Multi-Element Analysis of Riparian Sediments in ND

Aida Asgary, Marinus L. Otte, Donna L. Jacob
Wet Ecosystem Research Group
Biological Sciences Department
Introduction

• Sediments are chemically heterogeneous.

• Transfer nutrients, metals and organics.

• **Sediment fingerprinting method**: chemical and physical properties of the transported sediment reflect those of the source.
Land cover, geology, pH, turbidity and sediment-water chemistry impact the variations and distributions in plant communities.
Purpose of Riparian Study

- Study and survey the element distribution and patterns at the rivers and riparian sediments in North Dakota.

- Investigate links between land use activities in the region and the current conditions of the wetlands.

- Address the tributaries and sources that contribute the most to the concentrations of particular elements.
Study Area and Sampling (2011)
Results 2011

Significant variations in element concentrations between the Rivers, ND

- Out of the 56 elements, 47 showed statistically significant difference (p-value ≤ 0.001) between the rivers!
- Red, James and Sheyenne Rivers are similar in concentrations for 24 elements
Significant variations in particle size ($f<63\mu m$) between the Rivers, ND

Results 2011
Results 2012

Percentage contribution of Sheyenne and Turtle to the cadmium and selenium concentrations at the Red River

![Bar chart showing the percentage contribution of Sheyenne and Turtle to the cadmium and selenium concentrations at the Red River.](chart.png)
Conclusion

• This study have shown that there is a considerable variation in element concentrations in the sediments of the Red, Sheyenne, James, Missouri and Little Missouri.

• Geology and land use in the area could be the possible factors impacting variations.

• Tributaries showed significant contributions, and element-fingerprinting method could be applied for the sediment source tracing.
Acknowledgments

Funding:
- EPA project FAR 0017348.
- ND INBRE: National Center for Research Resources (5P20RR016471-12), National Institute of General Medical Sciences (8 P20 GM103442-12) from the National Institutes of Health.

Advisors:
Marinus Otte, Donna Jacob

Grad Students:
La Toya Kissoon, Alex Yellick, Carrie Werkmeister-Karki, Alex Stalboerger. Khurram Sheikh

Undergrad Students:
Ryan Sullivan, Emily Fischbach, Hannah Passolt, Candace Craft, John Schmidt, Alex Hoehle, Aude Monthean. Nicholas Peterson, Yiqing Xu, Bryan Marquardt