WATERSHED ACTION TEAM FOR ECOLOGICAL RESTORATION

Watershed Plan for a Coastal Plain Watershed: Cool Run

Megan Mauger[1] Gerald Kauffman[2] Anastasia Chirnside[3]
[1]Environmental Science
[2]Water Resources Agency
[3]Bioresources Engineering Department

Introduction:

UD WATER (Watershed Action Team for Ecological Restoration) is in the process of compiling a watershed management plan for the Cool Run Watershed. The first three phases have been completed. In the future we hope to complete and implement the plan.

Study Area:

The Cool Run Watershed is a sub-watershed of the Christina River Watershed. The Cool Run river itself is a tributary of the Wild and Scenic White Clay Creek. Our sub-watershed of focus encompasses most of the UD campus, the university farm, and a portion of the City of Newark.

Methods:

We used the A through I watershed plan protocol created by the EPA in section 319 of the Clean Water Act:

A. Identify sources of pollution and estimate pollutant loads
- We updated and re-categorized the land use data using ArcGis, aerial photos found DE Data Mill, and multiple field observations.
- We were able to quantify the amounts of sediment (TSS, TDS), nutrients (N, P) and metals (Cu,Zn) using the simple method:

[Annual Pollutant Load= area *mean annual precip.*runoff coefficient *event mean pollutant concentration*.2260]

B. Estimate pollutant load reductions that will occur from BMPs:
- Our goal is 80 percent reduction of TSS

[Percent of TSS removed = TSS removal efficiency for selected BMP* estimated annual pollutant load for given area/ total amount of TSS]

C. Design Best Management Practices
- We identified critical areas and decided upon appropriate BMPs that would result in load reductions from section B.

Results:

A. Identify sources of pollution and estimate pollutant loads

Shown here is the percentage of different land types found in the Cool Run. Commercial (25%) and Agricultural (23%) are the highest.

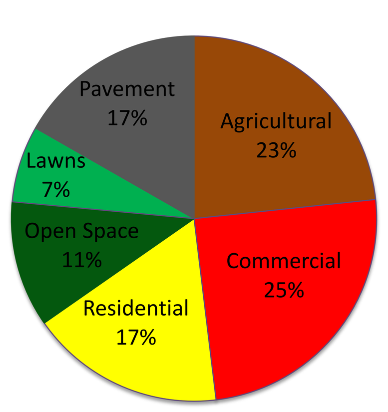


Fig 1: Land Use Areas for Cool Run Watershed

Sources of pollution present (and corresponding BMPs to remediate them):

Pollutant	Point sources	Nonpoint sources
Pathogens	Landfill	Agriculture (6)
Metals	Urban runoff (1,5), CSOs/SSOs, Industrial facilities, landfill	Atmospheric deposition
Nutrients	CAFO, CSOs/SSOs	Landscaped areas (2,3) livestock, fertilizer (2,3,6), atmospheric deposition
Sediment	Urban stormwater systems (8)	Agriculture(6), construction, roads, urban runoff (1,5)
Temperature	Urban stormwater systems (8)	Shallow and/or wide channels, urban runoff (1,5), lack of riparian shading (6)

Using the simple model, we determined the estimated annual pollutant load for sediments, nutrients, and metals according to the different types of land use.

