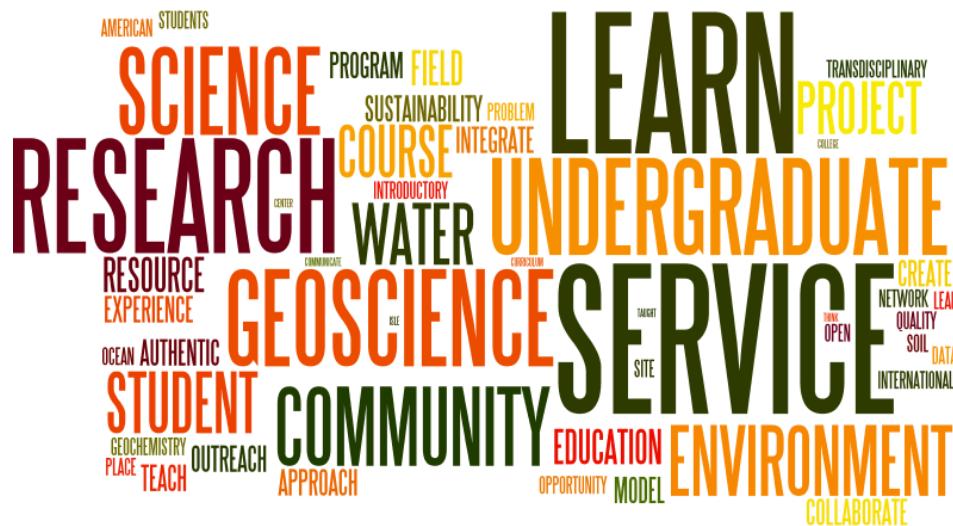


# Geoscience Service-Learning Literature Themes



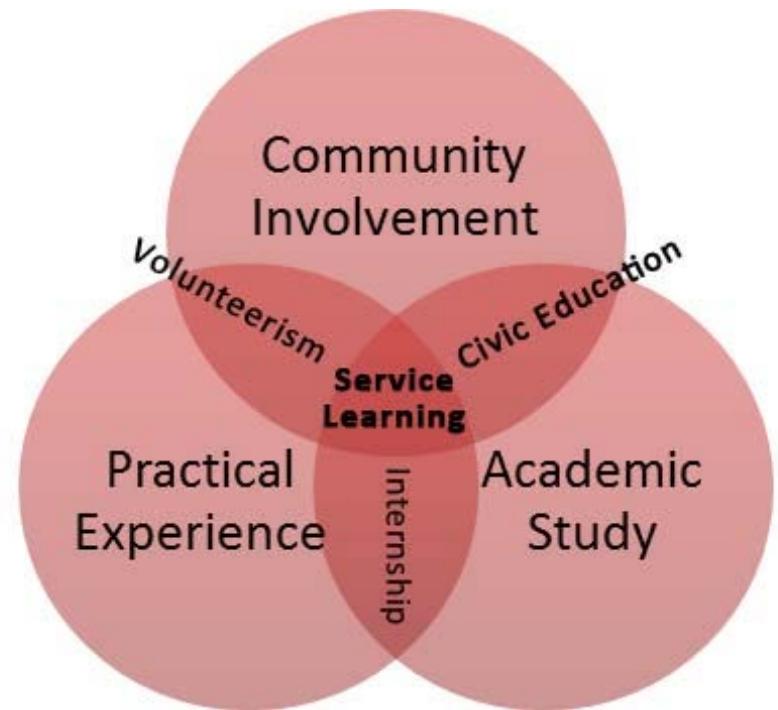
Suzanne Savanick  
Hansen  
Macalester  
College  
Sarah Fortner  
Wittenberg  
University

# Process

- Synthesize available resources
- NAS documents
- SERC examples
- Campus compact examples
- GSA abstracts
- Start of the conversation

# What types of service-learning activities are currently being implemented?

- Problem-based learning
- Real-world problem solving
- Career relevant skills
- “Classic” service-learning
- Not necessarily called “service-learning”



# What types of service-learning activities are currently being implemented?

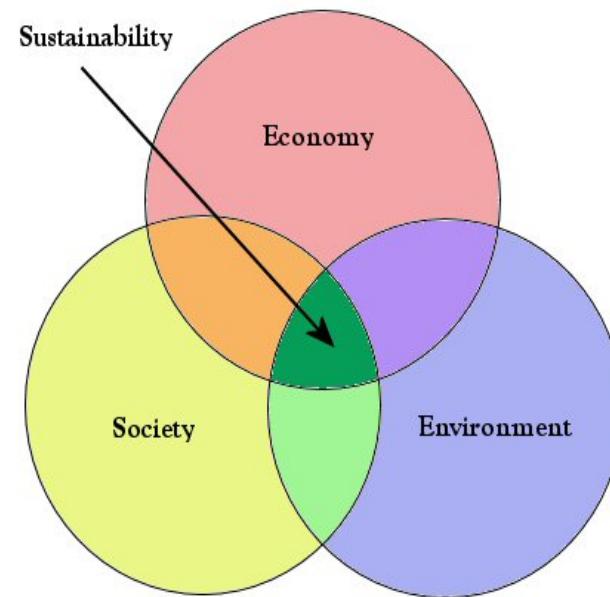
- Geology:
  - Hydrology/Water Quality
  - Soils
- Atmospheric Sciences:
  - Climate Change
- Oceans:
  - Water Quality
- Polar
  - Outreach



