NC STATE UNIVERSITY

Exploring The Benefits of High Resolution Water Quality Sampling in Stormwater Wetlands

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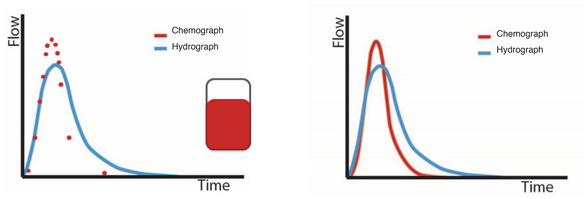
Conventional Sampling

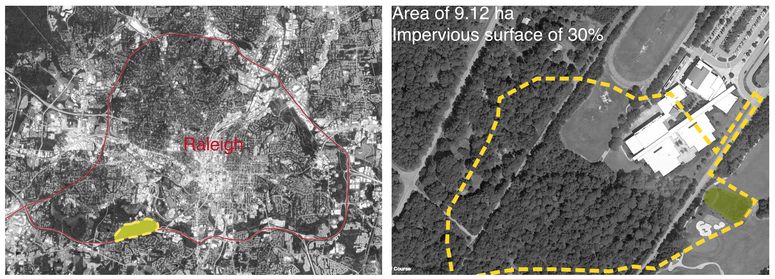
Current studies on Stormwater Control Measures
- Flow proportional sampling
- Event mean concentration sample
- 1 inlet sample, 1 outlet sample
- Performance of system evaluated by comparing pollutant concentration in the 2 samples
- No information about dynamics of the inflow and outflow
- No information about internal functioning of the system



Objectives

1. Obtaining inflow chemograph to better understand concentration reactivity in flashy urban watershed.
2. Obtaining outflow chemograph to better understand treatment effect of stormwater wetland.
3. Evaluating current sampling method of event mean concentration.
4. Obtaining further information about internal functioning of stormwater wetland during high and low flow (spatial and temporal).
5. Creating datasets for future modeling of stormwater control measures.
6. Transferring the results of this research as design suggestion of stormwater wetlands.

Study Site



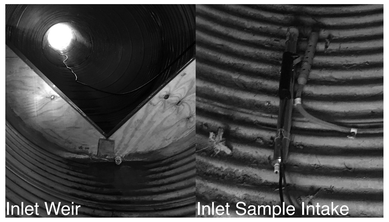
Constructed stormwater wetland
NC State University campus
Raleigh, NC.

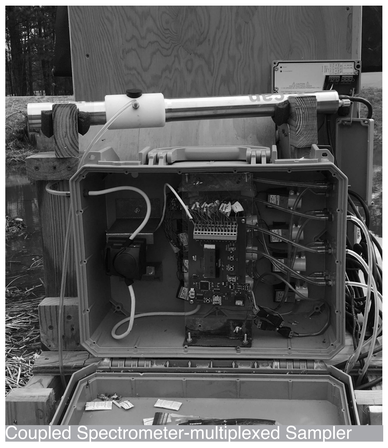
Methodology

Inlet / Outlet
- High frequency sampling UV-Vis spectroscopy (S-can spectrolysers)
- High frequency samples at 8-min time interval
- Discrete water quality sampling (ISCO Sampler)
- Selected samples to be analyzed in the lab

Inside the system
- Coupled spectrometer-multiplexed sampler to obtain spatial-temporal concentration at 3 points
- High frequency samples at 6-min interval for each point, for 3 points

Tested Pollutants
- NO3
- NH4
- PO4
- DOC
- TDN
- TSS





Further Steps

- With use of PLSR (Partial Least Square Regression) and gathered data, we can predict for different pollutants

- Learning from pollutant flow / treatment inside the system we could further learn the best way to divert the flow

- Finally the outcome of this research can be used for credit regulation of stormwater control measures

Aknowledgement

This research is funded by:
Clean Water Management Trust Fund

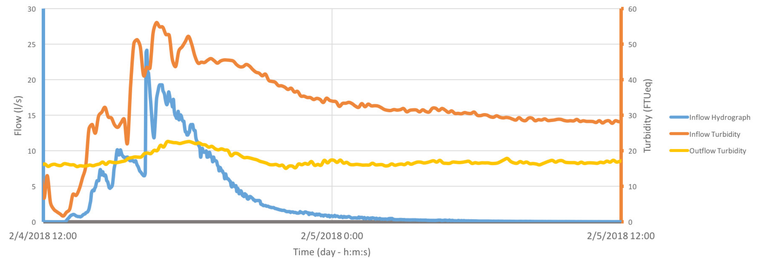
I would like to thank Shawn Kennedy, Samuel Garvey and Jeffrey Johnson for their support and help on this research.

Stormwater Engineering Group
https://stormwater.bae.ncsu.edu

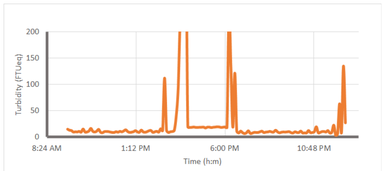
cleanwater MANAGEMENT TRUST FUND

Preliminary Results

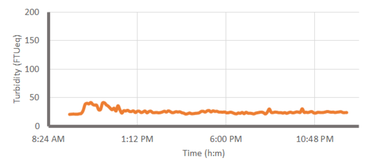
- Use of spectrolysers allows for capturing any size of storm even small ones.
- With spectrolysers we can eliminate the possible change in sample pollutants by testing fresh samples on site (eliminate error caused by sample handling)
- So far the spectrolysers have proven to be more reliable than ISCO samplers



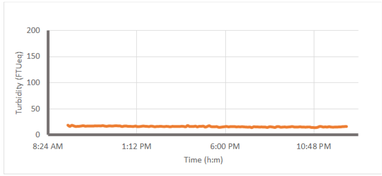
Outflow Tubidity



Point 1-Turbidity



Point 2-Turbidity



Point 3-Turbidity

Significance of Study

- First time high frequency sampling is used in study of a stormwater control measure

- Among few studies that looks into internal functioning of a stormwater control measure