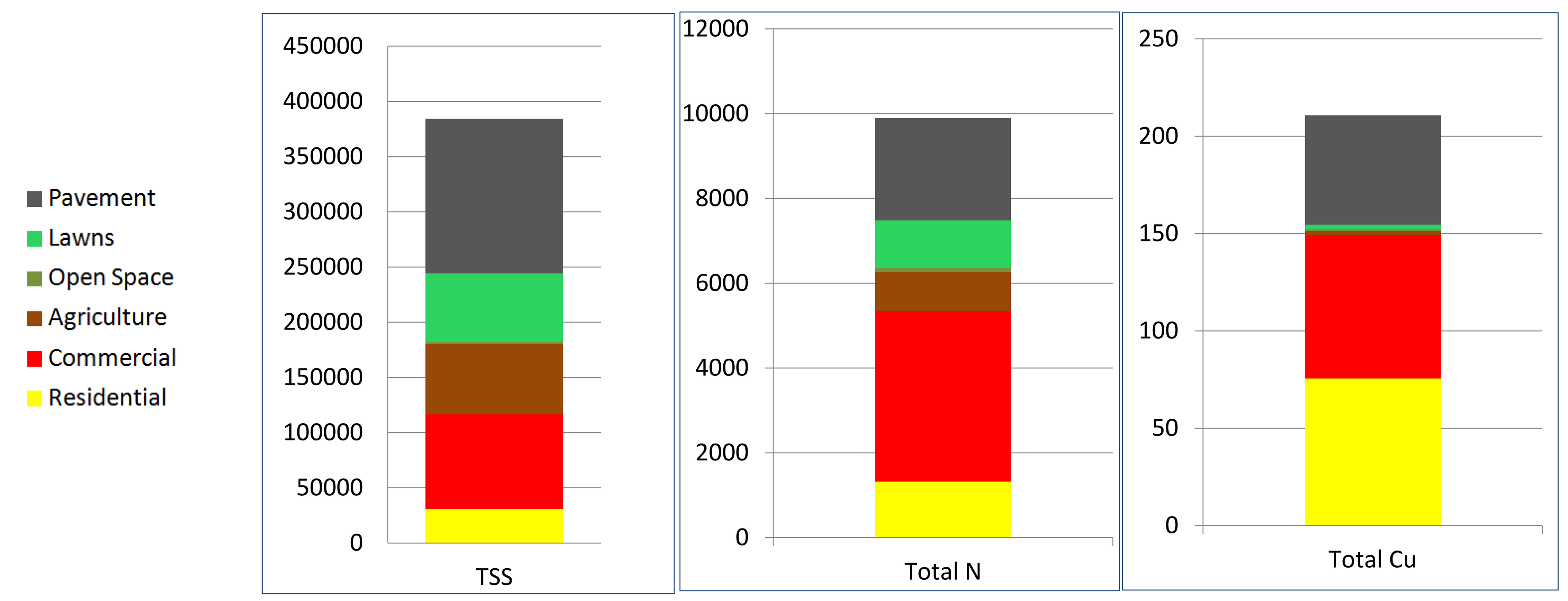


Fig 2: Estimated Annual Pollutant Load for Cool Run (Lbs/watershed/yr)

B. Estimate pollutant load reductions that will occur from BMPS

The BMPs that will achieve 80% reduction of TSS throughout the watershed.

Type of BMP	TSS removal efficiency	Percent of total TSS reduced
Infiltration Practice (porous pavement for street and parking lots)	90%	33%
Transition from lawns to landscaping	95%	16%
Increase riparian buffer by 10 m	80%	13%
Bioretention areas (Green Roofs and rain gardens)	60%	11%

Total : 73% of TSS reduced

C. Design Best Management Practices

1. Install porous pavement in parking lots and streets
2. Implement organic landscaping on UD grounds
3. Start rain barrel and pesticide-free incentive programs in residential areas
4. Daylight the middle fork of Cool Run
5. Install green roofs on Pearson, Townsend, and Perkins
6. Increase riparian buffer through agricultural land
7. Create more wetland areas on campus
8. Retrofit UD buildings with storm water collection systems to be used to irrigate university grounds.

