Three measures

The Shannon Index (H) is calculated as

$$H = \exp\left(-\sum_{i=1}^{s} p_i \ln(p_i)\right)$$

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The Simpson Index (D) is calculated as

$$D = \frac{1}{\sum_{i=1}^{s} p_i^2}$$

where s is the number of different species and p_i is the relative frequency of the ith species, or $\frac{n_i}{N}$ with n_i being the number of the ith species and N being the total number of organisms. The previous two measures are often used to determine species diversity in a given community. We will examine how they differ from each other by looking at some data.

It is also sometimes useful to measure if two communities are similar to one another. Soresson's Coefficient (CC) is calculated as

$$CC = \frac{2C}{S_1 + S_2}$$

where C is the number of species in common and S_1 and S_2 are the number of species in each community.

examples

Species	number of individuals (n_i)	rel. freq. ($n_i/N = p_i$)	p_i^2	$p_i \ln p_i$
Grasshopper green	6	$6/27 = 0.\overline{2}$	0.049	-0.334
Grasshopper brown	5			
Large blue butterfly	1			
Small blue butterfly	3			
Red and blue beetle	12			

1. Complete the table.

2. Calculate H and D.

3. What are the values of H and D if there only one species is collected?

4. What are the values of H and D if there are five examples of five species are collected for a total of 25 organisms.

Species	number of individuals (n_i)	rel. freq. $(n_i/N = p_i)$	p_i^2	$p_i \ln p_i$
Black Wasp	12			
Purple Wasp	21			
Bee	5			
Green Grasshopper	25			
Large Blue	17			

1. Complete Table.

2. Calculate H and D.

3. Which of the two communities is more diverse?

4. How similar are the two communities?