MINI GRANT PROJECT SUMMARY

Please complete the project summary and return the completed form to April Snyder, Associate Administrator for the Institute on the Environment at aprilsnyder@umn.edu. Paper copies will not be accepted. Please also attach any photos, publications, brochures, event agendas or other materials that were a result of the mini grant summary.

<table>
<thead>
<tr>
<th>Date of Report Submission:</th>
<th>August 10, 2015</th>
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<tbody>
<tr>
<td>Project PI &amp; Dept/School</td>
<td>Brian Smoliak/Peter Snyder, Soil, Water, and Climate/CFANS</td>
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<tr>
<td>Project Title:</td>
<td>Season of Change: Observing Local Environmental Change at the Landscape Arboretum</td>
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<td>Grant Amount $:</td>
<td>$2300</td>
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**Project Context & Purpose**

*Please include the original project purpose statement and revise for any changes that occurred in the project after the start date with a short explanation of the changes.*

The Seasons of Change network will monitor local temperature variations at the Minnesota Landscape Arboretum throughout 2014 and generate opportunities for visitor engagement around interactions between weather, climate, gardens, and the natural landscape.

Specific scientific questions are 1) How does local temperature vary across the natural and managed landscapes at the Arboretum, both throughout the seasons and over the day and night? 2) How do seasonal changes in the landscape affect spatial contrasts in temperature? (e.g. leaf out) 3) Can the network provide insights for Arboretum visitors in the design and management of their home gardens?

This project has a number of objectives that will be addressed: 1) Install and administer a local temperature sensor network at the Landscape Arboretum. 2) Foster research and education collaboration between staff at the University of Minnesota Twin Cities campus and the Landscape Arboretum. 3) Increase visitor engagement on local weather, climate, and environmental change through interactive displays and visible research at the Arboretum.
Work Completed

Please provide a summary of the work that was completed for the mini grant project.

Once the project collaborators (UMN Landscape Arboretum staff) reviewed the proposal, sensor installation work commenced in April 2014, followed by periodic data downloading and maintenance. In total, 24 sensors were deployed throughout the Arboretum. Data from the network was downloaded approximately once per month by a member of the research team from the Department of Soil, Water, and Climatic Data from each sensor were retrieved manually using a USB shuttle. The radiation shield is designed to facilitate this process with ease. Periodic maintenance was necessary because posts that the sensors are mounted on became loose in the ground, and some of the observing platforms became damaged. Informational signs with educational information were added to the network in early summer, once some data had been processed and analyzed for feature in the displays. Design and installation of the signs was complete by the end of July. The three deployed signs are shown in blue on the figure on the last page. These include a placard near the Oswald Visitor Center about the project, one in the Home Demonstration Garden about citizen scientists and what can be done in a backyard, and one under a forest canopy describing the role of trees in cooling the urban environment.

“SEASONS OF CHANGE”
WEATHER NETWORK AT THE ARBORETUM

Patrick Petersen, Editor

During the third week of April, University of Minnesota scientists led by Dr. Brian Smoliak installed a set of 24 temperature sensors around the Arboretum. This “Seasons of Change” network leverages the diversity of biomes present at the Arboretum in order to better understand how different landscapes contribute to spatial variations in temperature. The Arboretum is a unique study area because it contains curated gardens and many acres of natural forest, wetland and prairie.

According to Smoliak: “Although the Arboretum grounds are subject to the same weather variations, we hypothesize that the average climate at individual locations will be up to several degrees different due to variations in vegetation, elevation and sunlight exposure. We expect the temperature differences to be larger at times and smaller at others, depending on the weather (windy vs. calm, cloudy vs. sunny) and time of day (night vs. day).”

This spring and summer, University of Minnesota researchers will collect temperature data from the sensor network in order to answer research propositions such as: do seasonal changes in vegetation such as leaf-out affect spatial contrasts in temperature? Do the patterns of temperature contrast vary by season or are they relatively constant? Can the data provide insights for visitors in the design and management of their home gardens?

Results will be shared with visitors and the public through signage at the Arboretum and public presentations throughout the summer. The project is funded by a grant from the University of Minnesota Institute on the Environment and supervised by Peter Moe, Arboretum director of operations and research.

arboretummagazine • july/august 2014

Story on project in Arboretum Magazine, 2014.
Partnerships & Collaborations

Please provide a summary of the project personnel, partnerships and collaborations that worked directly on the project or were started as a direct result of the mini grant project.

Project Personnel
Dr. Brian Smoliak
Prof. Peter Snyder, Dept. of Soil, Water, and Climate / CFANS
Phil Mykleby, Dept. of Soil, Water, and Climate

Partnerships and Collaborations
Peter Moe, Operations / Research Director, UMN Landscape Arboretum
Prof. Peter Snyder, Dept. of Soil, Water, and Climate / CFANS (through Islands in the Sun IonE project)
To date we have collected nearly 1.5 years of data and we have opted to leave the network in place for the foreseeable future. We are doing this both because the data has provided visitors to the arboretum and scientists a more complete understanding of how urban landscape vegetation can contribute to modifying the local-scale climate on residential property. Additionally, the network has been integrated into the substantially larger Islands in the Sun network that is continuing to function and the information from the Arboretum network is valuable for continued operation of the metro area network. From a scientific standpoint, the information collected from the Arboretum sites (see map below) is allowing us to investigate the spatial extent of local-scale microclimate, especially within the context of attempts at providing sound urban heat island mitigation strategies. Results from these sensors are helping us understand the behavior of different vegetation and landscape types with the goal of producing actionable mitigation and adaptation strategies for urban warming. Additional educational efforts were undertaken throughout the summer and fall through the Arboretum Nature Notes blogs, the Bell Museum-Arboretum collaboration on Cafe Scientifique, and contact with local media (WCCO-TV did a story on Earth Data 2014).

**Fig. 4.** Distribution of 24 temperature observing platforms throughout the UMN Landscape Arboretum grounds. Red flags indicate standard platforms. Blue flags indicate platforms with informational signage.