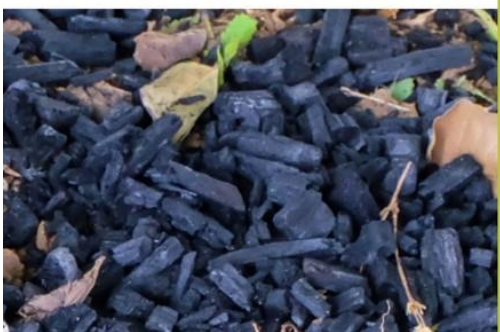




Minnesota
BIOCHAR  SUMMIT
Inaugural Event June 2023

**Wednesday,
June 28, 2023
8:30am-4:30pm
Minneapolis, MN**

Scan for
Conference
Registration
Website



 **Stantec**

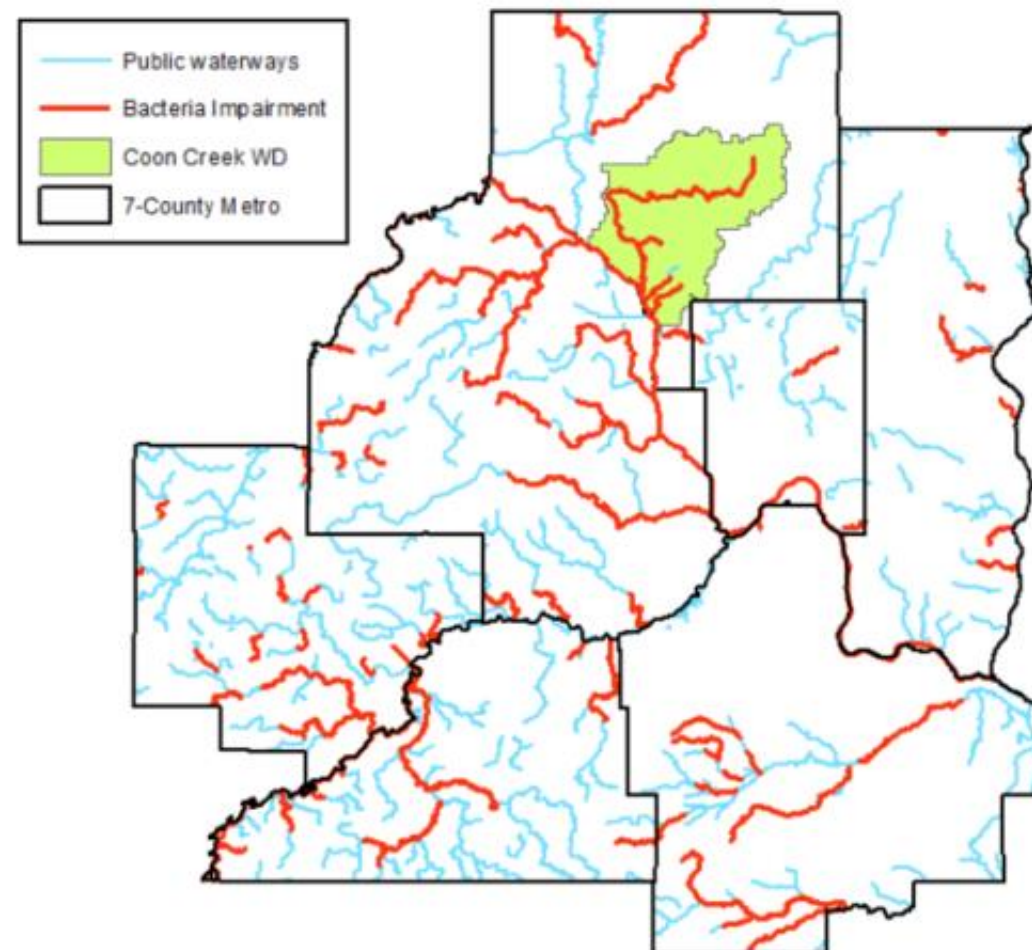
Biochar + Stormwater

Ed Matthiesen, P.E.



- Problem: Too much *E. coli* in urban stormwater

- *E. coli* used as an **indicator** of potential human health risks
- Basis for recreational use impairments
- Bacteria Standards:
 - 126 MPN/100 mL (chronic)
 - 1,260 MPN/100 mL (acute)
 - Need 93.7-99.4% reduction to meet chronic/acute





- Impacts of E. coli in urban stormwater

Outside in MN

Beach closed? Blame it on the rain

Dan Gunderson July 10, 2019 2:35 p.m.



A temporary beach closure sign warn visitors of Thomas Beach at Bde Maka Ska on Wednesday. The Minneapolis Park and Recreation Board found that E. coli bacteria exceeded state specified guidelines at the beach along with the 32nd Street and Hiawatha beaches. John Nguyen | MPR News

MINNEAPOLIS

E. coli leads to record number of beach closures in Minneapolis

An overwhelming amount of rain — and one potentially sick swimmer — has led to a summer ruined by the bacteria.

