 15. Dean Jackie Litt (Douglass Dean) * - historic and cultural uses of space
- 16. Nikki Graf * – floriculture greenhouses
- 17. Scott McPhee
- 18. Working groundsperson for Newell/Starkeys
- 19. Casimir Kulikowski (Comp Science) – Rutgers Gardens rover connection
- 20. Garden Club ladies – Rutgers Gardens
- 21. Sue O'Donald – Rutgers Gardens
- 22. Judy – Rutgers Gardens
- 23. Tony Broccoli – addressing climate change and resiliency on campus
- 24. Dave Robinson – state climatologist; students, campus and climate modeling
- 25. Karl Nordstrom – piers and shorelines

- 26. Josh Kohut – boat for classes on the Raritan, COOL, other ICMS
- 27. Scott Glenn – COOL, other ICMS
- 28. Steven Yergeau – EPA Raritan River data project
- 29. Dunbar Birnie – living lab with Material Science and Engineering
- 30. Jie Gong – living lab with Civil Engineering
- 31. Mike Muller – living lab with Mechanical Engineeringt
- 32. Peter Guarnaccia – health/sociology and NB community connections
- 33. Research methods professor
- 34. Brook Maslow *
- 35. Julie Lockwood
- 36. Lisa Estler - Associate Dean of Planning and Budgets
- 37. Sarah Ralsten – Animal Science
- 38. Carol Byrd-Bredbenner – research on nutrition and college campus environment
- 39. Jack Rabin
- 40. Joe Charrette – Dining Services
- 41. Mike Green – website information/connections
- 42. Head of maintenance for Cook Campus
- 43. Mark Vodak **
- 44. Jim White
- 45. Jim Applegate
- 46. Roger Locando
- 47. Lee Schinder
- 48. Bonnie McKay
- 49. David Howe - limnology use of campus
- 50. Earth Center on River Road
- 51. Sarah Dixon

- 52. Dr. Mark Robson
- 53. Kathleen Rahman
- 54. Janice McDonnell * – MCS and 4-H living lab connection
- 55. Julia Johnson (University of Washington, via Laura and Wolfram)
- 56. Natalie Howe
- 57. Albert Ayeni – internship connections
- 58. Ed Durner – CSA
- 59. Bruce Clarke – turfgrass
- 60. Lily Young – environmental science
- 61. Daniel Jimenez
- 62. Uta Krogman (stormwater stuff)
- 63. Joan Carbone – res life (intersection of academics and res life)
- 64. Barbara Turpin – her perspective as a dean; recreation perspectives
- 65. Mike Millson – Organic Gardening Club
- 66. Beekeeping club
- 67. Ag club
- 68. Sue Dickinson
- 69. Barbara O'Neil
- 70. Douglass Historical Society
- 71. Karl Kjer
- 72. Don Kinesik – perspectives on native landscaping on campus
- 73. Toadshade Wildflower Farm
- 74. Bowman's Hill Wildflower Preserve
- 75. Pat Harrity - Grounds
- 76. Dave DeHart - green recycling and cleaning
- 77. Mike Westendorf

Cook/Douglass Campus Background

LAND USE TYPE

- Urban
- Forest
- Agriculture
- Wetlands
- Water



The majority of the academic and residential buildings on campus are located on urban land. Through investigation of earlier landuse and landcover maps it can be seen that some of this urban land has been reclassified as development occurred from wetland to it's current urban title. This suggests the natural history of this campus was largely composed of wetlands with wet-site tolerant forest areas. While some wetland and forest areas remain, they are fragmented and disjointed from one another. Much of the agriculture on campus takes place southeast of Route 1.

LANDCOVER

- Managed wetlands
- Natural lakes
- Agricultural wetlands
- Tidal rivers
- Artificial lakes
- Stormwater basins
- Streams and canals
- Other agriculture
- Herbaceous wetlands
- Recreation land
- Forest, mixed + deciduous
- Cropland + pastureland



Here the various ecological landcover zones can be seen. This helps to give an idea of the zonation of environmental conditions and the spread of various habitats. It's also helpful in seeing a more detailed interpretation of the land use types.

I WAS SUPRISED BY ALL THE AREA DEEMED URBAN ON THIS MAP. PASSION PUDDLE FOR EXAMPLE IS URBAN BUT IS A GREEN, SPRAWLING LAWN. AFTER CONTACTING UNIVERSITY FACILITIES FOR MORE INFORMATION THE REASON FOR THIS CLASSIFICATION BECAME CLEAR...

