AP Environmental Science

Parking Lot Species Diversity Lab

The diversity of species present in an ecosystem can be used as one gauge of the health of an ecosystem. Species richness is a measure of the number of different species, while species evenness measures the relative abundance of the various populations.

In an ecological survey designed to measure species diversity, a wildlife biologist might determine the number of individuals of each species present in an area, and then calculate a “diversity index” for the area. Comparison of the diversity index of one area with that of other areas provides insights into the species diversity and the health of the ecosystem.

In this activity you ecosystem will be the school parking lot and the species will be the different car models and colors. As a class, we will be comparing the species diversity of the student and staff parking lots. The diversity index we will use is the Shannon Diversity Index. After determining the number of each species in each lot we will calculate the Shannon Diversity Index for each lot. An ecosystem with high species diversity has a large value.

**Calculating the Shannon Diversity Index (H’)**

**Equation 2**

H’ = - sum[pi \* ln(pi)]

**Equation 1**

pi = \_\_\_\_\_\_ni\_\_\_\_\_\_\_

 sum(ni)

**Equation 4**

E = \_ H’\_\_\_

 Hmax

**Equation 3**

Hmax = ln(N)

Where:

pi = proportion of total sample represented by species *i*

S = species richness

Hmax = maximum diversity possible

E = evenness = H

N = number of species

**Sample Data Table**

Use an entire page in your lab notebook for your data table. Leave enough space for 20 species.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | i  | ni | pi | ln(pi) | pi \* ln(pi) |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| Sums 🡪  |  |  |  |  |  |

**Prelab Questions**

*Answer the following questions in complete sentences in your lab notebook.*

1. Use two data tables similar to those that will be used for the lab to record and calculate the Shannon Diversity Index for sample data set provided in class.
2. Identify which parking lot you expect to be the most diverse and defend your choice.

**Data Analysis**

1. Determine the value for the Shannon Diversity Index for the data collected by the class. Show all of your work.
2. Compare the values of the Shannon Diversity Index for the two parking lots.

**Postlab Questions**

*Answer the following questions in complete sentences in your lab notebook.*

1. Identify the parking lot that was the most diverse. Was your hypothesis supported or not supported?
2. List the single most abundant species. Write a hypothesis that addresses why this is the most abundant species.
3. If you conducted this lab in a shopping mall parking lot, predict whether the Shannon Diversity Index would be high or low compared to the school parking lots.
4. If you conducted this lab at a new car dealership, predict whether the Shannon Diversity Index would be high or low compared to the school parking lots.

**Species Diversity Lab Grade Sheet** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_ / 100 – Table of contents updated

\_\_\_\_\_\_\_\_ / 100 – Ink only

\_\_\_\_\_\_\_\_ / 600 – Prelab questions

\_\_\_\_\_\_\_\_ / 100 – No obliterated data

\_\_\_\_\_\_\_\_ / 400 – Data tabulated / calculated

\_\_\_\_\_\_\_\_ / 100 – Data initialed

\_\_\_\_\_\_\_\_ / 100 – Diversity Index tabulated

\_\_\_\_\_\_\_\_ / 500 – Postlab questions

\_\_\_\_\_\_\_\_\_\_\_ / 2000 points

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