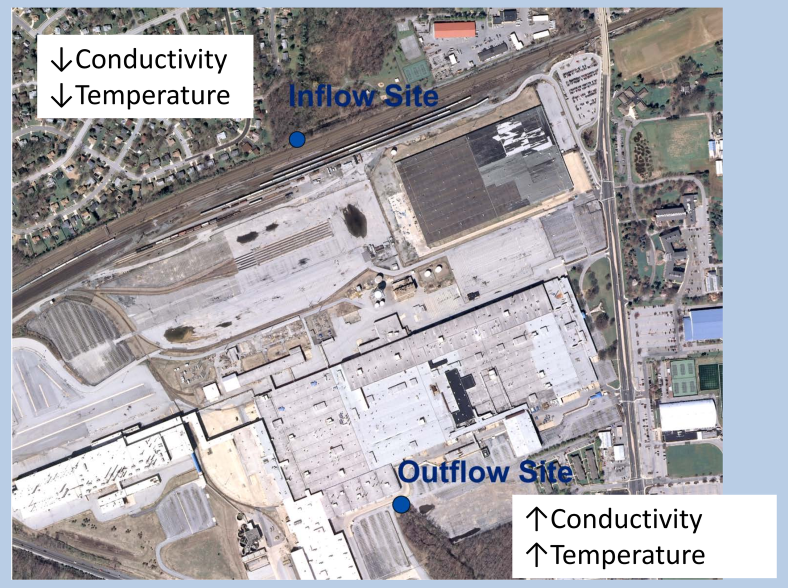
Water quality monitoring at STAR campus

Due to the new construction of the UD Star campus, where the old Chrysler factory is being developed into a new center for health sciences, the UD Water interns took monthly water sample of the Silver Brook creek. By studying the Silver Brook creek we hope to monitor the effect of the new construction on stream health.

Inflow Testing Site

Outflow Testing Site

We sampled monthly, waiting at least 3 days after significant rainfall. With the field probe we recorded dissolved oxygen, sediment, pH, conductivity, and temperature. We also collected grab samples from each site to test for metals, and nutrients.



Results shown are for the first three months of data. Standard values for a healthy stream are shown in orange. The DO for both sites is much higher than the DE minimum for a healthy stream, but this may be due to the cold temps. The TDS is increased and slightly above the standard for the outflow, showing increased turbidity.

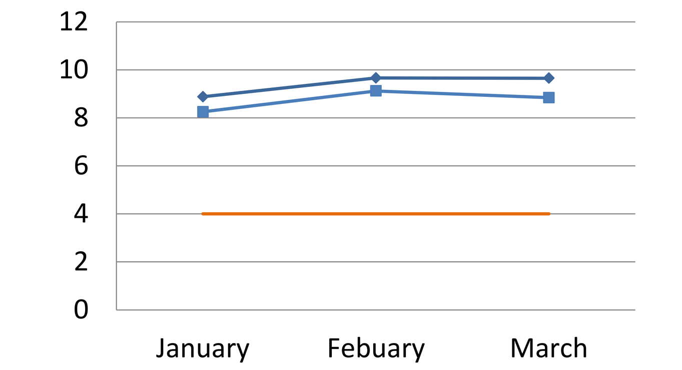


Fig. 3: Dissolved Oxygen for Inflow vs. Outflow (mg/L)

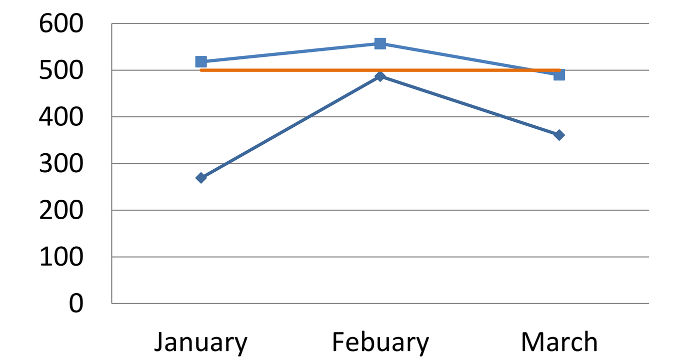


Fig 4: Total Dissolved Solids (mg/L)

Inflow Outflow Standard

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