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Drought Implications on River Water Quality

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Drought implications on river water quality

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Introduction

- Droughts natural phenomena that reflect water deficits - are expected to increase in frequency and severity based on projections of future climate change.
- Hydrological impacts of drought have been widely analyzed but the environmental impacts of droughts have received only perfunctory and qualitative attention.
- Quantitative analysis of the role of droughts on stream water quality has not been forthcoming probably due to the lack of availability of water quality data and the inherent process complexity

The current study aims to assess the effects of droughts on water quality of streams in the St. Joseph River basin.

Study Area and Data Availability

The St. Joseph River watershed(HUC # 04100003; Fig 1), with a drainage area of 2800 km², is located in Indiana, Michigan, and Ohio. The weekily timeseries data of water quality parameters for the basin (location as in Fig 1) were available for 11 years St. Joseph River watershed (1998-2008) from includes initiative. The quality parameters Ammonia, Phosphorus, Atrazine, Cyanazine, Alachlor, Metachlor, E.Coli and Total Coliform.



Figure 1. Location of the St. Joseph River watershed and water quality sampling stations. The station in circle is used for the current study

The study is proposed with analyzing the indication of drought on water quality data with different severity of drought. Droughts over different durations (monthly, seasonal, 6 months and annual, Fig.2) were identified using the Standardized Streamflow Index (SSI) (Kao and Govindaraju, 2010). SSI is a probability index based on the probability of recording of streamflow, the probabilities are standardized so that an index of zero indicates median streamflow. The index is negative for drought and positive for wet period.

The water quality analysis is performed using both load and concentration of different constituents. The daily loads were estimated using LOADEST model; a regression model which requires observed constituent concentrations and daily streamflow values. However, daily data cannot be estimated for E. Coli and Total Coliform using LOADEST, so for these constituents analyses was conducted using measured data only. The preliminary analysis has been done using the Cedar Creek basin data (highlighted in figure 1)







Figure 3. Comparison of measured data for the driest (2005) and the wettest (2003) year



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Study Approach

Preliminary Results and Discussion





- and pesticides concentration trend shows the nutrients has a positive correlation with wetness (SSI).







concentration and load during wet period than the dry period

St. Joseph River Watershed Initiative for water quality data