

Name _____ Date _____ Period _____

Parking Lot Biodiversity

Purpose

After reading the lab, create your own purpose below:

Pre-Lab Discussion

Biodiversity, or the variety of species in a given area, is a growing issue for habitats around the world and more and more species become extinct or near extinction. Also, recently many new medicines have been discovered by screening thousands of organisms for anti-cancer and antiviral properties. One common argument for preserving biodiversity is that if we fail to do so, the organism with “the cure for cancer” may become extinct before we utilize it. There are other strong arguments for maintain diversity. Current agricultural practice is to plant acres of a crop with identical genotype. This is done because some traits of the genotype are superior to others strains, but if that genotype is susceptible to a pest or disease, the entire crop can be lost. In the wild this naturally occurs, so regardless of the pest or disease the crop will still live on. Finally, there is an aesthetic value to biodiversity. We find variety appealing and zoos, gardens, and forests are popular places because they provide us an opportunity to see organisms we may not normally see. So if biodiversity is so important, how can we quantify or measure it? In this activity, we will use three indices to measure community diversity, as explained below:

Index 1: Species Richness

The species richness (R) is based solely on the number of species found in the given area and does not reflect the dominance of one species.

$$R = s$$

s = the number of different species

Index 2: Shannon-Wiener Index

The Shannon-Wiener Index (H') is determined by both the number of species and the even distribution of these individuals among those species. It indicates the degree of uncertainty of predicting the species of a given individual picked at random from the community. In other words, if the diversity is high, you have a poor chance of correctly predicting the species of the next individual drawn. H' will range from 0 for a community of a single species to 7 for a diverse community. The index is calculated using the following formula:

$$H' = - \sum p_i \ln p_i$$

p_i = the proportion of individuals of species i

ln = natural log

Index 3: Simpson’s Index of Diversity

The Simpson’s Index (D) is also dependent on the number of species and their relative dominance. It indicates the probability of both individuals in a randomly drawn pair being of different species. D will equal 0 for a community of a single species and approach 1 for a diverse community. Its formula is:

$$D = 1 - \frac{\sum n(n - 1)}{N(N - 1)}$$

n = the number of individuals of species i

N = total number of individuals collected

Procedure

Today, we will look at biodiversity by comparing the two parking lots on the side of the building. The two lots (communities) we will be looking at are the side student lot (by science) and the side faculty lot (by gym). With your partner you will need to record the make and color (species) of each car in the lots. (Make sure to keep data separated for each community). Using that collected data you will then apply the indices above to see the diversity of each lot.

Data

Index	Student Lot	Teacher Lot
Species Richness (R)		
Shannon-Wiener Index (H')		
Simpson’s Index (D)		

Questions

1. Which lot has the greater diversity? How can you tell?
2. What are the most common species in each parking lot?
3. What are some other characteristics that could have been used to further diversify the species we were looking at?
4. What do the species present in each lot say about the population (drivers) in that lot?
5. What are some techniques used to increase the biodiversity of a region?