

Analyzing Water Quality Parameters in the Northeast Anacostia Watershed



Amzah Koroma

College Park Scholars – Science & Global Change Program

Biochemistry

Amzah@umd.edu

CPSP359

College Park Scholars Academic Showcase, May 1, 2026



COLLEGE PARK SCHOLARS

Introduction

Across the Anacostia watershed, urban streams are very susceptible to eutrophication from anthropogenic nutrients. However, the role of both organic and inorganic carbon in eutrophication isn't widely discussed in the current literature. This study investigates the relationships in time for the first and latest complete water years as well as over time between dissolved carbon, both inorganic and organic, as well as total nitrogen across four sites within the Anacostia River watershed in Maryland, assessing their combined influence on eutrophication risk. Using relatively long-term data from 2017 to the writing of the paper in 2025, after analyzing the correlation between total nitrogen (TN), dissolved inorganic nitrogen, and organic carbon. The results, when aggregated, displayed a strong statistically significant positive correlation between DIC and TN, which was observed in 3 sites: Upper Campus Creek, Lower Campus Creek, and Paint Branch Trail.

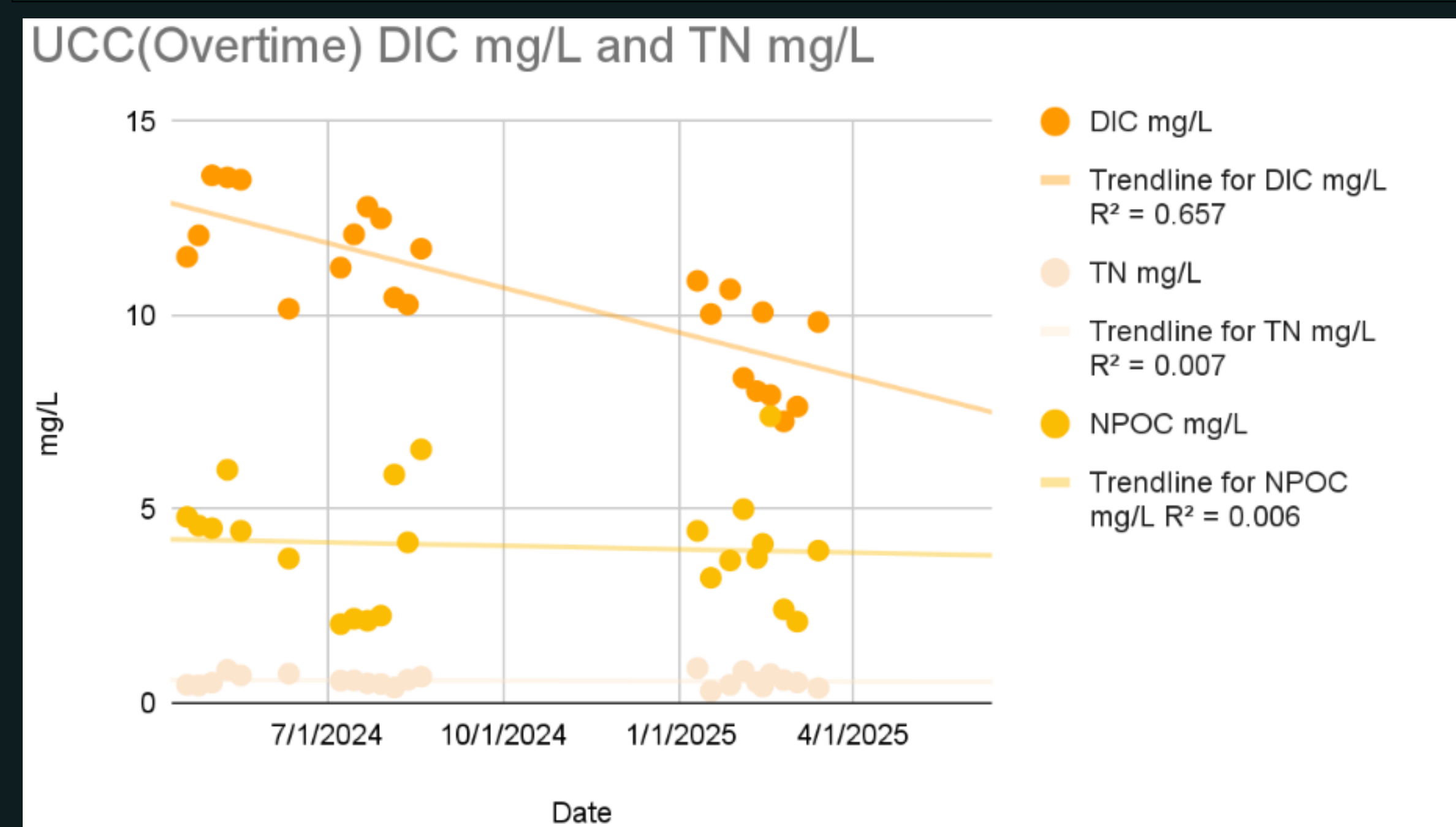
Site	n	Parameter Pair	R ²	p-value	Significance
LCC	428	DIC vs. TN	0.137	3.05E-64	Highly significant
		NPOC vs. TN	0.021	1.81E-118	Highly significant
NEA	293	DIC vs. TN	0.007	0.282	Not significant
		NPOC vs. TN	0.004	2.44E-34	Significant
PB	415	DIC vs. TN	0.096	1.22E-131	Highly significant
		NPOC vs. TN	0.290	5.62E-53	Highly significant
UCC	36	DIC vs. TN	0.657	< 0.0001	Highly significant
		NPOC vs. TN	0.006	6.63E-11	Highly significant