By Miguel Otárola Star Tribune | AUGUST 14, 2019 — 10:11PM

MINNEAPOLIS

Lake Nokomis beaches reopen after 73 confirmed cases of E. coli illness

A park commissioner says action should be taken to avoid similar closures next year.

By Miguel Otárola Star Tribune | SEPTEMBER 6, 2019 — 10:13PM

CBS Minnesota

High Levels Of E. Coli Won't Stop Beachgoers Amid Hot Streak

MINNEAPOLIS (WCCO) – As the heatwave continues, some beaches are closing because of high E. coli levels. Bde Maka Ska's 32nd Street Beach is...

Jul 24, 2021





• Overview

- The Problem: Bacteria in urban stormwater
- Solution: Biochar as filter media amendment
- Demonstration to Large-scale Filters
 - Results: Performance of Filters and Conclusions
- Next Steps: Upcoming Biochar Projects and Partnerships



• Biochar Overview

- Charcoal-like substance made via pyrolysis of organic material
- Historically used as a soil amendment
- Potential as filtration media amendment
 - Immense surface area, complex pore structure
 - Proven adsorption of heavy metals
 - Shown to remove *E. coli* from stormwater in lab columns (>99%) & small-scale field trials (49-93%)



Samueli
School of Engineering

Mohanty Lab



• Biochar used for Stormwater Filters

“Agricultural Carbon” by National Carbon Technologies

Source Material: Wood burned >550C

Surface area: 339 m²/g ≈100 sq.mi./CY

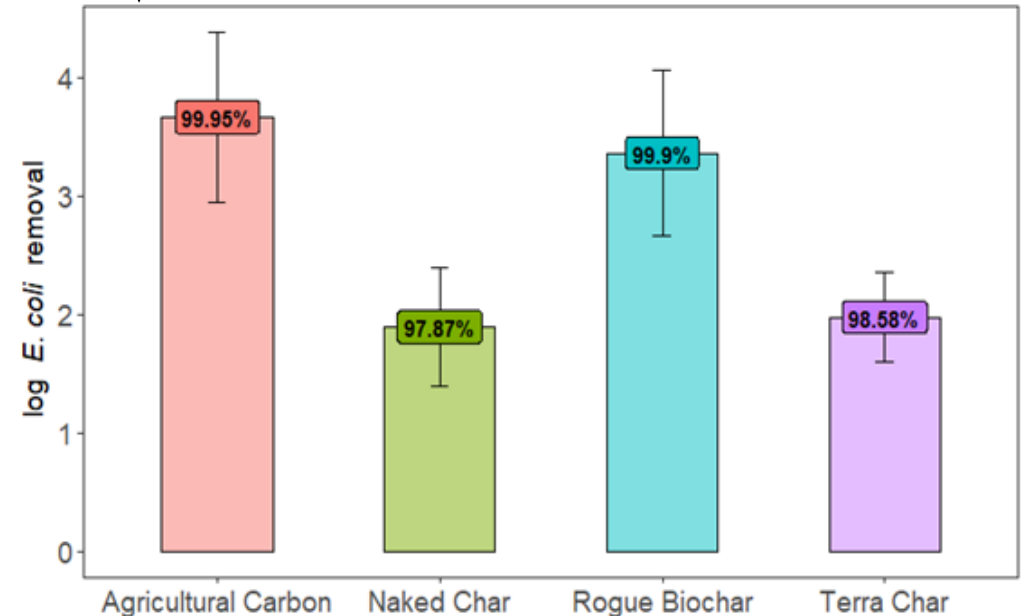
Composition:

- 84% Fixed Carbon
- 12% Volatile matter
- 4% Ash

Shingle Creek Pilot Studies

- Catch-basin inserts
- In-line Stream ‘Job Box’ filters
- Small stormwater pond bench retrofits

99.95% *E. coli* removal in lab trial



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School of Engineering

Mohanty Lab



- **Constructed biochar filters**
- City of Coon Rapids, MN Pumped Filter for Pleasure Creek
- City of Coon Rapids, MN Gravity Filter for Epiphany Creek
- City of Fridley, MN Pumped Filter to address Moore Lake Beach Closure
- City of Champlain and City of Crystal, MN biochar filters
- Fridley City Hall pumped filter
- City of Blaine, Pleasure Creek pumped filter

2021 Seed Grant Awards: Biochar Research Projects with University of MN

- Evaluation of Biochar and Iron-Enhanced Sands in Septic Systems
 - Dr. Sara Heger, CFANS – Department of Bioproducts and Biosystems Engineering
- Mycoremediation of PFAS: Exploring fungal pathways to tackle the “forever Chemicals”

