

# The Shannon Biodiversity Index of Bean Soup Mix

Background: The Shannon Index is a measurement used to compare diversity between habitat samples. This comparison can be between two different habitats or a comparison of one habitat over time. The actual formula for the Shannon-Weiner Diversity Index is:

- S = Total species
- $P_i$  = Percentage of that species out of the total
- ln = Natural log
- $\Sigma$  = Sum
- i = individual species
- E which is the evenness of those species. If the E value is 1, the species are equally present in the habitat.
- The formula to find E is:  $E = H/\ln(S)$ .

$$H = -\sum_{i=1}^S p_i \ln(p_i)$$

High values of H would be representative of more diverse communities. If the species are evenly distributed then the H value would be high. So the H value allows us to know not only the number of species but how the abundance of the species is distributed among all the species in the community.

Procedure:

- In team of 2, fill a cup with bean mix 1 and another cup with bean mix 2. Each cup represents plants from two different habitats
- Mark your cups so you know which cup is from which “habitat”.
- Fill in the charts for each “habitat” using **Shannon’s Diversity Index**.
- Calculate the **Evenness** of each “habitat” as well.

Community A				
Species (create a name for you bean)	Number of that species in sample (i)	$P_i = i \div n$ (Number of specific species ÷ total number of species)	ln( $P_i$ )	$P_i \times \ln(P_i)$
	Total number of organisms (n) = _____	Should add up to 1.0	Use the natural log table	H = _____ (add this column and remove the -)

<b>Community B</b>				
Species (create a name for you bean)	Number of that species in sample (i)	Pi $P_i = i \div n$ (Number of specific species $\div$ total number of species)	$\ln(P_i)$	$P_i \times \ln(P_i)$
	Total number of organisms (n) = _____	Should add up to 1.0	Use the natural log table	$H = \frac{-\sum (P_i \times \ln(P_i))}{\sum P_i}$ (add this column and remove the -)

Diversity index for: Community 1:  $H = \underline{\hspace{2cm}}$       Community 2:  $H = \underline{\hspace{2cm}}$

Questions:

1. Compare and describe the H value of the two habitats.
2. Determine the species richness and species evenness for each community.

	Species Richness (S) Number of different species found in your community	Species Evenness (E) $E = H \div \ln(S)$
<b>Community A</b>		
<b>Community B</b>		

3. Looking at the two habitats, what do you think would happen to the H value if you took a second sample from this habitat five years from now.

4. Considering all three Shannon measurements (H, S, and E), which community is most diverse? Explain your reasoning.

5. What are some advantages and disadvantages of using the Shannon index?

6. Do an internet search what is the highest Shannon Index value you are able to find and where is it located.