

Project Overview Report

1. UTC Identifying Number

DTRT13-G-UTC28

2. Center Identifying Number

CAIT-UTC-NC44

3. Project Title

Reducing Stormwater Runoff Volumes with Biochar Addition to Highway Soils

4. Principal Investigator & Contact Information

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7. Project Description

Through funding from the National Fish and Wildlife Foundation (NFWF), we recently constructed and instrumented a section of highway roadway soils at the intersection of state route 896 and Bethel Church Road in Summit Bridge, DE. One stretch of roadway soils was amended with biochar, while an adjacent control section was not. In-ground sampling trenches upgradient and downgradient from the test sections are used to quantify the stormwater runoff from each section and the nutrients in the runoff: thus, we are documenting the direct effect of biochar on reducing stormwater runoff and reducing concentrations of nutrients (nitrogen compounds) in the runoff.

This field site will be operated for the next 1-1.5 years, quantifying the effect of biochar-amended highway soils on reducing stormwater runoff and improving runoff quality. In this CAIT at UD project, a disc infiltrometer will be used at monthly intervals to track the time-varying soil infiltration capacity, which we expect will increase with time as biochar alters microbial communities. Concurrently, soil samples will be extracted and microbiological tools used to assess changes in microbial communities, and soil aggregation will also be quantified in these samples using standard soil analysis methods.

Reductions in stormwater runoff data from the NFWF project will be paired with water infiltration, microbial assay, and soil aggregation data collected from this project. Combined, these data will allow us to understand the mechanism(s) by which biochar reduces stormwater volume, which is critical for extrapolating the results from this field test to longer time periods and other highway soils.

8. Implementation of Research Outcomes (or why not implemented)

Our results to date demonstrate that biochar amendments to roadside soils may significantly increase infiltration, resulting in stormwater discharges up to 50-60 % smaller to regulated waterways. In order for regulators to count the benefits of biochar as a soil amendment, it is necessary to convince authorities of biochar's effect on infiltration.

The first step is publishing these results in peer-reviewed journals. This publication should include an explanation of the mechanism by which biochar alters infiltration, which is the focus of this proposal.

The second step is make the engineering and regulatory community aware of this work. Fortunately, we are partnering with environmental scientists and civil engineers who are co-investigators on our National Fish and Wildlife Foundation project. These scientists/engineers are well-connected to the regulatory community in Pennsylvania and the Delmarva Peninsula and have already presented our work to several government and regulatory groups. Most recently, these scientists/engineers arranged for us to present our work on biochar impacts on stormwater to the US EPA Region 3 office in Philadelphia (July, 2016). During and following this CAIT project, we will continue disseminating our work in similar venues, educating regulators about the benefits of biochar soil amendments.

9. Impacts/Benefits of Implementation (actual, not anticipated)

TBD

10. Dates and Budget

Start Date: 9/1/2016

End Date: 12/31/2018

UTC (CAIT) Dollars: \$ 69,910

Cost Sharing: \$ 70,137

Total Dollars: \$ 140,048

11. Keywords

biochar, stormwater, infiltration, TMDL

12. Web Links (Reports and Project Website)

<https://cait.rutgers.edu/cait/research/reducing-stormwater-runoff-volumes-biochar-addition-highway-soils>