[http://visibleearth.nasa.gov/view\\_detail.php?id=2429](http://visibleearth.nasa.gov/view_detail.php?id=2429)  
[http://veimages.gsfc.nasa.gov//2429/globe\\_east\\_540.jpg](http://veimages.gsfc.nasa.gov//2429/globe_east_540.jpg)

# Themes

- Interdisciplinary
- Applied research
- Sustainability



# Level

- Introductory Level
  - Classes Documented
- Advanced Level
  - Research Outreach
- Classic Service-Learning
  - Part of service-learning programs
- Themes
  - Liberal Arts Schools Document
  - Outreach theme

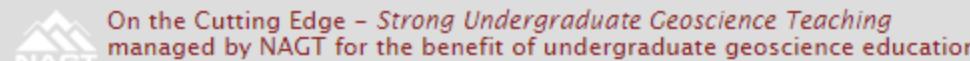
# Assessment

- Service-learning increases student engagement with the material
- Students gain skills
  - Technical skills
  - Job skills
  - Communication
  - Collaboration
  - Change agent skills
- Partner & Community Outcomes

A magnifying glass with a black handle and a silver frame is positioned over the word "Assessment". The word is written in a large, orange, sans-serif font. The magnifying glass is focused on the letter "s", making it appear larger and more prominent. The background is a plain, light color.

Assessment

Source: <http://www.supportbay.com/assessment>



Program-Wide Abilities

Your Career

Enhancing Teaching

Courses

Topics



## Teaching Service Learning in the Geosciences

### Topical Resources

Cutting Edge > Enhance Your Teaching > Service Learning > Example Service Learning Projects > Arsenic on Main St., Unity ME

## Arsenic on Main St., Unity ME

Lois Ongley, [Unity College, Unity, ME](#)

► **This activity has benefited from input from faculty educators beyond the author through a review and suggestion process**

### Summary

The ultimate plan is organizing a "Water Quality Fair" for residents of the Unity, ME area (rural farming region). Students would analyze water samples brought into the community center (although we might end up having a mobile lab). We will have displays for common water quality issues (hardness, iron, arsenic, sulfur, and pesticides). At this fair, there will be water labs, water remediation options, and some interesting water activities. I hope to do this in Spring 2010.

As a pilot project, students taking analytical chemistry will analyze water samples contributed by employees of the town. We will determine the arsenic concentration and hardness during the last 2 weeks of April, 2010.

In every case, various data about the water source will be recorded to begin assembling a water quality database for the state. Products may include student-designed brochures about water quality, lessons for K12 students designed by teachers, any other good ideas students come up with. This project is expected to "feed" student/faculty research, undergraduate theses, a publishable body of scientific work, and possibly samples sites for seasonal or long-term monitoring.

### Cutting Edge

Develop Program-Wide Abilities

Manage Your Career

Enhance Your Teaching

Affective Domain

...click to see 5 more...

Online Teaching

Service Learning

Recommended Resources

Example Service Learning Projects

The 8 Block Model For Service Learning

# Example: Water

GLISTEN

*Great Lakes Innovative Stewardship Through Education Network*



## **Great Lakes Innovation Stewardship Through Education Network**

Provides STEM students with service-learning experiences (e.g. research & restoration activities related to the Great Lakes on their campuses, partner clusters support students in 8 states.

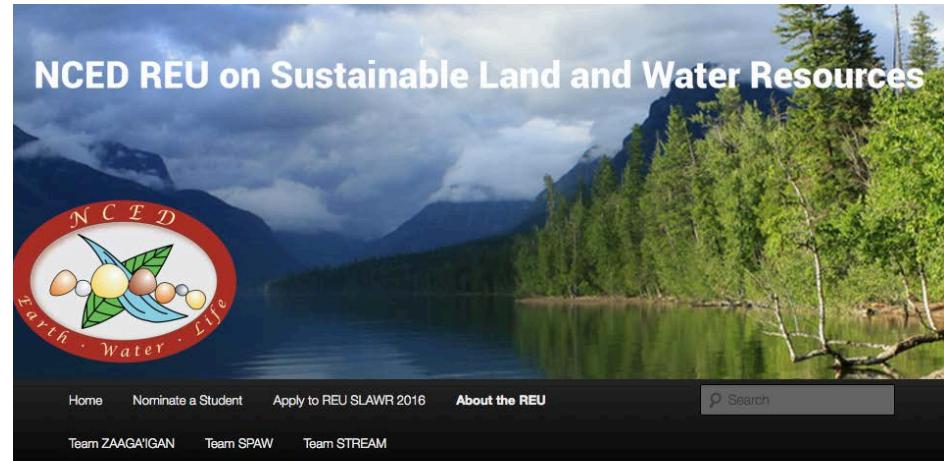


NATIONAL CENTER FOR  
SCIENCE & CIVIC ENGAGEMENT  
N C S C E

(i.e. Argyilan, E. P., 2012, GSA)

