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Influence of Climatological and Antropogenic Factors on pH and Associated Impacts of Select Heavy Metals in Aquatic Systems.

(Environmental Science / Arts and Science)

The interplay among climatological and antropogenic influences on water quality challenges efficient water resource management. Influence of interannual rainfall variability results in decreased runoff and inflows of surface waters. Such variable flows influence physical, chemical and biological characteristics of inland waters. In urbanizing watersheds, the influences of river flows on the hazards presented to aquatic life by antropogenic contaminants, including heavy metals, requires additional understanding. This study will examine an existing dataset from a recently completed U.S. Environmental Protection Agency project (Dr. BW Brooks, PI) of water quality gradients of Texas river inflows to reservoirs located across an urbanization gradient. During this study, field observations were collected from eight stream-reservoir transition zones in four reservoirs between a typical year (2005) and an extreme drought (2006). Our primary hypothesis it that nutrient enriched surface waters influenced by urbanized sub watersheds will exhibit higher daily pH variability than less urban water bodies, and the magnitude of this variability will be most pronounced during drought conditions. In urban watersheds, metals can degrade water quality by entering aquatic systems through direct (wastewater treatment plant discharges) and indirect (storm water runoff from municipalities) routes, and pH influences metal toxicity to aquatic organisms. Thus, laboratory experiments will be performed to define the influence of pH variability from the reservoir datasets on the toxicity of selected heavy metals (silver, copper, cadmium) to a model aquatic invertebrate, *Daphnia magna*. Experimental designs and analyses will follow widely accepted and peer-reviewed methods from the U.S. Environmental Protection Agency. An undergraduate researcher, Mr. Austin Cook-Lindsey, will perform these studies in Dr. Bryan Brooks' laboratory. The findings of the proposed project will specifically support environmental management of heavy metal risks to aquatic life under various rainfall and urbanization signatures in freshwater ecosystems.