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Effects of Drought on Water Quality in Streams

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Effects of Drought on Water Quality in Streams

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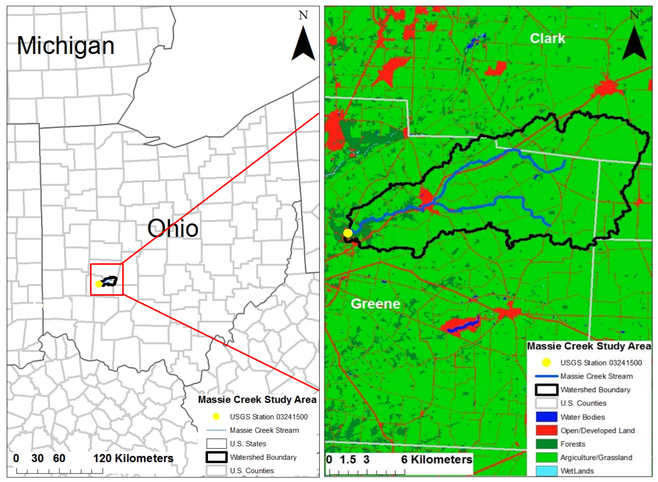
Abstract

The objective of this research is to understand the relationship between low stream flows during droughts and their impact on water quality. The area chosen for this study is the Cedarville sub-watershed that drains into Massie Creek, a tributary to the Little Miami River, Ohio. By using stream flow and water quality data collected from the Massie Creek in Ohio, we will be able to study the impact of droughts on water quality.

Study Area



The geographical location of the Massie Creek sub-watershed in Ohio is shown on the left hand side. The figure on the right shows the land use in Massie Creek watershed, the Little Miami River, and the USGS station at Massie Creek Wilberforce, OH.

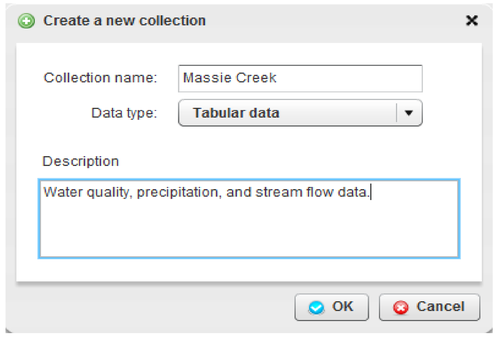
Data Used In The Study

	Water Quality Data*	Stream flow Data	Precipitation Data+
Source	YSI 600 series system	USGS	WXT 520 weather station
Time Interval	30 minutes	Daily, Monthly and Annual	30 minutes
Number of Stations	1	1	1

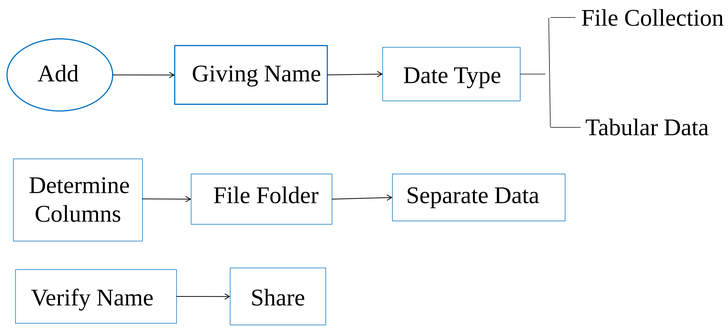
*Water quality: radiosonde simultaneously measures temperature, pH, dissolved oxygen, turbidity, and conductivity in the stream.