# Example: Water

- NSF funded REU conducts work on reservation
- Projects developed in collaboration with tribal environmental managers
- Increasing participation of historically underrepresented students (approximately half would not otherwise participate in research-estimated)



## Partners

- Fond du Lac Band of Lake Superior Chippewa
- National Science Foundation
- National Center for Earth-surface Dynamics
- Healthy Cities Network, Humphrey School of Public Affairs
- St. Anthony Falls Laboratory
- Salish Kootenai College
- University of Minnesota, Twin Cities and Duluth Campuses

<https://reuslawr.wordpress.com/about/>

Bueno Watts, N., Berthelote, A. R., Lichtenberg, J., Patrick, D., Dalbotten, D., Sustainable land and water resources REU: Community-inspired research meets open inquiry, GSA, 2015

# Examples: Soils



- Investigating contaminant transport and environmental justice issues in a local watershed through service-learning projects with Sierra Club

*Instructor: Jennifer Houghton, Rhodes University*

- Monitoring Lead in an Urban Community Garden,

*Instructor: Jennifer Latimer, Indiana State University*

News Releases (2013-2016):  
WTHITV, Indiana State University Communication  
*'Geologists study lead levels in Terre Haute' 'Get the lead out: testing by students, faculty, aimed at keeping kids safe'*

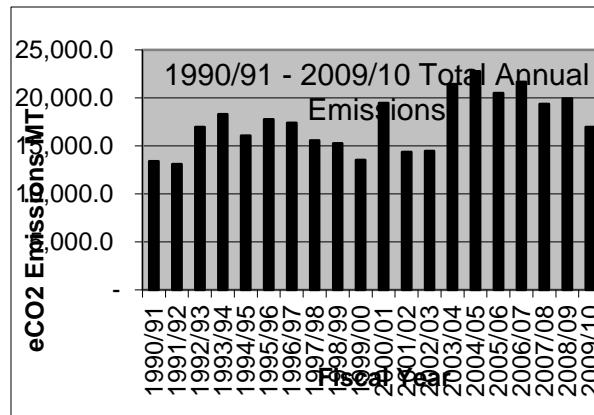
# Example: Oceanography



- Marine Environmental Geology, Bowdoin
  - Problem-based water quality project in Casco Bay
  - Collect & analyze data
  - Work with & present findings to partners

Instructors: Ed Laine, Cathryn Field

# Examples: Atmospheric Science



- Campus Greenhouse Gas Emissions Inventory, Climate Action Plan

*Instructors: Suzanne Savanick Hansen & Chris Wells, Macalester College*

- Local Solutions to Global Climate Change: locally-relevant climate modules created collaboratively with local experts and informal science experts

*Instructor: Sarah Fortner, Wittenberg University*



## **Example Student Outcome, increased relevance:**

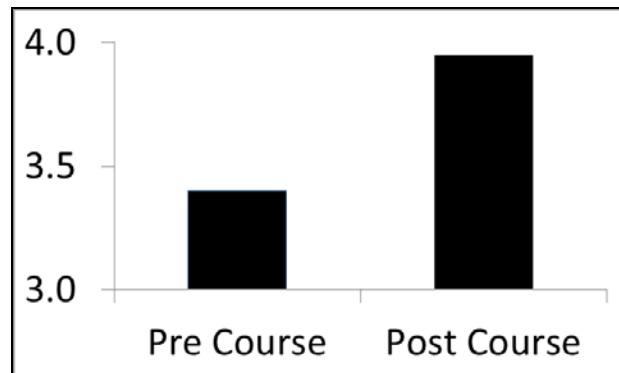
Paired responses from 44 students that resulted in significant attitudinal shifts

### **Are climate and energy issues important to many fields?**

5= Important to all or almost all sectors

4= Important to most sectors

3= Important to some sectors



### **Example Partner Outcomes:**

- 2 students became interns with local experts following this course
- 2 students hosted additional events with local experts
- Literacy modules were used again at other public events
- Science museum partners converted to a for-profit model with larger universities to train science graduate students in communication

# Example Polar

**JUNEAU ICEFIELD RESEARCH PROGRAM**

HOME    ABOUT    HISTORY    SUPPORT JIRP    CONTACT    BLOG

PROGRAM DETAILS    APPLY



**Glaciology is Mathematics**

August 12, 2015

Glaciology is Mathematics: The perspective of a master of mathematics student

James Headen, Elizabeth City State University



Panorama of Camp 10. Photo by author

$\int 8x dx = 2x^2 + C$  ...  $3a = 12x^2$ , regardless of the equation, there exists an explicit solution (definition: a function expressing a *solved* relationship between variables). Although mathematics has its share of implicit solutions (definition: an *unsolved* relationship between variables), the solution still has a variation of some finite (definition: known value) equation. Glaciers on the other hand, have so many unknowns that solving or drawing near a conclusion can be overwhelming. And that is the exact reason I'm drawn to nature's canvas.