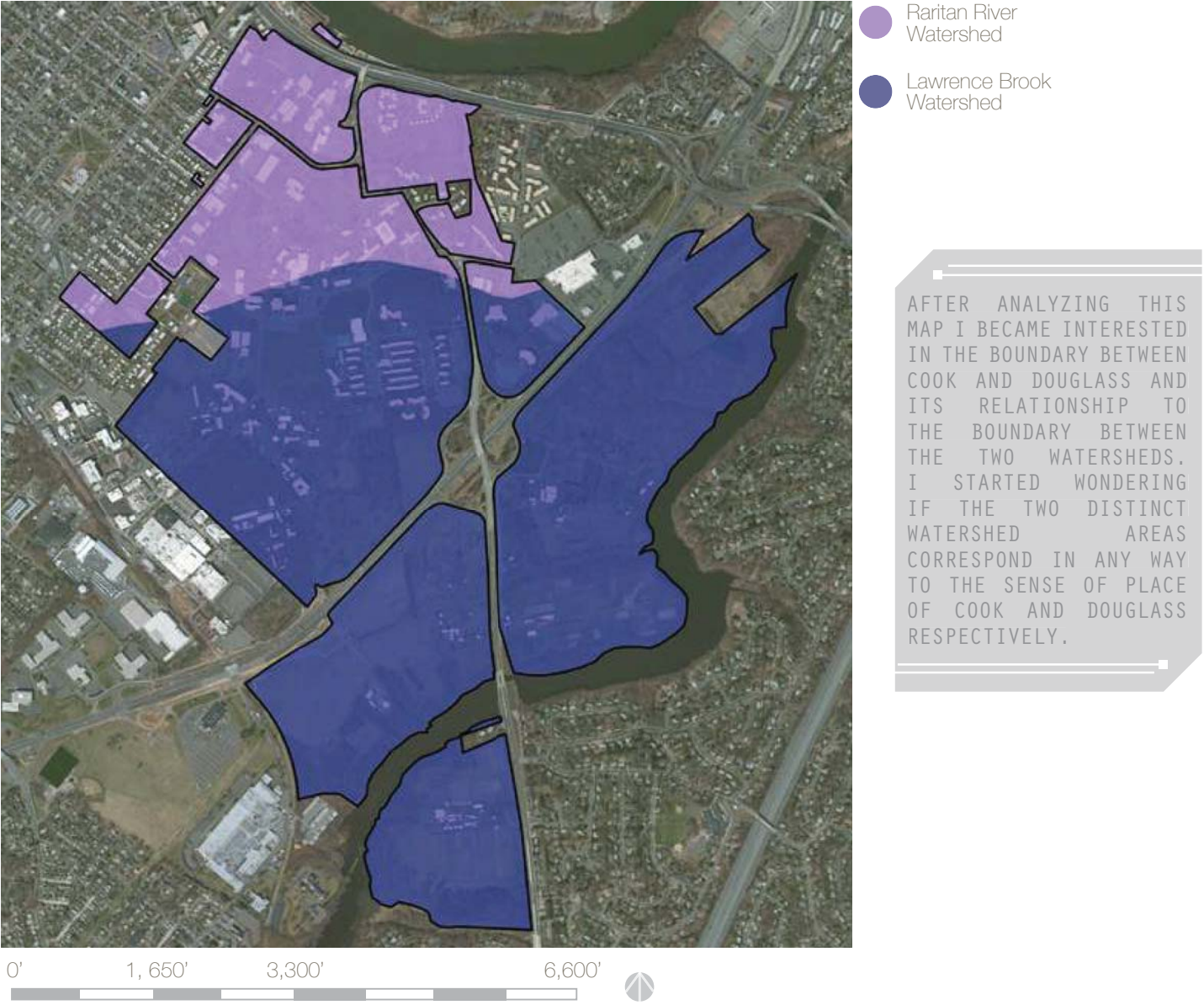
DIGITAL ELEVATION MODEL



The above map shows the topographic changes within campus. There is about 100 feet change between the highest and lowest points. The lowest points are at -2' below sea level and the highest are at 100'. This map helps model how water would flow when it falls over the campus. The southern area of campus has the greatest elevation changes and water will run faster down a slope here than on a more northern spot on campus.

Cook, Rebecca. Designing with Water: Stormwater Management on Cook/Douglass. George H. Cook Thesis. April 2014.

