LINKING MULTIPLE STRESSORS TO ADVERSE ECOLOGICAL RESPONSES ACROSS WATERSHEDS

CAN STRESSORS ASSOCIATED WITH WASTEWATER BE MANAGED TO REDUCE ENVIRONMENTAL RISK?

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The integration of contaminant fate modelling (including hydrologic variability) with measured biological responses can support water management, especially in the context of evaluating multiple stressors and cumulative effects in watersheds. Using the Grand River as a well studied example, this project advances tools to better predict the effects of contaminants in municipal wastewater in the context of multiple stressors.

Better integration of predictive models, that can be applied across watersheds, will empower managers to improve environmental assessment, protection, and remediation.

Predict contaminant fate and exposure in aquatic ecosystems

Models are being developed that can predict the release, transport and fate of substances from municipal wastewaters in aquatic environments.

These models can be used to:

› Enhance predictive ability to estimate exposure of contaminants to aquatic ecosystems

› Establish effluent standards and targets

The models will allow testing of future scenarios that may include increased urbanization, shifting population demographics and hydrological variability.

Link exposure to effects in aquatic ecosystems

Reliably predicting environmental thresholds for biological changes requires establishing relationships between exposure concentrations and biological responses of societal concern (e.g. endocrine disruption).

Researchers are:

› Comparing the predicted concentrations with observed ecological responses in the Grand River watershed during a period when major process upgrades occurred

› Developing and integrating exposure-response relationships with environmental exposure models

The result will be the ability to simulate and test remedial options and support environmental protection.

Place wastewater in the context of cumulative effects

The ecology of rivers change in response to many factors, making it difficult to separate specific contaminants or stressors from natural variation.

The development of predictive cumulative effects assessments therefore requires:

› Assessment of contaminants in wastewater outfalls in the context of multiple stressors and environmental change in the receiving environment

› An understanding of how contaminants interact with other stressors (e.g. temperature)

Assessments will therefore be valuable in prioritizing watershed management actions.

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