Sunset view looking westward from Camp 17. Photo by author.

- Juneau Icefield Research Program (JIRP)

- Summary: Juneau Icefield Research Program (JIRP) students share their glacier in a public blog. JIRP also has a long history of having students present research to the Atlin, B.C. community at the end of the research expeditions. This community has a vested interest in the glaciers near them.

*Principle education-outreach instructor:  
Kristin Timm*

# Program Level Example

## **Wittenberg University Geology & Environmental Science**

- Emphasis on community-based research across the curriculum
- 6 faculty, frequent co-teaching, 20+ partners

### **Student Outcomes:**

- Gains in research experience (CURE, RISC, Inquiry & Analysis VALUE Rubric)
- Students intern for partners they worked with in class
- Student gains increased access to resources, land, & instruments for research
- Reflection essays suggest that relevance of topics is clear; several have gone on to similar careers as the partners we work with

### **Partner & Community Outcomes:**

- Increased publicity/awareness
- Better environmental decision making & management
- Increased watershed restoration & recreation (e.g. new wetland area, lowhead dam removal, & monitoring of reservoir releases for tourism, public land evaluation).
- Shared programming with faculty, students, & other partners

### **Faculty Outcomes:**

- Educative gains from partnering inform teaching & scholarship (new knowledge) (Fortner, et al., 2015, GSA)



Information goes in 2 directions  
From partners to students &  
students to partners



Photos from Amber Burgett, Wittenberg

Service is highly valued as an institutional marketing tool....

Students are compassionate change agents.

But there is little evidence that it is valued in institutional reward structures



HOME NEWS SPORTS ENTERTAINMENT LIFE OPINION OBIT

FEATURED » PHOTOS GAMES TV GUIDE LOCAL BUSINESS CALENDAR BRANDED CONTENT SUBMIT YOUR NEWS

## NEWS NOW

Duties of former chancellor Loftin's job at Missouri unclear

...

Springfield police to start:

## 19 S&T undergraduates to exhibit research to state legislators

Undergraduates from Missouri University of Science and Technology will travel to Jefferson City to exhibit their latest research projects to the state's top legislators Tuesday, March 15.



By Staff Reports

Posted Mar. 13, 2016 at 6:20 PM

Undergraduates from Mi: exhibit their latest resea



## Amid urban jungle, Penn has partnered with West Phila. to build community farm

By CHARLOTTE LARACY • 04/07/16 3:41am

SHARE THIS

About a five to 10 minute ride on the 36 trolley from Penn's campus will get you to a secret garden of

## UGA student makes science fun for local students

By Clint Thompson UGA College of Agricultural and Environmental Sciences Apr 14, 2016



University students Eric Palomares and Anthony Palomares are shown taking part in Science Night.



N — University of Georgia student Megan Powell's creative and innovative way of teaching Tift County fourth and fifth graders about the environment is an experience the students won't likely forget.



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OLIVIA KAMERON COOPER

## This Week's Circulars



## Healing the soil

Repurposing abandoned urban lots starts with soil test

Date: February 10, 2016

Source: American Society of Agronomy

Summary: Chicago's history of industrialization and urbanization left its mark on the soil. Soil acts as a sponge, and lost contaminants for years. In Chicago, the waste from industrial manufacturing causes undesirable organic chemicals, heavy metals, and other chemicals to linger in the soil. A non-profit youth development center hopes to repurpose the lots into useful spaces for the community. However, the poor soils in the lots create challenges.

[Releases](#) | [Feature Stories](#) | [Publications](#) | [Contact Us](#)

ER Home > Communications and Marketing Home > Feature Stories > Partnership provides opportunities for Geology Students

## Partnership provides opportunities for Geology Students

By Costa Maragos **Posted:** January 27, 2016 6:00 a.m.



Students study core samples at the Subsurface Geological Laboratory. The undergraduate students are with Geologists Colin Card (centre) and Sean Bosman (second from right). *Photo courtesy of Kathryn Bethune.*

Faculty, staff and students at the Department of Geology are looking forward to a continued close relationship with the Saskatchewan Geological Survey (SGS), the organization that compiles and maintains information about the geology, mineral and energy resources in the province.

## Mineral resource partnership with SGS, University of Regina

[FULL STORY](#)



Students from DePaul University Ellen Webb (left) and Yarency Rodriguez (right) collect soil from empty lots on Chicago's South Side to gauge the health of the soil and better inform the next steps for the lots.

*Credit: Photo credit James Montgomery.*

Four empty lots in Chicago's South Side bear scars of the past. Their surfaces are strewn with construction debris and foundation rubble. However, the most incriminating evidence of the past lies beneath the surface, in the soil.