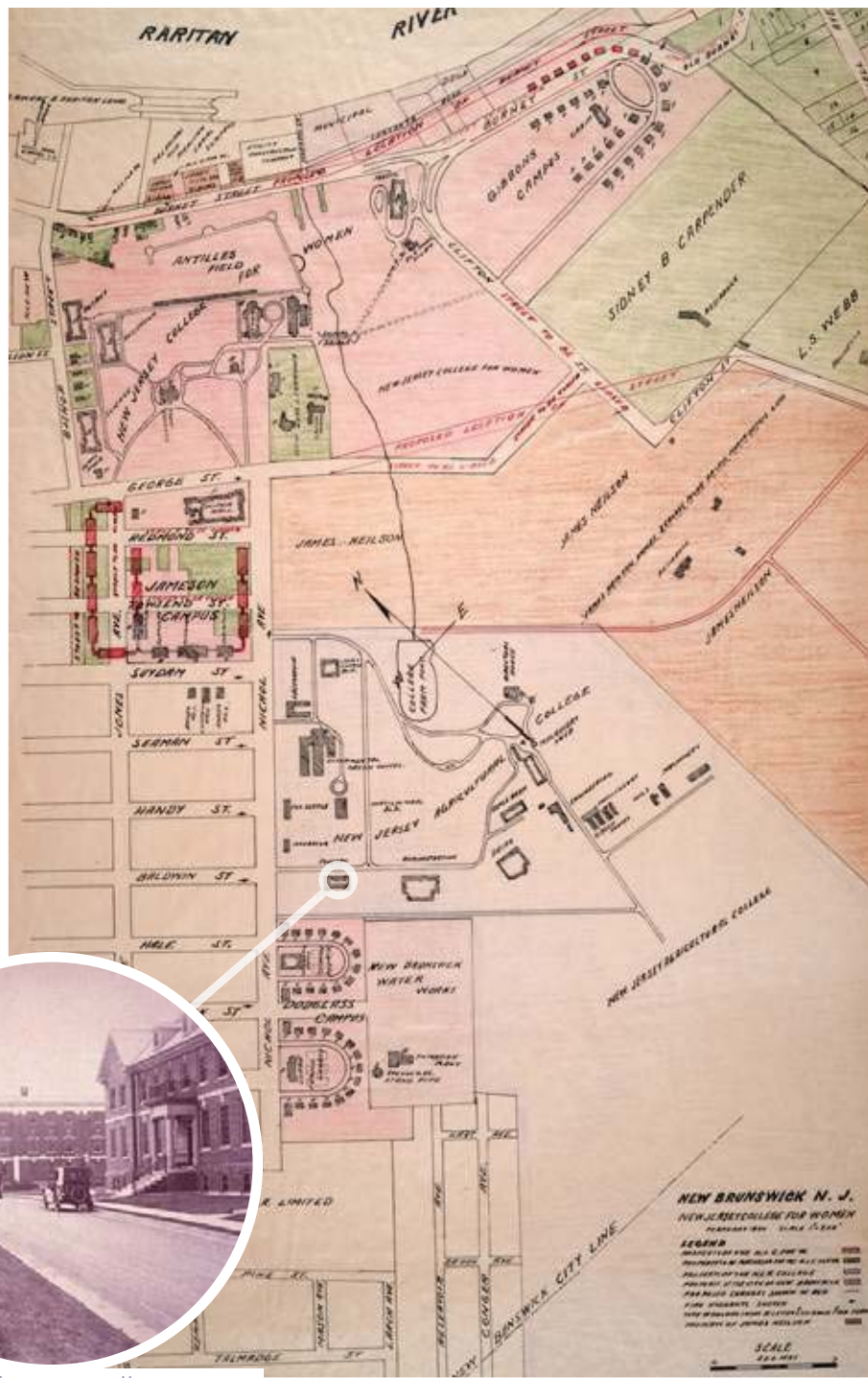
WATERSHED CLASSIFICATIONS



Cook/Douglass campus lies within two watersheds. Most all of Douglass and a good portion of Cook are within the Raritan watershed and thus flow into the Raritan River. Even so, the majority of the campus area is part of Lawrence Brook Watershed. Within this portion is a lower frequency of university buildings and student inhabitant/use areas. Also, this area of campus is sliced by a major highway, Route 1. This map helps to understand where water flows when it lands on a particular part of campus and helps further distinguish the areas of Cook and Douglass.

Cook, Rebecca. Designing with Water: Stormwater Management on Cook/Douglass. George H. Cook Thesis. April 2014.

CAMPUS MAP, 1929

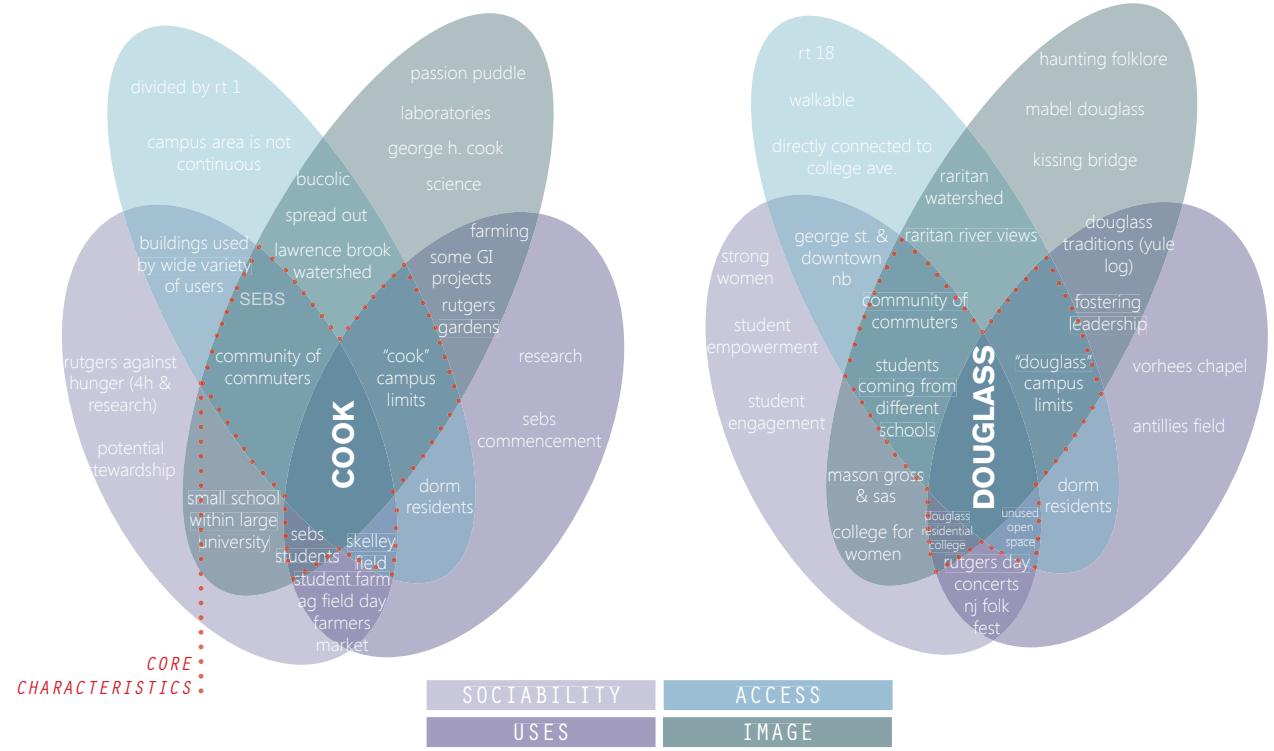


A VIEW OF THOMPSON HALL, THEN HOME OF NEW JERSEY AGRICULTURAL COLLEGE'S POULTRY DEPARTMENT, DOWN LIPMAN DRIVE

Map courtesy of Rutgers University Archives. Photo of Thompson Hall from See Appendix for additional historical maps

