Dissolved Organic Carbon and Nitrogen in rural, suburban and urban streams in south-central Texas

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Dissolved organic carbon (DOC) and nitrogen (DON) concentrations were quantified in urban and rural watersheds located in central Texas, USA between 2007 and 2008. The proportion of urban land use ranged from 6 to 100% in our 12 study watersheds which included nine watersheds without waste water treatment plants (WWTP) and three watersheds sampled downstream of a WWTP. Annual mean DOC concentrations ranged 20.4–52.5 mg L⁻¹. Annual mean DON concentrations ranged 0.6–1.9 mg L⁻¹. Only the rural watersheds without a WWTP had significantly lower DOC concentrations compared to those watersheds with a WWTP but all the streams except two had significantly reduced DON compared to those with a WWTP. Analysis of the nine watersheds without a WWTP indicated that 68% of the variability in mean annual DOC concentration was explained by urban open areas such as golf courses, sports fields and neighborhood parks under turf grass. There was no relationship between annual mean DON concentration and any land use. Urban open area also explained a significant amount of the variance in stream sodium and stream sodium adsorption ratio (SAR). Ninety-four percent of the variance in annual mean DOC concentration was explained by SAR. Irrigation of urban turf grass with domestic tap water high in sodium ([181 mg Na L⁻¹]) may be inducing sodic soil conditions in watershed soils in this region resulting in elevated mean annual DOC concentrations in our streams.

Publications:
1. Aitkenhead-Peterson J A, Nahar N and Ayaluru S. Land use and water quality in urbanizing post oak savannah watersheds: Controls on DOC and DON. Abstract 40934, Section A05 Environmental Quality. 2008 Joint meeting of the GSA, SSSA-ASA-CSSA, October 5th-9th, Houston, TX, USA.
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