## Vacant lot lead testing, DePaul University

enhance job prospects

## Interdisciplinary minors energize learning and enhance job prospects

By Jessica Wolf, UCLA

Tuesday, March 8, 2016



Credit: UCLA

Students taking a new course on food justice at UCLA learn about the topic from the ground up. The course is part of a new food studies minor, one of a growing number of interdisciplinary programs that have become popular to take.

A growing list of interdisciplinary minors is attracting students who seek to broaden their post-graduation prospects and interact with peers in different areas of study.

"I'm clearly seeing how beneficial the entrepreneurship minor is to my future career prospects," said Veronica Chan, a fourth-year who is double-majoring in both architecture and design media

## UCLA Garden Partnership

## New Wave

[share](#) [print version](#) [subscribe](#)

### Faculty Receive Community-based Research Grants

January 15, 2009

New Wave staff

[newwave@tulane.edu](mailto:newwave@tulane.edu)

With a community-based research grant, Tulane faculty member Sadredin "Dean" Moosavi will expand his efforts assessing beach erosion on Grand Isle, La., with students, residents and Grand Isle State Park officials.

Tulane's community engagement is not limited to students working in the community — faculty members have long worked with the local community to jointly address issues important to both. To assist faculty members in implementing their projects, the Tulane Center for Public Service annually awards funds to support this engagement.

Moosavi, a professor of practice in the Department of Earth and Environmental Sciences, is one of five Tulane University faculty members who received a \$4,000 grant from the Center for Public Service.

"The faculty grant will enable us to take the [Grand Isle Project](#) in two new directions, both of which will enhance the quality of the science our students are conducting," Moosavi says.

Moosavi plans to establish a collaboration with Grand Isle High School to enlist, train and equip the teachers and students on the island to perform work in parallel with the Tulane students.



Sadredin "Dean" Moosavi, right, a professor of practice in the Department of Earth and Environmental Sciences, works on a beach erosion project with students at Grand Isle, La., a spit of land on the edge of the Gulf of Mexico. (Photo from Dean Moosavi)

### Dean Moosavi's partnership on the Gulf of Mexico expands

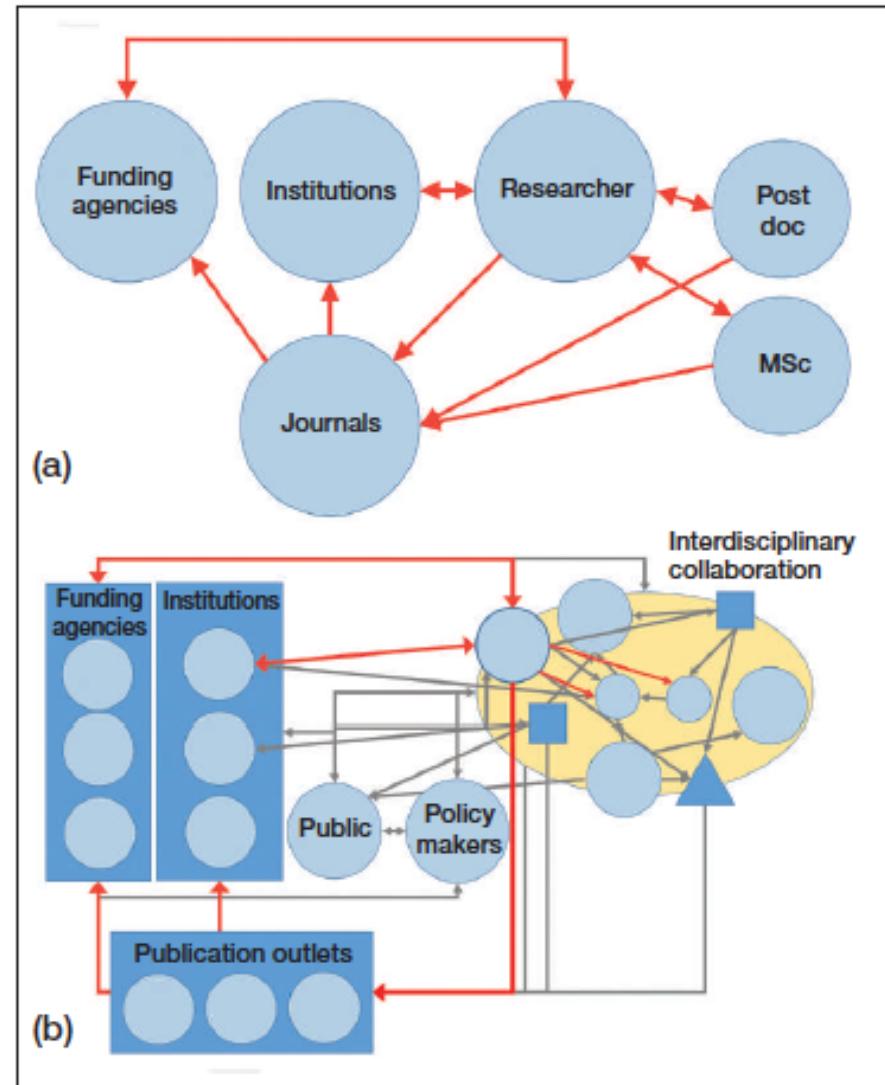
# The institutional reward structure may not favor service-learning