Welcome to the George H. Cook Campus, home to the *SCHOOL OF ENVIRONMENTAL AND BIOLOGICAL SCIENCES* and the New Jersey *AGRICULTURAL EXPERIMENT STATION*. The campus is named after *GEORGE H. COOK*, the first head of the *RUTGERS SCIENTIFIC SCHOOL* (later to become the School of Environmental and Biological Sciences). Find links to information about events and services on and around the campus. If you have questions or comments, please feel free to contact us.¹⁸

Welcome to the *BEAUTIFUL AND HISTORIC* Douglass Campus. Douglass is home to many academic departments in both the *SCHOOL OF ARTS AND SCIENCES* AND THE *MASON GROSS SCHOOL OF ARTS*, as well as research centers such as the nationally prominent Eagleton Institute for Politics. Originally New Jersey College, in 1918, the name changed to Douglass College in 1955 in honor of the first dean, *MABEL SMITH DOUGLASS*. Rutgers has maintained its *COMMITMENT TO WOMEN'S EDUCATION* through the programs on Douglass Campus, primarily *DOUGLASS RESIDENTIAL COLLEG*. Douglass campus also houses the striking *VOORHEES CHAPEL AND THE UNIVERSITY INN AND CONFERENCE CENTER*.¹⁹

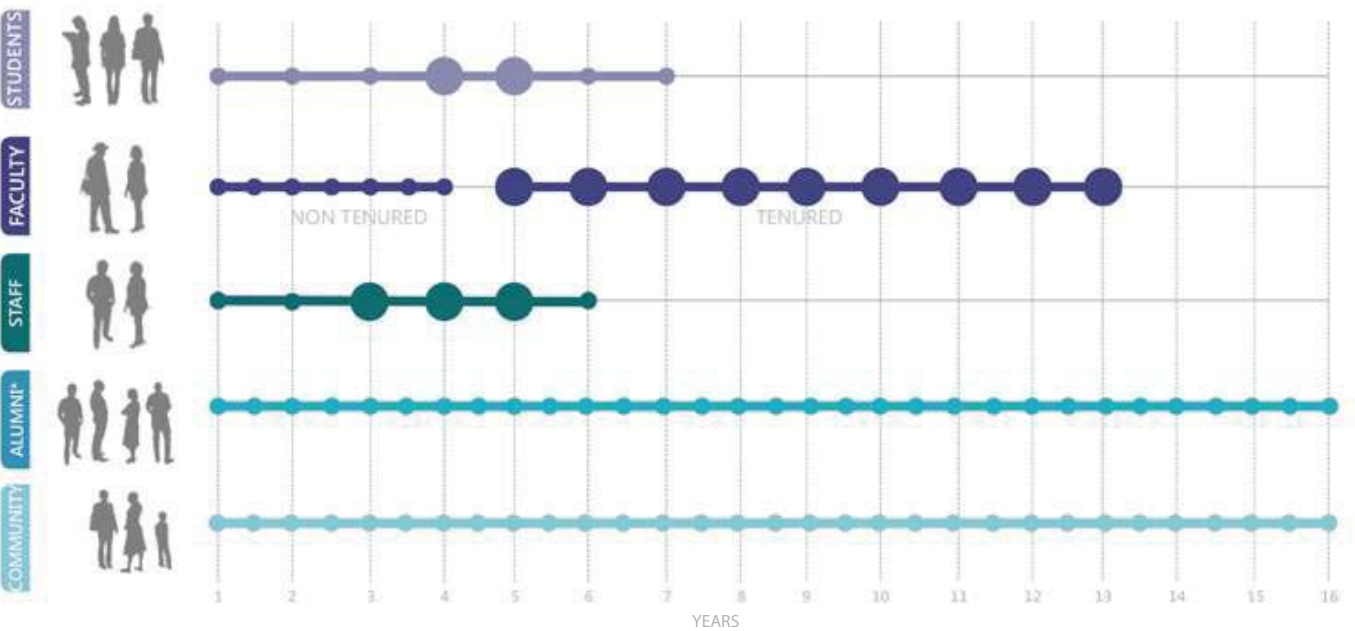


Cook, Rebecca. Designing with Water: Stormwater Management on Cook/Douglass. George H. Cook Thesis. April 2014.

Cook, Rebecca. Designing with Water: Stormwater Management on Cook/Douglass. George H. Cook Thesis. April 2014.