+WXT 520 weather station measures wind speed and direction, precipitation, barometric pressure, temperature, and relative humidity

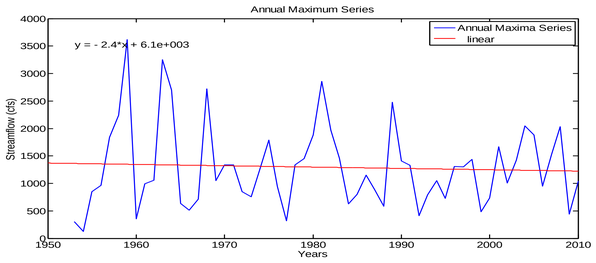
iData : driNET tool for uploading data



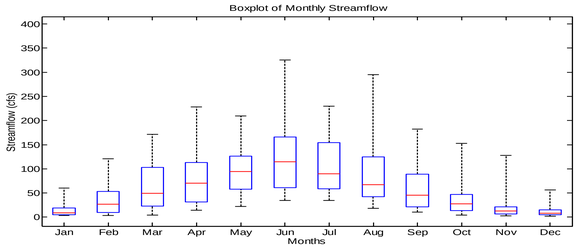
The figure on the left shows the iData interface to upload either a file collection or tabular datasets. The flow chart below shows the different steps needed for uploading tabular data.



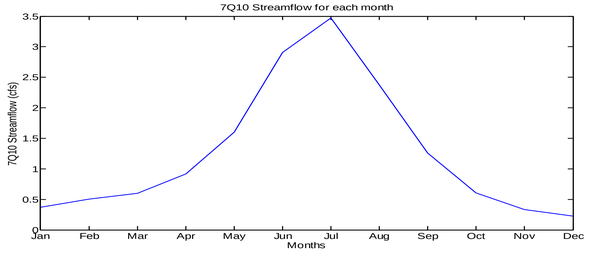
Preliminary Results



Analysis of annual maximum stream flow series shows no significant trends over time.

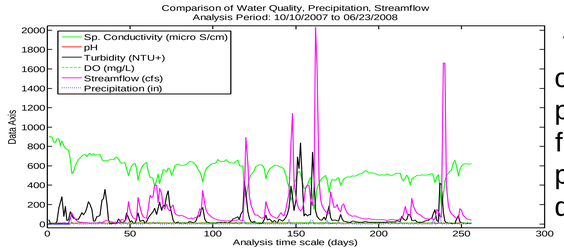


The Box-plot shows the seasonal variation in monthly stream flow at the study site.

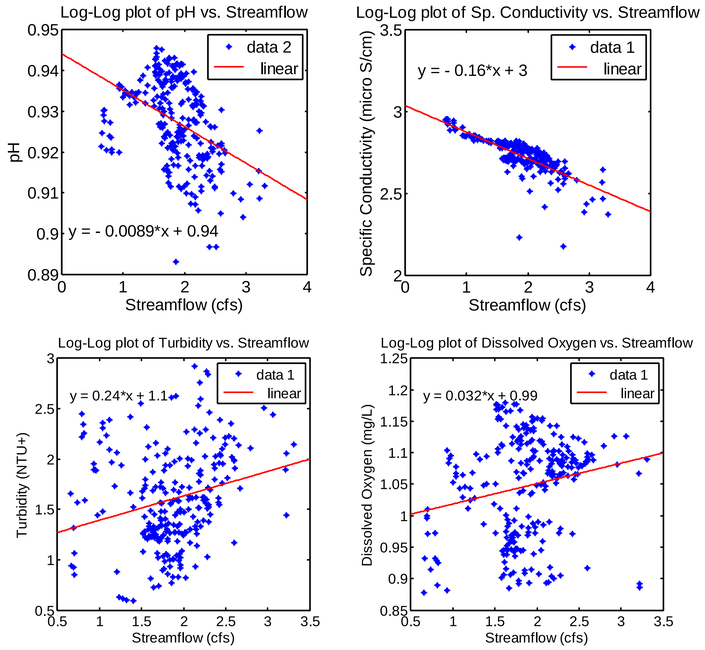


The 7Q10 low flow statistic calculated using 7-day average flow series for each month.

Results - contd.



Time series graph of water quality parameters, stream flow and precipitation at a daily time-step.



Scatter Plots of Water Quality Parameters with Stream Flow

Conclusions

- Trend analysis shows that Annual Maxima Series has no significant trend over the study period (1952-2010)
- From the boxplot and 7Q10 analysis, we may conclude that the study site's stream flow is highest during the months of June and July.
- The relationship between water quality parameters and stream flows exhibits a wide scatter.

Future Work

To investigate the relationship between the water quality parameters and stream flows during droughts and non-drought conditions.

Acknowledgments: NSF and USDA-NIFA