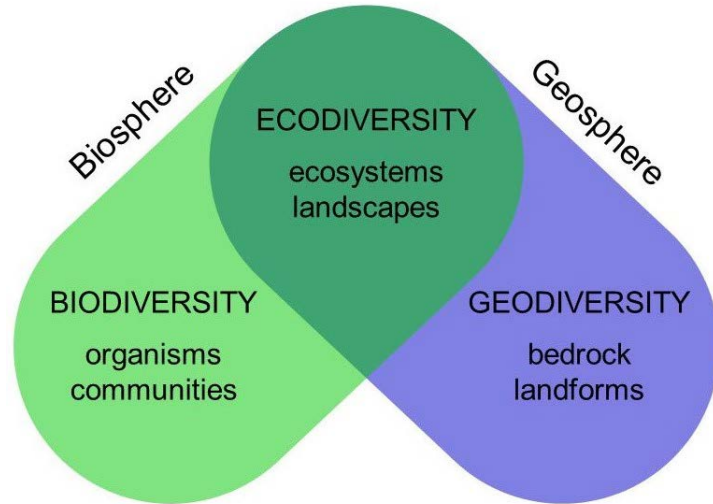


# Integrating Biodiversity and Geodiversity/conservation

Sarah Gaines  
Ester Sztein  
Vince Santucci  
An-Min Wu  
Benjamin Tobin



# Actual Connections between Geo- and Bio-diversity

- The real world
- Some conservation approaches, often around specific sites or processes
- Paleontology as a science
- Soil Science as a science
- Relationships can be observed at different scales
  - Acidic soils and specific plants (organism level)
  - Adiabatic lapse rate and precipitation (landscape scale)
- Specific landscapes are conducive to cooperation across disciplines
  - Access issues (caves, mountain peaks, marine/aquatic)
  - Land management needs

# Root of the Separation of Fields of Study

- K-16 education emphasis on other sciences
  - K-12: prioritization of biology, chemistry, physics over earth science
  - Undergraduate: limited exposure outside of STEAM major
- Practicality
  - Need to split subjects to learn them in more detail

# Progress towards Integration

- Understanding anthropogenic forcings on the environment
- Spatial/temporal understanding of environments
- Biologic study of speciation patterns
- Processes connecting biotic and abiotic world
- Integration of disciplines in education and research



# Branding Challenges and Opportunities

## Challenges:

- Not familiar with geoheritage terminology / meaning / importance
- Designated funding for Geoheritage collaborations

## Opportunities:

- Support for an International Geoheritage Day, designated by UNESCO
- Partner with agencies already doing science e.g. science museums, teachers.
- Explicitly describe conservation of geoheritage in terms of its broader impact
- Work we already do, but refer to it by a different name
- Include 'geoheritage' keyword in publications and other communications
  - #geoheritage

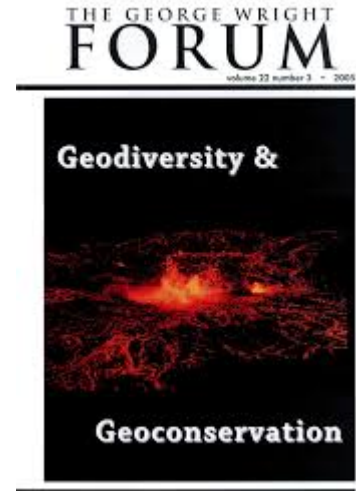
# Scientific and Management Challenges and Opportunities

## Challenges:

- Lack of recognition of the value of interdisciplinary work
- Holistic/system perspectives requires interdisciplinary collaboration

## Opportunities:

- Outreach/Collaborations
  - Citizen Science (Watershed Watch, BioBlitz, etc)
  - Sessions, papers, flyers, etc
- Decision making
  - Interactions with land managers
  - Manager buy-in



# Short-term Actionable Outcomes

- Publish using the language of geoheritage
  - Upcoming George Wright Society Geoheritage publication
  - Upcoming *Carbonates and Evaporites Journal* Special Issue on the Karst 2020 conference
  - Others journals or communication outlets?
- Work to integrate Geoheritage work into Biodiversity work
  - Reach out to ecologists and others (i.e. taxonomists) for collaborations
  - Train NPS land managers/resource specialists on basics of geoheritage
  - USGS avenues?
- Create interdisciplinary sessions/workshops at ecological and natural resource conferences
  - Submitted special virtual session to the ESA 2021 Annual Meeting



# Broader Needs in Moving Forward

- Including indigenous perspectives in these discussions of geoheritage and biodiversity
  - Separation of biology and geology is not consistent across cultures and interpretation
- Develop funding opportunities
- Language of Research vs. Science
- Cooperation on resource management between agencies charged with biological and/or geologic resources at the state and federal level
  - Geologic Surveys, Fish and Game, Forestry, Land Management Agencies