Cook/Douglass Users and Use Patterns

USER TIMELINE

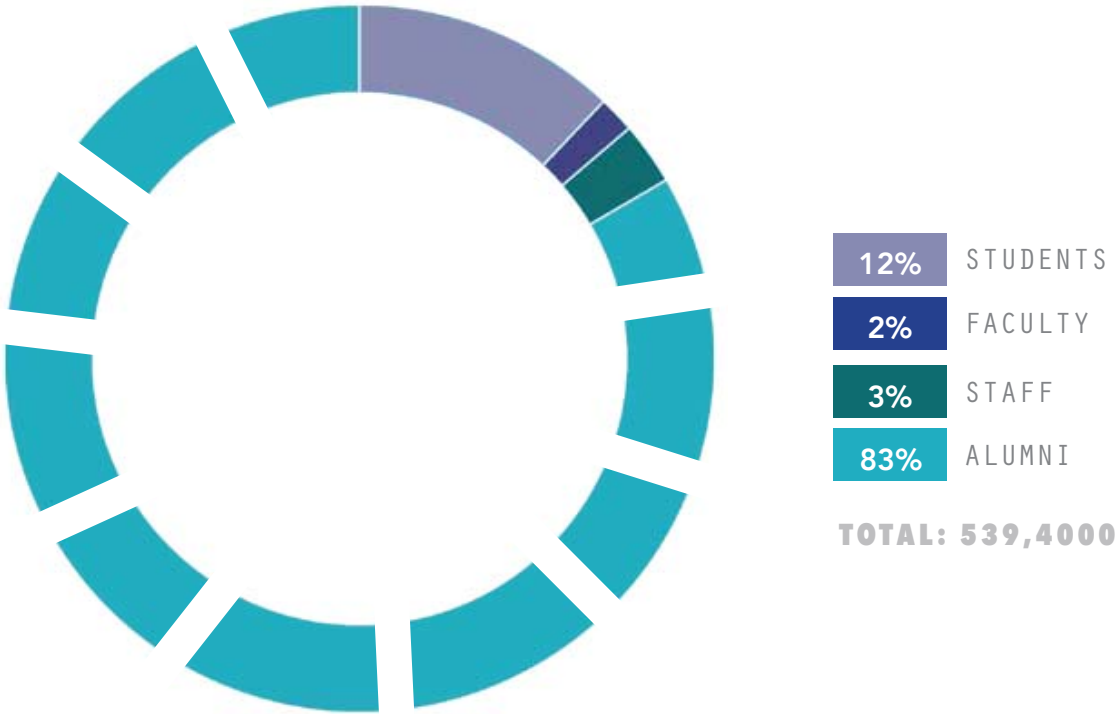


This figure shows the time each stakeholder interacts, on average, with campus. Students are on campus for as long as they attend the university until they graduate, an average between four and six years, according to the National Center for Education Statistics'. Faculty have a range of average times they hold positions on campus, depending on if they're a visiting/temporary instructor, with an average of five or a tenured faculty member, with a significantly higher average. Alumni and their friends and family have a lifetime relationship with the university and thus have potential during that entire time to come back and visit campus.

These findings are significant in designing interactive and educational green infrastructure for campus because the longer green infrastructure is relevant to visitors the more sustainable it will be. This research suggests that appealing to annual or even less frequent visitors (such as alumni and their loved ones) is valuable because their relationship with campus is the most prolonged. Based on this data, events such as Rutgers Day can be valuable opportunities to showcase campus sustainability projects. These findings inspired a closer look into the proportion of each user type to the total number of campus users. Without knowing how significant each type is to the whole, it is hard to put the findings of the timeline into perspective.

.....
* Alumni accounts for both alumni and friends + family of regular users Bureau of Labor Statistics. Number of Jobs Held, Labor Market Activity, and Earnings Growth: Results from a Longitudinal Survey. U.S. Department of Labor, 2012. Print. National Center for Education Statistics' Integrated Postsecondary Education System. Graduation rates by state. The Chronicle of Higher Education, 2010. Web. 18 Jan. 2014.

