LIVING LAB **Learning Adventure**
Promoting a Resilient MIT

STFF
RESILIENT ECOSYSTEMS

RESEARCH PROBLEM

How will changing climate hazards impact MIT's students, staff, faculty, buildings, research, operations, infrastructure and landscape, and what steps can we take now to thrive in the face of these climate changes?

SOLUTION

To be a campus that can continue to fulfill its mission within the face of impending climate threats (i.e. buildings and programs that are designed to flood while still maintaining research, education and student life goals).

LIVING LAB **Learning Adventure**
MIT Flood Vulnerability Study

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RESEARCH PROBLEM

What is the capacity of MIT's landscape to cope with the extreme precipitation events anticipated as a result of changes in climate?

SOLUTION

Identify strategies/actions that enable the MIT campus to continue operations during severe flooding events (i.e. keep occupants safe and provide flood-proof infrastructure that delivers key services to buildings).

LIVING LAB **Learning Adventure**
Energy Consumption of Building 18

SORE
LOW CARBON CAMPUS

RESEARCH PROBLEM

How does the MIT campus consume energy? What recommendations can be made to reduce energy usage?

SOLUTION

Calculate the energy balance of the second largest energy consuming building per square foot on the MIT Campus (Building 18). Study fume hood operation and the behavior of lab staff, students and principle investigators.

LIVING LAB **Learning Adventure**
Stormwater & Landscape Ecology Plan

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RESEARCH PROBLEM

How can every inch of the MIT campus landscape serve critical functions faced by a changing climate such as capturing, cleansing and reusing urban stormwater while also moderating increasing heat stress?

SOLUTION

A greater awareness of the role that our site and buildings can play in managing stormwater flows demonstrated by active interventions in campus projects to attenuate stormwater quantity and quality challenges.

LIVING LAB **Learning Adventure**
MIT Flood Vulnerability Study

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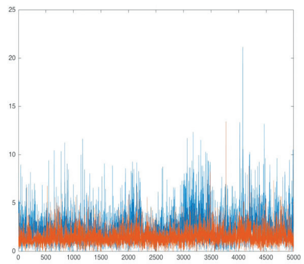
Leading Players
Office of Sustainability (Brian Goldberg, project manager bsgold@mit.edu), Joint Program on the Science and Policy of Global Change (Dr. Ken Strzepek, Research Scientist, strzepek@mit.edu)

The Story
Professor Kerry Emanuel initiated this study to evaluate the applicability of his global tropical storm pathway prediction models to the MIT Cambridge campus area for understanding future climate change impacts to MIT. The urban stormwater flooding of the campus was modelled by MIT Research Associate Ken Strzepek, to evaluate the capacity of the campus landscape to attenuate stormwater flows.



Preliminary findings suggest that the campus buildings and landscape are already exposed to significant flooding conditions under extreme storms in today's climate, while climate changes are anticipated to further exacerbate the intensity, frequency and duration of future flooding events. Buildings and infrastructure of greatest flood exposure are being identified for informing next step efforts by campus planners for determining adaptation plans.

For more information contact Brian Goldberg bsgold@mit.edu).

6 months

Feasibility Study

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CLIMATE RISK AND RESILIENCE

$$\text{Vulnerability} = \frac{\text{Exposure} * \text{Sensitivity}}{\text{Adaptive Capacity}}$$

$$\text{Risk} = \text{Probability} * \text{Consequence}$$

The Players:
Office of Sustainability (Brian Goldberg, project manager bsgold@mit.edu),
Office of Emergency Management (Suzanne Blake, Manager, smblake@mit.edu),
Office of Campus Planning

The Story
Although the MIT Cambridge campus has flourished for its first one hundred years, climate changes such as heat stress, inland flooding and storm surge/sea level rise threaten the next hundred years and beyond. Working with a diverse collaboration of campus staff, faculty and students, we are beginning a process of understanding our physical and social vulnerabilities and risks to climate change hazards.

The analysis will provide MIT's operational and academic leadership with a prioritization of campus assets most at risk from climate impacts. Additionally, the MIT Resiliency Plan will advance strategies that can enable MIT to prepare for and adapt our most at-risk campus and community assets to mitigate climate impacts.

For more information contact Brian Goldberg bsgold@mit.edu).

6 months

Feasibility Study

LIVING LAB **Learning Adventure**
Stormwater & Landscape Ecology Plan

STFF
RESILIENT ECOSYSTEMS

The Players
Office of Campus Planning (Laura Tenny, Senior Campus Planner, ltenny@mit.edu and Todd Robinson, Campus Planner, toddrobi@mit.edu);
Office of Sustainability (Brian Goldberg, project manager bsgold@mit.edu),

The Story
Approximately sixty-four percent of MIT's 169-acre Cambridge campus is covered in impervious surfaces (roofs and pavement). Rain falling on these surfaces becomes stormwater runoff that can cause flooding on campus and convey pollutants into the Charles River. The Office of Sustainability and the Office of Campus Planning are developing a comprehensive campus-wide stormwater management and landscape ecology plan that will enhance the productivity of every inch of the campus' built and ecological systems to capture, absorb, re-use and treat stormwater.

Engaging students, staff and faculty in measuring, monitoring, designing and testing new solutions in the landscape is a key measure of success for optimized landscape function.

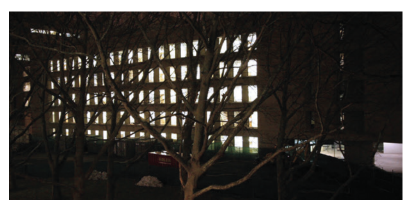
Contact Lead researcher Carlo Ratti @ ratti@mit.edu

6 months

Feasibility Study

LIVING LAB **Learning Adventure**
Energy Consumption of Building 18

SORE
LOW CARBON CAMPUS



The Players
Stephen Thomas Amanti (undergraduate student in Mechanical Engineering)
Supporting Cast
Leon Glicksman, Professor of Architecture and Advisor to Amanti's thesis

The Story
Student Steven Amanti, as part of MIT's Undergraduate Research Opportunities Program (UROP),and under the advisement of Professor Leon Glicksman, studied the energy balance in Building 18; one of the most energy intensive buildings on the campus. He used time-lapse photography and a series of equations to assess energy consumption of HVAC equipment, steam, chilled water, and circulating pumps. He identified potential savings by targeting fume hood openings and targeting the behavior of those using the labs. His work indicated that if unused hoods were closed, the consumption of electricity, steam and chilled water could be decreased by approximately 17% and save the Institute $350,000 per year in utility costs.

The Outcomes
His work sparked another study of fume hoods at MIT involving faculty, administrators and external partners (Weslowski, et, al, 2010), and provided a target for future energy conservation measures projects such as fume hood sash controls that sense the presence or absence of a person in front of a laboratory bench air-circulating hood (Halber, 2008).

Contact Leon Glicksman @ glicksman@mit.edu

1 year

Feasibility Study