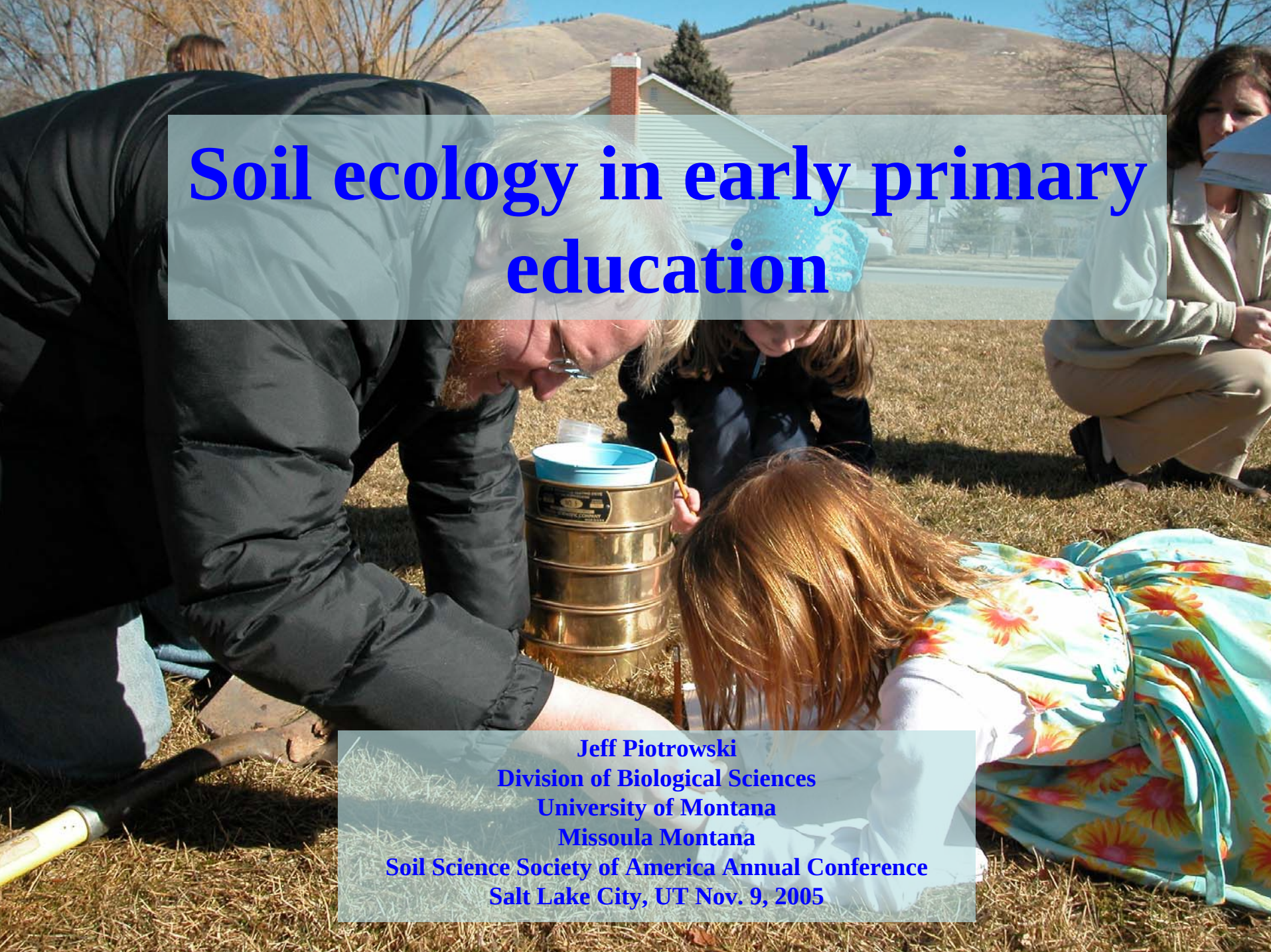




Soil ecology in early primary education

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Outline

- Description of ECOS program
- Why a soils curriculum?
- Outline of the curriculum
- Extensions
- Conclusions and future considerations



What is the ECOS program?