USER RATIO

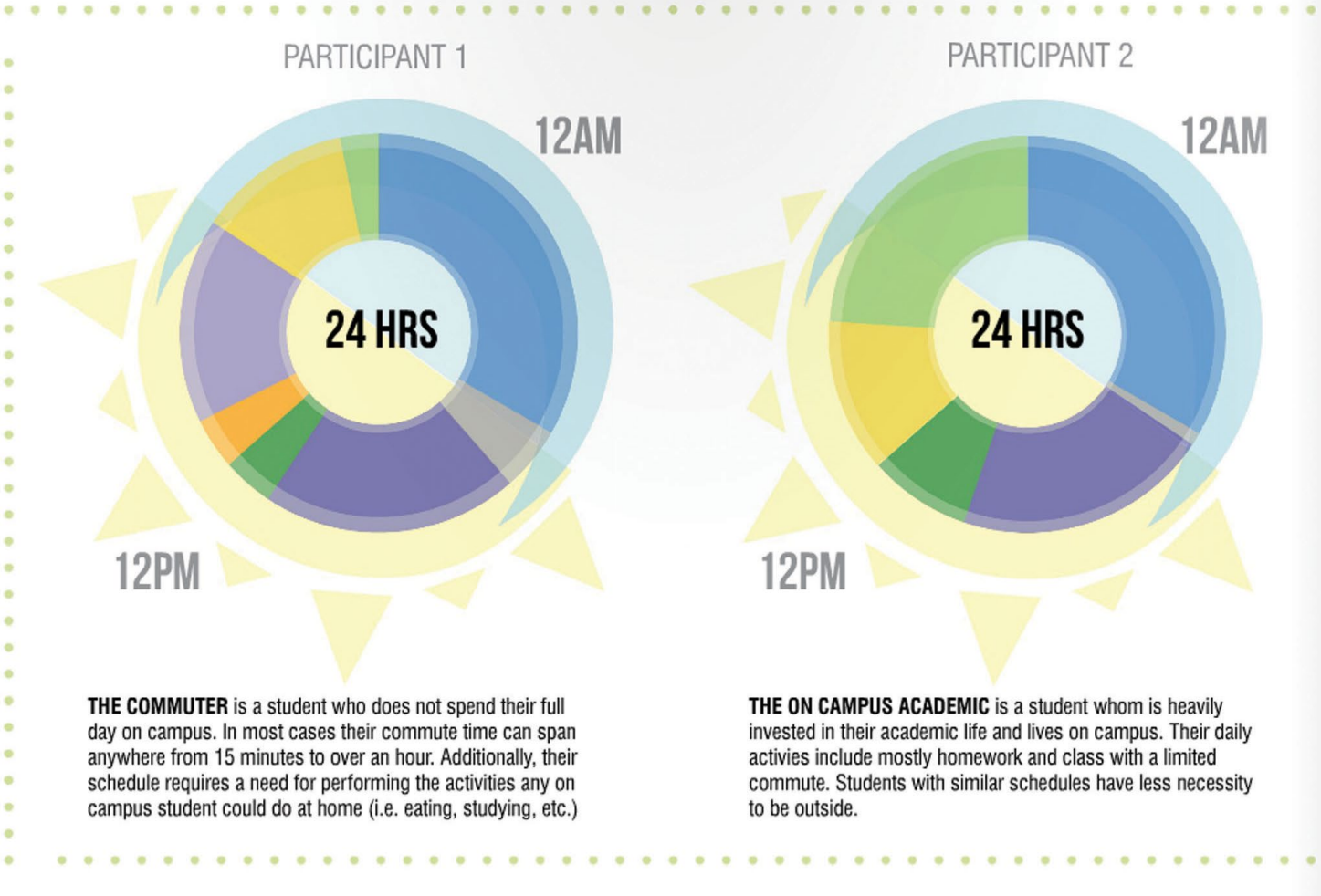


This figure shows the number of user types within the Rutgers University community in relation to each other. Alumni is the most expansive group, but its intermittent. Students are also a significant portion of the community. This goes to show that people who currently attend or attended the university make up the majority of the community. Both faculty and staff represent a minute portion of the total number of community members. It is important to note that there was no data on number of family and friends associated with students and alumni but it can be assumed their presence is represented proportionally to the number of students and alumni.

The most significant group to design for is students of the past and present. As a result, design focuses should be around places students use most because these are places they can best learn from and also the ones they will remember when they revisit as alumni. Additionally, spaces where alumni come (spaces used for receptions and events) are key focus areas. They must address and resolve water issues while also inspiring learning in the time the alumni is there, which could be just a few hours or even in momentary passing. In conjunction with the findings of the timeline, it can be concluded that alumni are an extremely important user group to consider when designing for Cook/Douglass campus.

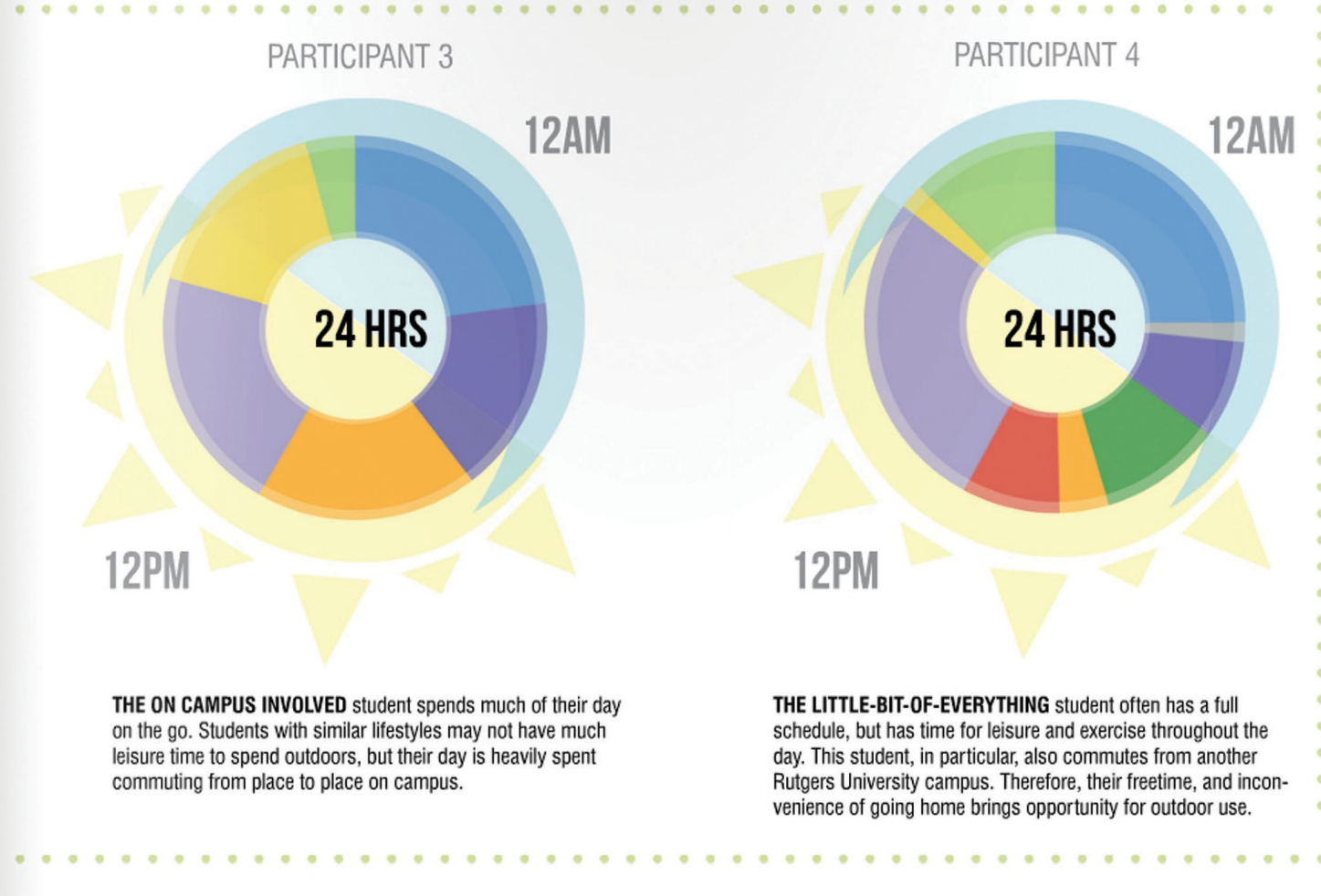
.....
"Facts & Figures Rutgers, The State University of New Jersey." N.p., Web. 18 Jan. 2014.