Improving the culture of interdisciplinary collaboration in ecology by expanding measures of success

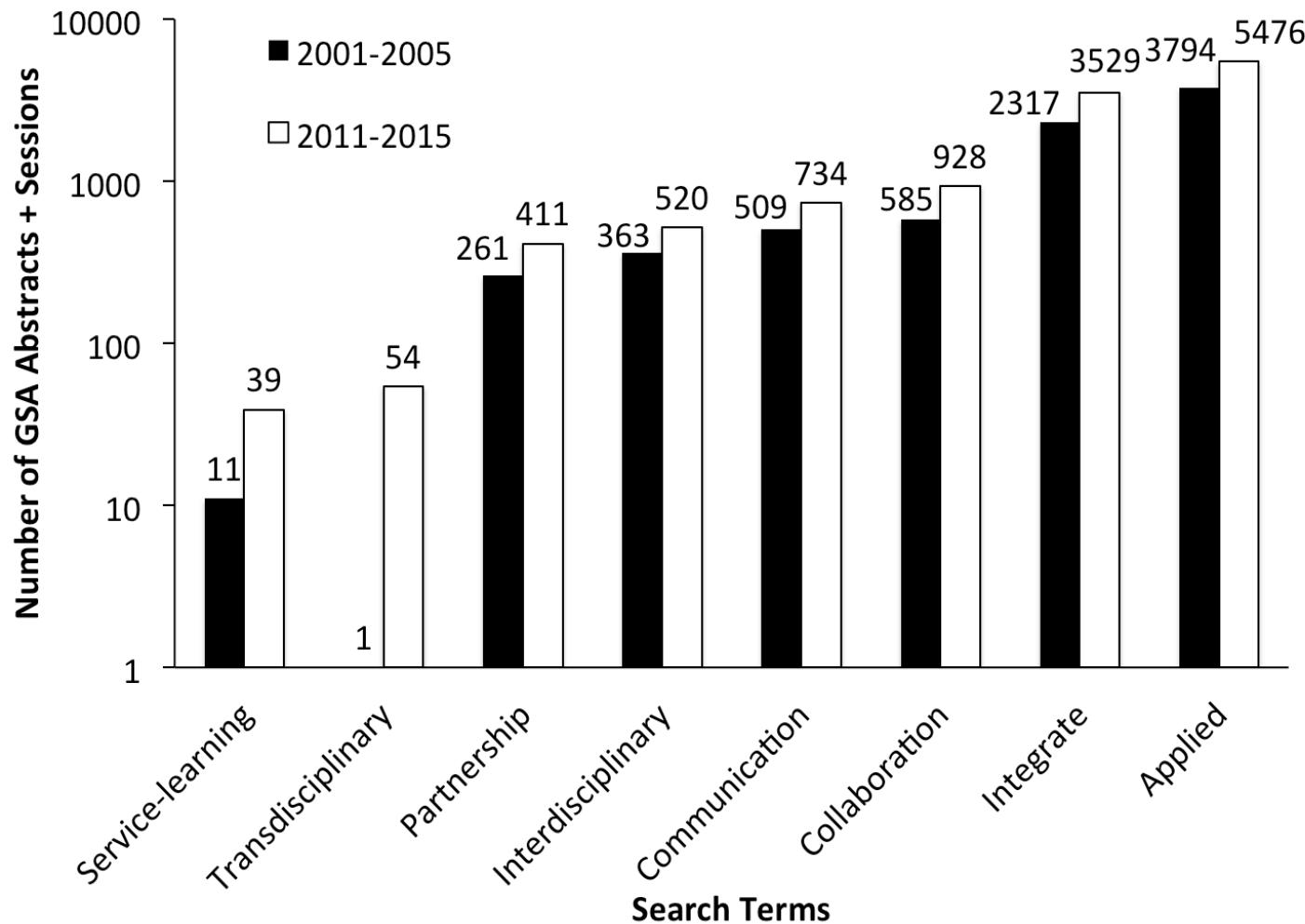
Simon J Goring<sup>1\*</sup>, Kathleen C Weathers<sup>2</sup>, Walter K Dodds<sup>3</sup>, Patricia A Soranno<sup>4</sup>, Lynn C Sweet<sup>5</sup>, Kendra S Cheruvilil<sup>4,6</sup>, John S Kominoski<sup>7,8</sup>, Janine Rüegg<sup>3</sup>, Alexandra M Thorn<sup>9</sup>, and Ryan M Utz<sup>10</sup>