- NSF funded partnership between PhD students, teachers, and undergraduate science majors
- Goal of better biology/ ecology education
- Resident school scientists
- Curriculum design
- Develop school-wide project centered around an ecological concept
- Create comprehensive naturalist guide to local taxa (visible) and soils
- Greater community/ university collaborations



Why soil ecology?

- “From the standpoint of the child, the greatest waste in school comes from his inability to utilize the experience he gets outside... he is unable to apply what he is learning in school to his daily life...that is the isolation of school, its isolation from life” (John Dewey 1916)
- Soil ecology rarely taught at the earliest grades
 - But soil is highly relevant, even to young kids
 - Can be used to addresses current content standards
- Necessary elements of a soils curriculum (aside from the soil science)
 - Local context
 - Simple, few materials required
 - Easily integrated into science “units”
 - Dramatic, attention getting
 - Relevant, let students know applications



A simple series of soil lessons to integrate as a science unit

- What is soil?
 - Construct and deconstruct a simple soil
- A tour of soil types
 - Explore the different soil types around the school yard, and associated plants
- Soil organic matter
 - How does SOM affect plant growth
- Soil erosion
 - Erosion causes and prevention
- Decomposition
 - Long term demonstration that can be integrated to other lessons



1. CONTRIBUTOR'S NAME: **JEFF PIOTROWSKI**
2. NAME OF INQUIRY: **THE BENEFITS OF SOIL ORGANIC MATTER (AKA "THE RADISH PARTY")**
3. GOALS AND OBJECTIVES:
 - a. Inquiry Questions: What makes a soil "good" for plant growth?
 What are the functions of soil?
 - b. Ecological Theme(s): Soil conservation/ beginning soil ecology
 - c. General Goal: Understand the importance of organic matter in soil
 - d. Specific Objectives:
 - Academic:* This inquiry taught the role of soil organic matter in the environment and basic nutrient cycling concepts
 - Experimental:* The students learned how to set up a growth experiment with replicates
 - Procedural/technical:* Students how to maintain plants and use grow lamps
 - Social:* Students work in pairs to set up the experiment
 - Communication:* Students must draw and write predictions of the inquiries outcome
 - e. Grade Level: first and second
 - f. Duration/Time Required: Two classes 3 hours (20 minute follow-up)
 - Prep time 2 hours
 - Implementing Exercise During Class 45 minutes
 - Assessment 15 minutes
4. ECOLOGICAL AND SCIENCE CONTEXT:
 - a. Background (for Teachers): This is an exercise to help students understand the role of litter and soil organic matter in plant growth. All plants need nutrients from the soil to sustain life. These nutrients (i.e. nitrogen, phosphorus, potassium) may come from the mineral soil or may come from dead and decaying organic materials. It is often easier for plants to take up nutrients from the organic material. Additionally, this organic matter helps soils hold water and makes soils drought tolerant. This inquiry allows students to investigate what contribution of organic matter is more important to plant survival: drought tolerance or nutrients.
 - b. Background (to present to Students):
 This is likely one of this grade levels first introduction to soil science. Here we present the concepts of soil, its importance, composition, and conservation. The teacher explains what soil organic matter is and why such things as composting are important. The students are introduced to ideas of soil water retention and aeration.

Curriculum available at
www.bioed.org/ecos

Each piece has:

- Goals
- Ecological themes addressed
- Specific objectives
- Ecological context
- Background information
- Grade level targeted and
 how to adapt to others
- Duration
- Materials
- Extensions

School wide demonstration project

- Understanding nutrient cycling through composting of school wastes
- Worm composting bins
- School wide presentation and assessment
- Compost used to fertilize outdoor native plant garden
- Student see a small nutrient cycle first hand



Conclusions

- Kids love soil, and getting down and dirty
- Soil is relevant to their daily lives at the earliest ages, which offers a great teaching opportunity
- Soil lessons can be easily integrated into a normal science curriculum, and offer excellent hands-on exploration and outside time
- Students have greater knowledge of the concepts through these interactive lessons as opposed to traditional teaching methods

Future considerations

- More testing of the lessons
 - Will these be of value to teachers
- Assessment of learning
 - Are students learning the material?
- Assessment of efficacy
 - Are these types of lessons more successful than others?
- Assessment of application
 - Are students applying these principles in their homes, gardens?

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