24-HOUR DAY// THE STUDENT LIFE ON CAMPUS



The diagrams below show the wide variation between the way students spend their days on campus. The student's perception of campus as "home" makes it the place that they spend 24 hours of their day. Below, the pie charts represent a full day of living on campus. Each student represents different on a small sample of the wide variety of campus lifestyles

- SLEEP
- COMMUTE
- CLASS
- EATING
- INVOLVEMENT
- EXERCISE
- WORK
- HOMEWORK
- LEISURE



SOCIAL HOTSPOTS

A CLASSIFICATION OF BUILDING AND SPACE HIERARCHY

Trying to figure out where people go on a campus with such a large influx of people throughout the day and night seems nearly impossible to do without surveying a good portion of the population. It's important to figure out the buildings and areas that are utilized the most.

In today's technological society, the use of social media has the potential to tell a lot to about people's locational habits and preferences. 'Checking-in' is the concept of geospatially tagging yourself at a location at a certain point in time and is frequently used among the culture of social networks and apps such as Facebook, Twitter, and Instagram. The main powering source behind many of these GPS check-ins is the engine and website known as Foursquare. Foursquare, and the similar check-in engines on other popular social media sites allow you to search places that are within close proximity to your relative co-ordinates, or to create your own space. Within the social networking culture, check-ins are done at places that people deem important, memorable, and noteworthy based on either frequent daily use or one time 'tourist' visits.

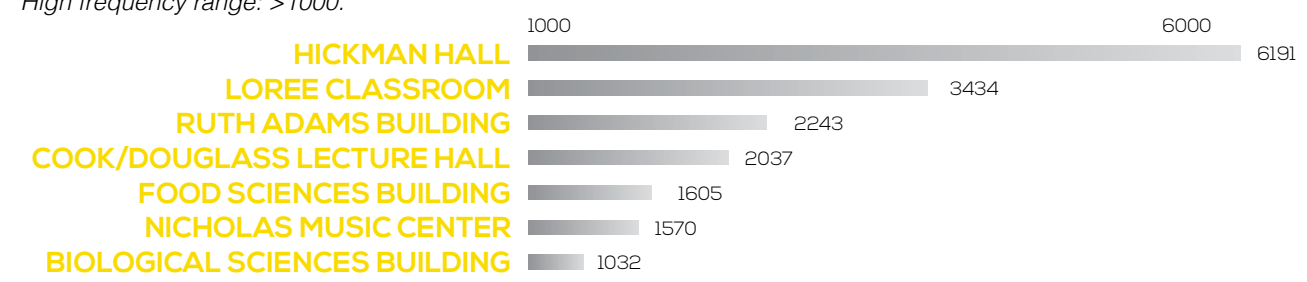
In the college realm, check-ins occur most at places that students are frequently in for class, studying, or other recreational activities. This data can provide unique insight into which places on campus are important to the Cook/Douglass culture that may not come across in a standard inventory of people. By no means is this data scientific, but for the purposes of designing a more relevant network it can help to create a hierarchy of use based on something more social than just numbers.

The following check-in data was gathered from combined counts from Facebook, Twitter, Instagram, and Foursquare that are publicly available. Based on the mean within each category of building/space type, a range was created from high to low frequency of check-ins. Shown below are the top hits that fell into the high frequency range for each category, and thus can be considered social 'hotspots' on campus.

Data taken on February 19th, 2014. Current values may be different.

