Semi-Annual Progress Report

Project Number and Title: 4-7, Integrated Green Infrastructure and Sustainable Transportation Planning
Research Area: Thrust Area 4
PI: *Christopher Hunter, University of Rhode Island*
Co-PI(s): *Farhad Atash, University of Rhode Island*
Reporting Period: *10/1/2018-2/28/2019*
Date: *3/31/2019*

Overview:

Provide overview and summary of activities performed during previous two months….

- Conducted a comprehensive review of literature focusing on the topic of green infrastructure: definition, types, approach and importance for climate resiliency.
- Initiated research into the use of the asset management system of the Rhode Island Department of Transportation

Provide context as to how these activities are helping achieve the overarching goal of the project…

- The review of literature provides the background to accomplish the first objective of the research project that determines the potential impact of green infrastructure on the transportation planning process. Integrated green infrastructure and transportation planning provides a more effective context for resiliency for transportation infrastructure.
- The initiation of the asset management system allowed the researchers to begin considering the parameters for impact and the types of data needed for input in such a system

Describe any accomplishments achieved under the project goals…

- A literature review was accomplished.

Describe any opportunities for training/professional development that have been provided…

- *NA*

Describe any activities involving the dissemination of research results (be sure to include outputs, outcomes, and the ways in which the outcomes/outputs have had an impact during the reporting period)…

- *NA*

Encouraged to add figures that may be useful (especially for semi-annual reporting by the project manager and management team)…

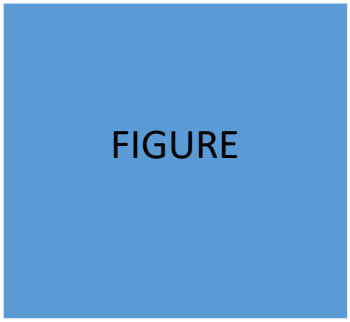

Figure 1: *Figure Title*

A figure is accompanying this portion at the end of the document.

Participants and Collaborators:

List all individuals who have worked on the project.

- Farhad Atash and Christopher Hunter

List all students who have participated in the project. (Include class standing, major, role in the research)

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- No students at this point

What organizations have been involved as partners on this project?

- Rhode Island Department of Transportation

Have other collaborators or contacts been involved? If so, who and how?

Changes:

Discuss any actual or anticipated problems or delays and actions or plans to resolve them…

- We have been asked to revise our initial proposal, and we haven't resubmitted that to determine how we wanted to finalize it. We will continue with the stated tasks and modify if needed.

Discuss and changes in approach and the reasons for the change…

Planned Activities:

Description of future activities over the coming months.

- Review enacted legislations promoting green infrastructure in transportation sector.
- Define green infrastructure approach: Plan; Design; Build; Operations & Management; and Funding.
- Identify specific set of infrastructure parameters to use for performance analysis

Green Infrastructure for Climate Resiliency

Climate change is impacting urban areas in many ways, from exacerbating the urban heat island effect to elevating flood risk. Build green infrastructure to help improve community resilience.

FLOODING

By the end of the century, annual damages from flooding in the U.S. are projected to **increase by 30%** [1]

DROUGHT

1 out of 3 U.S. counties in the lower 48 states face higher risks of water shortages by mid-century.[2]

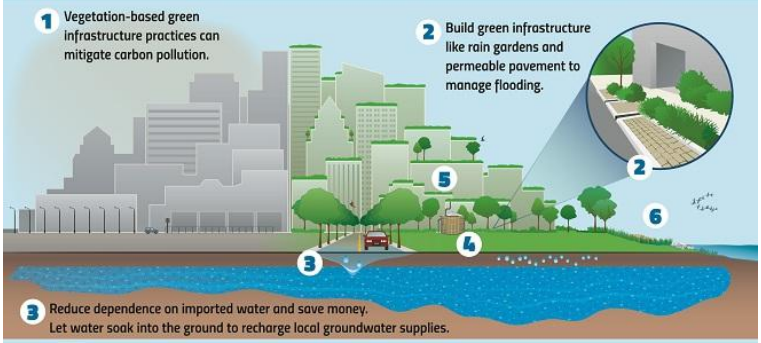
COASTAL DAMAGE

50% of Americans live in coastal counties, where water and energy infrastructure are increasingly vulnerable to higher sea levels.[3]

URBAN HEAT

Climate change will likely lead to **more frequent and severe** heat waves during summer months.[4]

Green Infrastructure Builds Resiliency



3 Reduce dependence on imported water and save money. Let water soak into the ground to recharge local groundwater supplies.

4 Keep water local. Capture runoff in cisterns and rain barrels to reduce municipal water use.

5 Plant trees and green roofs to mitigate the urban heat island effect.

6 Use living shorelines, buffers, dunes and marsh restoration to reduce the impact of storm surges.

Green Infrastructure at Work

LOWER URBAN HEAT ISLAND EFFECTS

Studies show that green roofs can **reduce the energy** needed for cooling on the floor below the roof by more than **50%** [5]

KEEP WATER LOCAL

By capturing rain where it falls, urbanized Southern California and the San Francisco Bay area could boost water supplies by up to **200 billion gallons per year** – as much water as the city of Los Angeles uses annually.[6]

BUILD COASTAL RESILIENCY

Research suggests that **wave height can be reduced by 50%** within the first 16 feet of marsh and 95% after crossing 100 feet of marsh.[7]

MANAGE FLOOD RISK

A study in Burnsville, MN showed a **93% reduction** in runoff volume after the installation of 17 rain gardens in a 5.3 acre neighborhood.[8]

USE LESS ENERGY

Give your air conditioner a rest! One young, healthy tree can produce cooling effects **equivalent to ten room-size air conditioners** operating 20 hours a day.[9]

EPA United States Environmental Protection Agency

For more information on green infrastructure, see: *www.epa.gov/greeninfrastructure*

1. http://onlinelibrary.wiley.com/doi/10.1111/jfr3.12043/pdf
2. www.nrdc.org/media/2010/100720.asp
3. http://nca2014.globalchange.gov/report
4. USGCRP (2009). *Global Climate Change Impacts in the United States.* Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA
5. www.nrdc.org/water/pollution/files/GreenRoofsReport.pdf
6. www.nrdc.org/water/files/ca-water-supply-solutions-stormwater-IB.pdf
7. Knutson, P.L., R.A. Brochu, W.N. Seelig, and M. Inskeep. 1982. Wave Damping in Spartina alterniflora Marshes. Wetlands. 2:87-104.
8. www.ci.burnsville.mn.us/DocumentCenter/Home/View/449
9. www.arborday.org/trees/benefits.cfm