**Figure 2.**  
a) Traditionally disciplinary activities  
b) Interdisciplinary activities

Red= institutionally rewarded  
Grey= unrewarded



# Yet we're becoming more interdisciplinary & need applied problem-solving



AMERICAN STUDENTS

**SCIENCE** PROGRAM FIELD  
**RESEARCH** SUSTAINABILITY PROBLEM  
CENTER INTRODUCTORY  
RESOURCE COMMUNICATE WATER COLLEGE  
EXPERIENCE GEOSCIENCE CURRICULUM TRANSDISCIPLINARY  
OCEAN AUTHENTIC ISLE TAUGHT PROJECT  
**STUDENT** PLACE OUTREACH SITE  
GEOCHEMISTRY TEACH APPROACH COLLABORATE  
**COMMUNITY** EDUCATION ENVIRONMENT  
OPPORTUNITY MODEL

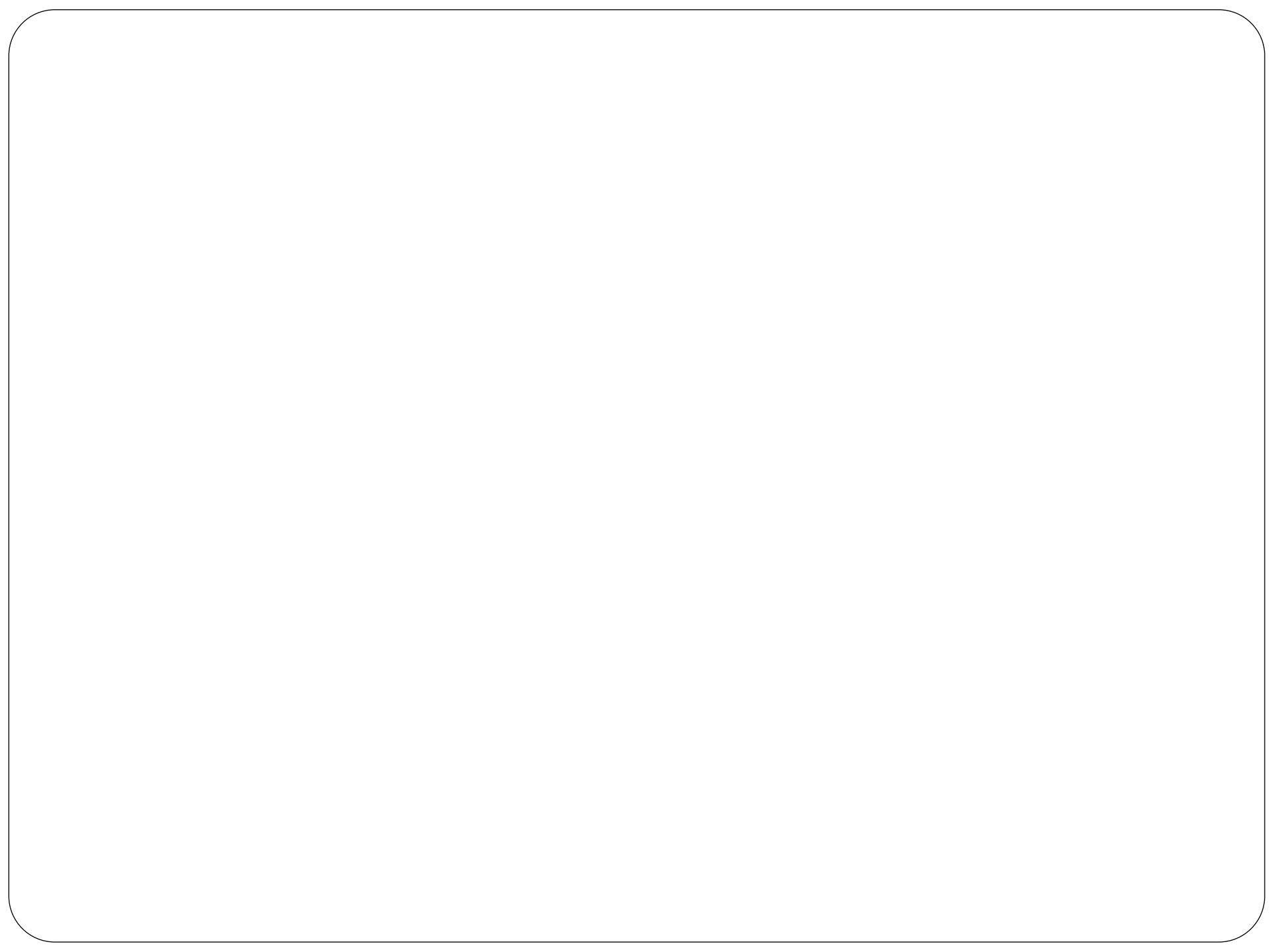
# Service-Learning in the Geosciences

## Summary

- Increases student engagement with the material
- May not be called service-learning
- Common areas
  - Water
  - Climate
  - Soils
- Students gain skills
- Interdisciplinary, real-world projects



[http://visibleearth.nasa.gov/view\\_detail.php?id=2429](http://visibleearth.nasa.gov/view_detail.php?id=2429)  
[http://veimages.gsfc.nasa.gov//2429/globe\\_east\\_540.jpg](http://veimages.gsfc.nasa.gov//2429/globe_east_540.jpg)