Activities:

This was a summer biogeochemical internship in Dr. Kaushal's lab, performing field sampling and ICP/AQUALog analysis on the Anacostia Watershed to study the impact of C, N, and P on water quality; authored an independent comparative analysis paper

Impact:

The most important finding of this study is the demonstration of identical spatial patterns in the relationships between dissolved carbon fractions and total nitrogen within an urban watershed. The strong, significant correlations in UCC, LCC, PB versus the weak, non-significant relationships in the mainstem river NEA indicate that eutrophication risk is not uniform.



The most notable correlation that was discovered after aggregating the data could be observed in Figure 6 for the Upper Campus Creek (UCC) site, where DIC and TN showed a strong, highly significant positive relationship, returning a $R^2 = 0.657$, $p < 0.0001$, despite the smaller sample size (Figure 6)

Figure 1: Results of linear regression analysis examining the relationships between carbon parameters (DIC and NPOC) and total nitrogen (TN) across four study sites.

Name of Site: Kaushal Biogeochemistry Lab

Address: 8051 Regents Drive, College Park, MD 20742.

Your supervisor: Ashley Mon

Mission Statement:

We seek to answer two overarching questions: (1) how do human interactions with land use, climate, and watershed geology transform the chemistry of inland waters; and (2) how can we evaluate and enhance watershed restoration strategies to reduce water pollution?

Acknowledgments:

I would like to thank Kaushal for having me at his lab and Ashley Mon and the biogeochemistry graduates for their help; Drs. Holtz & Merck;

Discussion: The results our study exhibited partially support the initial hypothesis, revealing a complex picture of the relationship between carbon and nitrogen in the Anacostia watershed. It is important to note that the finding that DIC, rather than DOC, showed the most consistently strong correlation with TN at three of the four sites (UCC, LCC, PB) is significant. By the data it can be suggested that processes which co-release inorganic carbon and nitrogen, such as wastewater effluent, carbonate weathering from concrete and urban infrastructure, or in-stream respiration of labile organic matter, are key drivers of water chemistry in these smaller tributaries.

Future Work:

To counter the risk strategies must be site-specific and try to focus on the management of carbon and nitrogen in upstream areas where their relationship is strongest. While noting that inorganic carbon dynamics are closely tied to nitrogen enrichment provides a new lever for mitigating eutrophication. Future efforts should move beyond bulk measurements to characterize the specific sources and bioavailability of carbon, which is critical for protecting the health and ecosystem services of urban streams.



SCIENCE AND GLOBAL CHANGE

