

CHANGES IN THE EXPORT OF DISSOLVED SOIL ORGANIC CARBON WITH ALTERED SNOW PACK AND CLIMATE IN NORTHERN FORESTED WATERSHEDS



Michigan Tech
School of Forest Resources
and Environmental Science

A McIntire-Stennis supported project

Long-term studies of northern brownwater-fed freshwater bodies of Europe and North America have revealed increasing concentrations of dissolved organic carbon (DOC) over the last two decades. However little is known regarding the sources from forested lands and mechanisms underlying these changes. This project will attempt to understand changes in DOC associated with seasonal changes in water movement through the ground, particularly through snowpack melt. This work contributes to a 30-year monitoring effort documenting DOC export in a small forested watershed of Lake Superior.

The goals of this research are:

- a. To understand how water flows through soils differently and how solutes change in response to earlier or rapid snowmelt in forests.
- b. To analyze long term data records of climate, snowpack, and DOC export from forests encompassing a long-term period and relate them to different winter characteristics. Increased DOC can have negative impacts on water quality and reduce productivity.



COLLABORATION

We leveraged three decades of monitoring conducted by USGS and MTU partners to understand how climate changes have influenced the exports of elements from forested streams into Lake



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Peer reviewed publications in collaboration with other Michigan Tech scientists stemmed from this research project

About McIntire-Stennis

The McIntire-Stennis program, a unique federal-state partnership, cultivates and delivers forestry and natural resource innovations for a better future. By advancing research and education that increases the understanding of emerging challenges and fosters the development of relevant solutions, the McIntire-Stennis program has ensured healthy resilient forests and communities and an exceptional natural resources workforce since 1962.



IMPACT

This work has revealed that stream DOC concentrations have been increasing over the last three decades, and highlights the need for long term monitoring to understand climate change drivers.



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Decades of monitoring has revealed increased DOC concentrations, increased fall temperatures, and early snowmelt



2 Ph.D

students conducted their research for their dissertations through this research project



0.12 mg Carbon/litre

Increased concentration of dissolved organic carbon in water per year since 1987