Biodiversity Lesson Plan

Summary: Students will collect data on species presence/absence for different sites and at multiple scales in order to calculate three different measures of diversity (alpha, beta, and gamma diversity).

Objectives:
1. Students will gain a general understanding of biodiversity, and the many contexts in which it is applicable.
2. Students will be able to define and calculate alpha, beta, and gamma diversity and relate them to one another.
3. Students will be able to apply the concept of biodiversity to different aspects of an ecosystem.

Assessment Opportunities:
- At the end of the fieldwork portion, the class will come back together and share some of their data. This is an opportunity to give direct feedback to the groups.
- The worksheet for this activity could also be taken up and assessed.
- Formative assessment could occur during the activity by asking groups questions to make sure they understood the concepts presented in the powerpoint.
- Optional writing assignment for after the activity: Student will write an ecological story about one of their sites and explain how it ended up with its current species composition.

Audience: Undergraduate Introductory Ecology class or lab, class size 10-20 students

Key Concepts:
- Alpha, beta, and gamma diversity are all different ways of measuring biodiversity across different scales in the landscape.
- There are weaknesses to using a simple metric - Sites with different species composition may still have the same species abundance (total number of species), but these ecosystems may look completely different.
- The concept of biodiversity is applicable in many areas, not just species composition

Skills:
- Identifying different species at different scales
- Communication and Collaboration with group members
- Comparing and contrasting site compositions
- Making insights about the simple metric
- Creatively thinking about other applications of biodiversity

Materials Needed:
-Powerpoint
-Worksheet
-Cut-outs of different animal and plant species organized into six distinct sites and grouped into two landscapes

Preparation Time: 30 minutes

Activity Time: 20 - 30 minutes

Getting Ready:

1. Print and cut out the animal and plant representations. Choose some redundant species between sites, and some unique species per site. Make sure to have multiple individuals per species (but not always the same number) since the students will be qualitatively approximating evenness as a part of their worksheet. Interesting ideas include keystone species, invasive species, and species local to your area.
2. Spread the cutouts across your six sites, creating sites with an ecological story behind them.
3. Calculate each type of biodiversity for the sites, pairs of sites, and landscapes.

Doing the Activity:
1. Present material in powerpoint to introduce the topic of Biodiversity.
2. Students will work in pairs to complete their worksheets.
3. Assign half of the class to the first landscape, and half of the class to the second landscape. The students will randomly select sites from these landscapes to compare.
4. Allow 10 – 15 minutes for the students to complete their fieldwork. Interact with the groups as they complete the activity, asking questions to gauge their learning and answering any questions that they may have.
5. Gather class back together after their fieldwork to report back on their results.
6. Evaluate the class results. Make corrections and provide explanations if applicable.
7. Lead the class in brainstorming other potential applications for biodiversity measures.