

The Illinois Water Resources Center (IWRC) is dedicated to research and outreach programs on water resources issues critical to Illinois and the Midwest. This document provides an overview of the current programs of the IWRC.

Chicago Area Streams Impacted by Perscriptions and Personal Care Products

What do antacids like Tagamet®, antimicrobial agents found in everything from dish soap to toothpaste, and caffeine have in common? They are all passing through waste water treatment plants and affecting aquatic ecosystems.

Emma Rosi-Marshall of Loyola University of Chicago worked with graduate students, Paul Hoppe and Antoine Aubeneau, undergraduate students, Drew Lee and Sikandar Khan and high school student, Amatul Salma, to completed research funded by IWRC on the prevalence and ecological significance of pharmaceuticals and personal care products (PPCP) in Chicago area waterways. “Significant amounts of PPCPs such as hormones, antibiotics, caffeine and antacids persist after their intended use,” said Rosi-Marshall. “They enter waste water treatment facilities, which are not designed to remove these chemicals, so they are discharged into our nation’s rivers.” Although it is known that these chemicals are finding their way into streams and rivers, the ecological effects have not been well studied.

According to Rosi-Marshall, the goals of this project were to measure the concentration of pharmaceutical compounds in the Chicago area and measure the effects of PPCPs on four major components of stream ecosystems — algae, detritus, grazers and shredders.



The research was conducted in the laboratory which allowed the researchers to make significant headway. “We are developing new and improved methods for using artificial streams to measure the effects of novel contaminants on stream ecosystems,” said Rosi-Marshall. “These methods allow us to experimentally manipulate contaminant concentrations while using replication to analyze ecosystem effects.”

The most significant outcome of this research was related to the ecotoxicological effects of cimetidine. Cimetidine is one of a class of H₂ histamine antagonists, or antacids. The researchers found that at concentrations commonly occurring in surface water, cimetidine has a significant impact on invertebrate growth, mortality and population dynamics. Aquatic invertebrates are a primary food source for many fish species.

The researchers also studied antimicrobials, in this case triclosan, and found increased microbial respiration rates at high concentrations. Initial investigations did not indicate significant impact at the levels found in streams; however, research is ongoing.

Caffeine was found to impact the growth rate of some species but not others. This research is also ongoing.

Rosi-Marshall and her collaborators plan to submit an NSF proposal soon to continue their work. They are preparing a publication based on this research.

IWRC Funds Two New Research Projects in 2007

Two researchers began projects under the Illinois Water Resources Center state grant program in 2007.

Robert Hudson, University of Illinois associate professor of aquatic chemistry and biogeochemistry, was selected to conduct research titled, “Methylmercury Bioavailability and Dynamics in the Streams of Piasa Creek Watershed: New Methods of Sampling and Analysis.”



Through this project, Hudson and his collaborators will begin to study the mercury and methylmercury levels in a mixed land use watershed in Illinois. Hudson contends that there is a knowledge gap about mercury contamination in Illinois surface waters.

“Methylmercury, the most potent neurotoxin of all the mercury species and the only form that biomagnifies in aquatic food webs,” is poorly understood said Hudson.

Not only will the research advance understanding of mercury, but the study will be conducted in conjunction with faculty and undergraduates from Lewis and Clark Community College and the National Great Rivers Research and Education Center’s summer intern program.

Ximing Cai and Albert Valocchi, assistant professor and professor, respectively, of civil and environmental engineering at the University of Illinois, will conduct research titled, “Balancing Irrigation and Instream Water Requirements under Drought Conditions: A Study of the Kankakee River Watershed.”

Cai and Valocchi’s research will improve understanding of the connection between irrigation use in drought years and the impacts on streams and rivers. Those impacts might include endangerment to fish and recreation. The study seeks to find a strategy to balance the two uses.

Cai and Valocchi hope to increase government and public awareness of the impacts of irrigation. They will use the Kankakee watershed as a model for other similar watersheds.

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