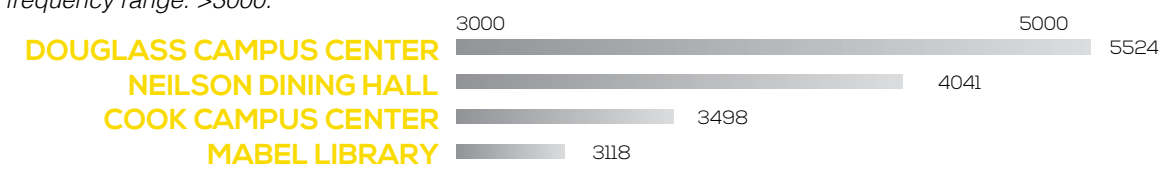
ACADEMIC BUILDINGS

*Classrooms and lecture halls used primarily during scheduled 'school day' hours.
High frequency range: >1000.*



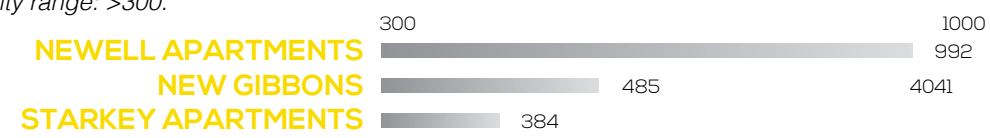
COMMUNITY BUILDINGS & SPACE

*that primarily serve the more permanent community.
High frequency range: >3000.*



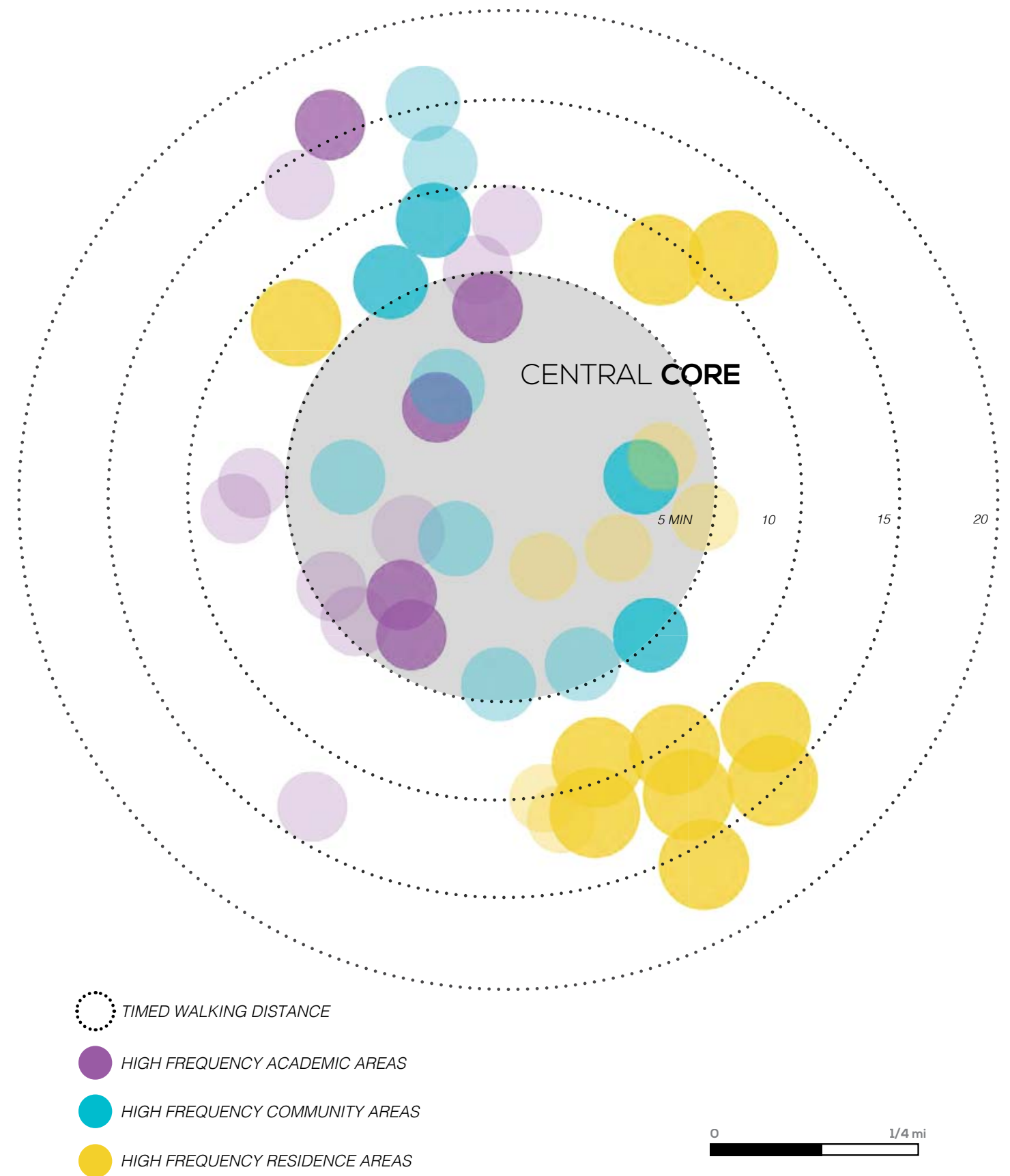
RESIDENTIAL HALLS & APARTMENTS*

High capacity range: >300.



* This data is based off of concrete numbers from Rutgers University Residential Life statistics. Based on my personal behavioral assumptions, people are less likely to check-in at their residence because it is a place they mostly come to rest at; it is under this assumption that social media check-in data would not properly represent the importance of residential buildings on campus and therefore actual resident numbers were obtained.

Woods, Jessie. Sustainable Transportation Strategies. George H. Cook Thesis. April 2014.



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