The rest of the slides are graphics that could be used

The discussion will ask people to identify common & unique elements for service-learning by:

- Discipline
- Institution type
- Nature of students

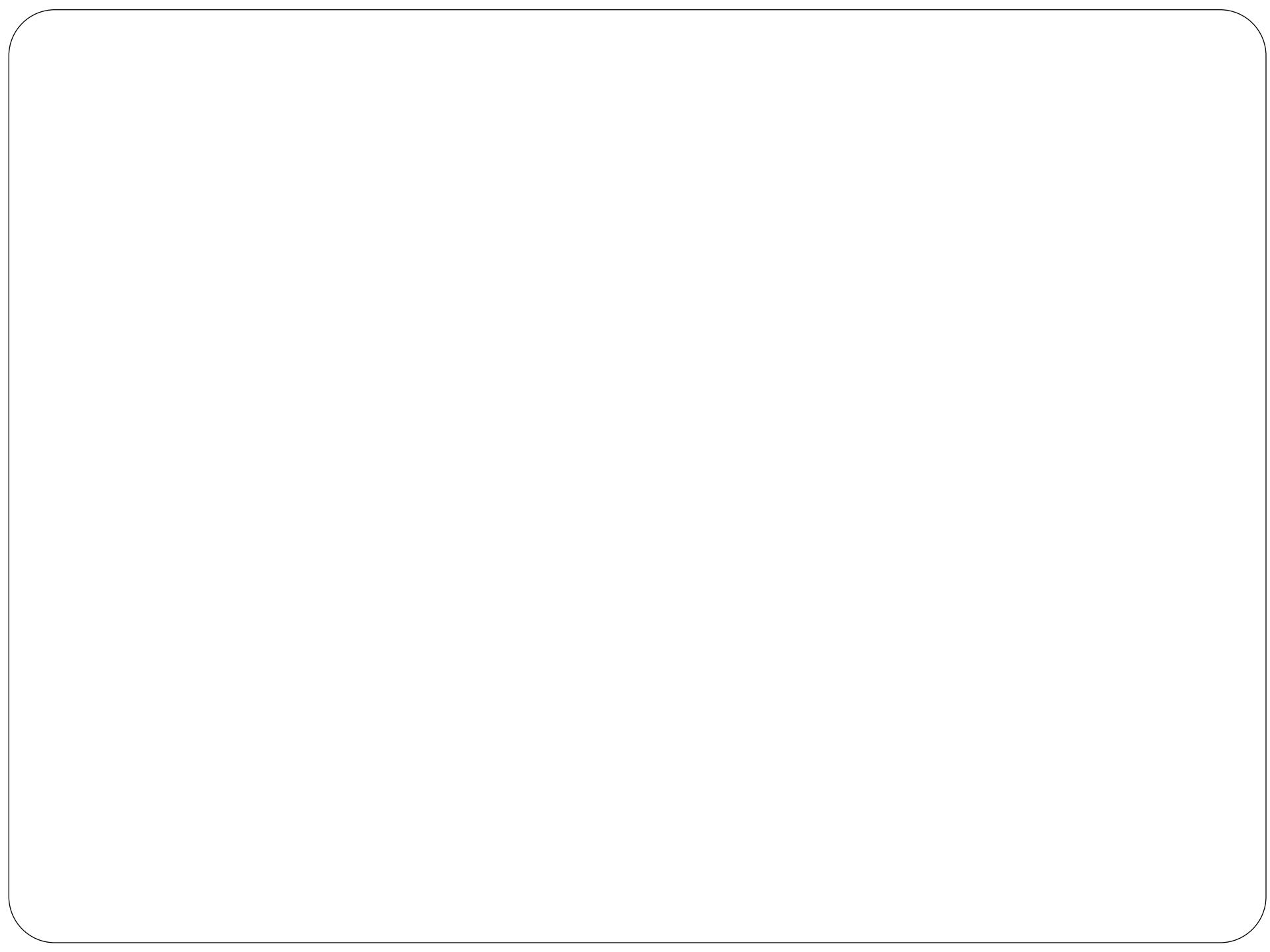
The talk & paper primarily cover the first so maybe this gap is the last slide?

The rest of the slides are graphics that could be used

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Source: <http://agrobusinessng.com/seven-projects-protecting-soils-around-the-world/>



Image source: [http://news.softpedia.com/news/Global-Warming-Threatens-to-Turns-Oceans-into-Major-Carbon-Emitters-445805.shtml#sgal\\_0](http://news.softpedia.com/news/Global-Warming-Threatens-to-Turns-Oceans-into-Major-Carbon-Emitters-445805.shtml#sgal_0)



Graphic source: <http://www.motherearthnews.com/nature-and-environment/environmental-policy/global-water-supply-zmgz12djzkon.aspx>

# Assessment



Source: <http://www.supportbay.com/assessments/>