Campus Resilience
Climate-ready Landscape Evaluation

Summary

Campuses can serve as examples for landscape resiliency in a changing climate.

In the summer of 2013, four student interns piloted a new tool to evaluate campus landscapes for their sensitivity to climate change and provided recommendations to the land owners. Led by key researchers at The Field Museum, Notre Dame, and The Nature Conservancy, six sites were evaluated over the course of the summer. Two of these sites were at Loyola University Chicago, the highly urban Lake Shore Campus and the suburban/rural Retreat and Ecology Campus. Although designed for the Chicago Region, this tool is of use to campuses interested in considering what issues to explore to make landscapes more resilient in the face of climate change.

Recent Changes in Climate (Since mid-20th Century)
- Annual average temperature increase of more than 3°F since 1945
- Increase in temperature was greater during the winter, than during other seasons, increasing 4°F since 1980
- Much of the warming is concentrated during the cool season and at night
- Fewer cold waves, and a number of major heat waves in the last few decades
- Lengthening growing seasons (indicated by a progressive advance in the last date of spring freezes); current dates are approximately 1 week earlier compared to the beginning of the century
- Lake Michigan ice forming later, lasting shorter periods, with some years having almost no lake ice
- A doubling in the frequencies of heavy rain events (defined as occurring on average once per year during the past century); since the early 1990s
- Increases in fall precipitation resulting in increased annual mean and low flow of streams, without any changes in high annual flow
- Increasing lake-effect snow during the twentieth century which may be a result of warmer Great Lakes surface waters

Changes Expected by Middle to End of This Century*
- Temperature increase—Chicago could expect an annual average temperature increase ranging from 3–4°F under lower emissions to 7–8°F under higher emissions; greatest increases likely to occur during summer and winter seasons
- Hotter summers—number of extremely hot days (over 100°F) could increase from the current 2 days per year to 8 days per year under lower emissions; or as many as 31 days per year under higher emissions
- More heat waves—using the catastrophe 1995 heat wave as a baseline, under higher emissions there could be several heat waves like 1995, each year and one every other year with lower emissions
- More humidity—warmer air holds more water; increased evaporation of surface water would result in increased humidity
- Longer growing season—last spring frost would occur from 30 days earlier under lower emissions to about 30 days earlier under higher emissions
- Less frost—fewer frost days each year and frost depth in the soil will decrease
- Fewer extremely cold days and cold spells—the average coldest day of the year could warm by 4–6°F through this century
- Large seasonal shifts in precipitation—most precipitation occurring in winter and spring, and increased chances of drought in the summer
- More heavy precipitation events—defined as greater than 2.5 inches, the threshold for combined sewer overflush into Lake Michigan; slightly greater increases are expected for regions closer to the Great Lakes; and
- More lake effect snow—increasing winter precipitation (20–30% by the end of the century) combined with less ice

Lake Shore Campus
Stormwater Management—Loyola should continue to improve the stormwater management system through green and gray infrastructure. Already keeping over 18 million gallons out of the combined sewer system, Loyola should expand this to areas currently contributing to the combined sewer system.

Invasive Species—Loyola Planting List currently includes three species that have the potential to become invasive species. Loyola should stop planting these species immediately and create a plan to remove them from existing planting areas across campus.

Overall Landscaping—A large volume of area is currently dedicated to turf grass and/or groundcovers. These add very little ecological value and cost money and energy to irrigate and mow. Loyola should evaluate all turf areas on campus for more productive use considering edibles, wildlife, urban heat island and stormwater benefits.

Primary Recommendations

Primary Risks

Extreme Precipitation
The Chicago region should expect more large rain events and more rain falling during those events. Due to the topography and stormwater/fewer infrastructure, these events cause basement and overland flooding, and untreated sewage to be released into our waterways. This creates hazards for homeowners, aquatic users and ecosystems.

Extreme Heat
During the 1995 heat wave, over 700 Chicagoans died of heat-related illness. Our forecast is to have several similar heat related events each year putting stress on the utility grid, emergency personnel and people with respiratory and heat-related vulnerabilities.

Invasive Species
In a changing climate, weeds thrive. As we see more weather fluctuation, invasive species will take over more and more landscapes, and some new pest species will emerge as issues. Invasive and aggressive species eliminate native species and threaten ecosystem function. Managing these species can be an expensive proposition requiring labor and chemical treatments.

Site Maps

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Clean Energy—Loyola should continue to advance the 2012 Net Zero Energy Master Plan. Currently implementing energy efficiency measures, funding should be identified for renewable energy strategies, including photovoltaics, solar thermal and large wind turbine.

Ecological Restoration—Loyola should continue active management of the east side natural areas including invasives management, species planting and the pond de-commissioning to re-establish hydrology to the wetland and adjoining properties.

Student Farm—Loyola’s student farm is an immersive experience in hands-on sustainability action. It does require significant energy, water and labor resources and these inputs will only increase with climate change. The student farmers should explore conservation measures addressing energy and water reductions and weed reduction measures that support the grassroots approach to agriculture currently at work.

Retreat and Ecology Campus

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Project team included City of Chicago, the Field Museum, The Nature Conservancy, Notre Dame and Loyola University Chicago.

Acknowledgments

Student Interns were:
- Muzit Gebretensae, Loyola University Chicago
- Jessika Magelan, Elmhurst College
- Lydya Nichols-Russel, University of Maryland
- Mary Szabo, Loyola University Chicago

Other sites assessed as part of this project were Chicago Park District, Chicago Museum Campus and the Cook County Forest Preserve District.

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