



I. Introduction:

For centuries Native American cultures have had a unique understanding of the complexities of humans' interactions with earth systems. This perspective is important to the geoscience field. However, Native Americans are historically underrepresented in geosciences degree programs and careers. The reasons for this lack of participation are complex and differ on case-by-case bases, yet are important to understand in order to employ strategies that will increase students' interests in geoscience careers.

School culture and curricula have a strong influence on students' decisions for the future. Integrating Earth Science into public schools through place-based and culturally inclusive methods has potential for engaging students and increasing underrepresented populations' participation in geosciences. However, many schools do not teach Earth Science content passed 8th grade and few educators have a firm background in geosciences. In addition, Earth Science is often taught in the absence of other STEM subjects despite its interdisciplinary nature.

II. Study Setting :



Hannahville Indian School Nah Tah Wahsh PSA

- Hannahville Potawatomi Indian Community is located in Michigan's Upper Peninsula in the Cedar River Watershed
- Nah Tah Wahsh (Soaring Eagle) is a community school established in 1976 & serves both community students and non-Native Americans from the surrounding area.
- The school building includes K-12 grade levels, youth service programs, child care & adult education.
- The scope of this study is focused on middle school & high school geoscience education at Nah Tah Wahsh school and Hannahville Youth Services.



Hannaville Potawatomi



Source: www.hannahville.net retrieved Oct 2013

III. Research Questions:

How does integrating interdisciplinary community-based investigations into existing STEM programs affect:

- Earth Science literacy among Nah Tah Wahsh students & teachers?
- Student attitudes towards geoscience-related careers?
- Partnership building between the school and community groups?
- Awareness of ongoing community watershed management efforts?

	Mixed Method Design						
Outcome Measured	Pre/ Post Student Test	Post- Motivation Survey	Student Focus Group	Archival Analysis of Work	Adult Interviews	Adult Surveys	
Geoscience Knowledge	X		X	X	X	X	
Scientific Inquiry Skills	X		X	X	X	X	
Geoscience Attitudes		X	X	X			
Watershed Management	X	X	X	X	X	X	
Partnerships					X	X	

Increasing Native American Involvement in Geosciences Through Interdisciplinary Community Based Investigations

Emily E. Gochis (eegochis@mtu.edu)¹, John S. Gierke¹, Kedmon Hungwe², Alex Mayer¹, and Stephen R Mattox.³ (1) Geological and Mining Engineering and Sciences, Michigan Technological University, 1400 Townsend Dr, Houghton, MI 49931, (2) Cognitive and Learning Sciences, Michigan Technological University (3) Department of Geology, Grand Valley State University







IV. Lesson Development Strategies: **Turning Challenges into Opportunities**





Teacher Professional Development



Student Centered, Field-**Based Investigations**



Interdisciplinary Earth Systems Lessons

Teacher Driven Lesson Development



Partnership Building



Community Focused & Culturally Relevant





VI. Results

- Deeper understanding of water pathways & how human actions can affect water quantity
- Increase awareness of Hannahville careers & infrastructure
- Improved confidence & skills in communication & education
- No measurable changes in Student attitude towards science

VII. Next Steps In Lesson Development

Acknowledgements

This work is supported by the National Science Foundation GK12 Fellowship Program & the Michigan Space Grant Consortium Graduate Fellows Program

Special thanks to Loretta Cox, Rebecca Spreitzer, Rod Lovell, Rachel Fix, Nah Tah Wahsh teachers, the Hannahville Environmental Department & the Hannahville Indian Community for their collaboration.





V. Pilot Study: Summer Youth Programs 2013

Experimental Design with 9-12th grade Summer Youth Employees (n=17) Experimental Group participated in curriculum that Included:

> Inquiry based investigations focused on local water resources & hydrologic process



and taught STEM lessons to K-6th grade Kid Zone participants

Creation of Water Awareness Videos for community members





- Expressed Interest in
- Hands on activities
- Outdoor explorations
- Student Centered Learning
- Working in Groups
- Students would like
- Focus and connection to Biology
- Fun! (and less school)

