Spatial Microhabitat Biodiversity

Bioblitz 2016 project proposal

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1 Concept

1. Areal distribution
2. site/situation
3. Environmental determinism

2 Materials

Piney Z lake

2.1 For each of the groups

Clipboard
Data sheet
Flashlights (for night shifts)
Digital camera (for documentation of species)
GPS unit (for tagging approximate location of finds) Guidebooks for identification of organisms, specific to each group first aid equipment (including snake bite kit)

2.2 For microorganism analysis

Table
Microscopes
Petri dishes/ slides and slide covers
Protoslo® or equivalent
Water testing kits (2 for each shift)
Water sampling equipment

3 Time required

1. Orientation/group division: ≈ 5-15 minutes
2. Exploration/cataloging: ≈ 1.5 hours
3. Regroup and discussion: ≈ 15-30 minutes

4 Objective

The students should be able to identify the differences between plants, animals, fungi and protists in a natural setting and demonstrate an understanding of the basic spatial relationships of biotic and abiotic factors in a microhabitat through discussion and analysis of biodiversity data.

5 Methodology

5.1 General scheme

1. Upon the arrival of the students, split them into the three competing groups each to identify different organisms in the area. The three groups will identify plants, animals, and fungi and microbiota.

2. Starting at one microhabitat, identify species and record their locations with the GPS unit and take notes regarding their habitat. For example, if a group is operating in a pine forest, take general notes about the pine forest (needle covered floor, not as much sunlight as other habitats, etc.) and add specifics if necessary to where each specimen is located.

3. Identify abiotic factors that are in the microhabitat (light levels, soil type, etc.). Identify species at each microhabitat for $\approx$ 30-45 minutes and then move to another, repeating the same methods as in the step above.

4. After the planned out microhabitats have been investigated, regroup all the students at the starting location to pool data and debrief; count species identified to declare the "winner" of the contest.

5. Discuss with students about the differences or similarities they observed with regards to species and environmental factors in the different habitats. Then ask for inferences as to why those differences or similarities occurred.

6. Upload pictures and other data to iNaturalist and construct maps based off of data to then analyze biogeographical trends.

6 Analysis

After the data has been collected and the picture files uploaded to the iNaturalist website, several maps of this data are going to be created. These maps include:

map of the locations of animal species

map of the locations of plants and fungi species

map of the locations of microbiota

maps of the densities of these species

composite map of the locations of different species (in their relative taxanomic groupings)

These maps should show the relative biodiversity found within the microhabitats sampled, as well as displaying the spatial distributions of some species, allowing for the investigation and discussion of unique biogeographical patterns and the biological and geographical causes behind them. If investigating with an older group, simple descriptive statistics and/or frequentist tests (such as an ANOVA) could be used to see if the differences between the groups is significant, or due largely to pure chance. The younger students can make bar graphs of the number of species per habitat, which will help be a proxy to diversity.

7 Appendix

7.1 Teaching materials

Before the field, the students need to have a firm understanding of some fairly abstract ideas. To help have a discussion to establish the following concepts:

1. What is a habitat? What habitat do people live in?
2. Do organisms only live in one habitat?
3. What might limit some animals to live in certain habitats? (e.g. most fish cannot survive out of water for extended periods of time) What are some examples?
4. Do you think there might be more species in one habitat versus another? Why?

After the data is collected and the maps created, the maps will probably show that there are disparities between the number of species and densities for different microhabitats. The data reflected in these maps would probably benefit most from small group and class discussion, which should probably investigate the following questions:

1. Were there any animals that were in all the habitats? Which ones?
2. What natural (abiotic) factors play into the diversity of a habitat? What living (biotic) factors play a role in this?
3. Do some individuals of some species live farther apart or closer together? What is an example?
4. If a wall was built between two habitats, would that change which life could be there?