



Digital Commons@

Loyola Marymount University
LMU Loyola Law School

Module 06: Urban Biodiversity

Urban EcoLab

April 2021

Student Pages - Different Measures for Different Needs

Center for Urban Resilience

Follow this and additional works at: <https://digitalcommons.lmu.edu/urbanecolab-module06>



Part of the [Ecology and Evolutionary Biology Commons](#), [Environmental Education Commons](#), [Sustainability Commons](#), and the [Urban Studies and Planning Commons](#)

Repository Citation

Center for Urban Resilience, "Student Pages - Different Measures for Different Needs" (2021). *Module 06: Urban Biodiversity*. 29.

<https://digitalcommons.lmu.edu/urbanecolab-module06/29>

This Lesson 2: Different Measures of Biodiversity is brought to you for free and open access by the Urban EcoLab at Digital Commons @ Loyola Marymount University and Loyola Law School. It has been accepted for inclusion in Module 06: Urban Biodiversity by an authorized administrator of Digital Commons@Loyola Marymount University and Loyola Law School. For more information, please contact digitalcommons@lmu.edu.

Name: _____ **Date:** _____ **Class/Period:** _____

Lesson 2.1: Different measures for different needs.

Purpose

Scientists have developed multiple measures to evaluate the biodiversity of a particular site. To understand why scientists use different methods to evaluate biodiversity we will develop our own methods to evaluate the diversity of an everyday object: the cell-phone.

The review below rates each cell phone company from very good (score of 5), good (score of 4), fair (score of 3), poor (score of 2), and very poor (score of 1) on several categories.

Rating Category	Company A	Company B	Company C
Cost of phone	\$100	\$60	\$90
Call Quality and Reliability	5	3	4
Number of free minutes	5	4	4
Available features (call waiting, redial when busy)	5	4	4
Phones are easy to use	4	4	4
Coverage area	5	4	5
Other media (phones play music and videos)	Not Available	4	5
Downloadable Games	Not Available	4	3
Thickness/Size of Phones	4	1	3
Average Score	4.70	3.50	4.0
Total Number of Plan Features	6	8	8

1. Based upon the data in the table, which cell-phone company's plan would you buy? Why? What were the factors that most influenced your decision?
2. Do you think your classmates will agree with you that Company _____ is the best? Why or why not?

Name: _____ Period/Class: _____ Date: _____

Lesson 2.3: Examining Biodiversity measures**Purpose**

In the previous lesson, you examined three different urban sites and discussed which one you felt had the greatest biodiversity. In this activity, you are going to revisit those sites, examining specific bird data and using different measures of biodiversity.

Prediction

Look at the data in the table below. Which of the three sites do you think will have the greatest biodiversity using the Simpson and Shannon-Weaver indices? Why?

Procedure

1. For each site record the species richness in the data table on the next page.
2. Describe the species evenness for each site in the table (e.g. even number of each species, a couple of dominant species with high numbers and the rest are low.)
3. Open the spreadsheet *biodiversity_measures.xls*. The data for the three sites is recorded in the table below. You will need to add the data from one site at a time to calculate the Simpson and Shannon-Weaver indices.
4. Start with Site #1. Species #1 will be the Rock Dove so change the species number to 32. Repeat this with all 10 species. After adding all of the data, record the final Simpson and Shannon-Weaver Indices in the data table on the next page.
5. Repeat the procedure for Site #2 and then Site #3.

Species of Bird	# of individuals counted at site		
	Site #1	Site #2	Site #3
Rock Dove (pigeon)	32	44	20
Black Capped Chickadee	4	22	23
European Starling	43	47	25
House Sparrow	15	42	25
Song Sparrow	1	6	20
House Finch	23	45	24
Dark-eyed Junco	0	0	20
American Crow	4	4	20
Common Grackle	0	5	23
American Robin	0	4	20
Total Number	122	219	220

Results:

Record below the species richness. Then use the excel sheet to calculate the Shannon Weaver and Simpsons indices for both sites. Record both indices below.

Site	Species Richness	Species Evenness	Simpsons	Shannon-Weaver
Site 1				
Site 2				
Site 3				

Conclusion

1. Which of the three sites had the greatest biodiversity? Explain why it has the highest biodiversity.

Further Exploration

1. What do you think will happen to the Simpsons and Shannon-Weaver index if there is only one species? Will it be high, in the middle or low? First make a prediction. Then use the spreadsheet to test your idea and then record your results.

Module 6 Lesson 2.3

2. What do you think will happen if you have 10 species but one very dominant one? Again, make a prediction, then use the spreadsheet to test your idea and record your results below.
3. Using the spreadsheet, try to make the Simpsons and Shannon-Weaver index as high as possible. What conditions lead to the two indices being high?
4. What do you think is the best indicator of biodiversity, the number of species, the number of individuals, the evenness, or a combination of all three indicators? Why?

Name: _____ Period/Class: _____ Date: _____

Lesson 2.4: Measuring biodiversity using tree data – Version 1

Purpose

In Module 2, you collected tree data at your field site. You are now going to revisit that tree data to calculate the tree biodiversity of your field site. Before conducting your calculation please answer the following questions.

Predictions

1. Do you think you have diverse sampling of trees? Why or why not?

Results

1. Use the **biodiversity_measures.xls** spreadsheet to calculate the Simpson and Shannon-Weaver indices for your field site. Record the results below.

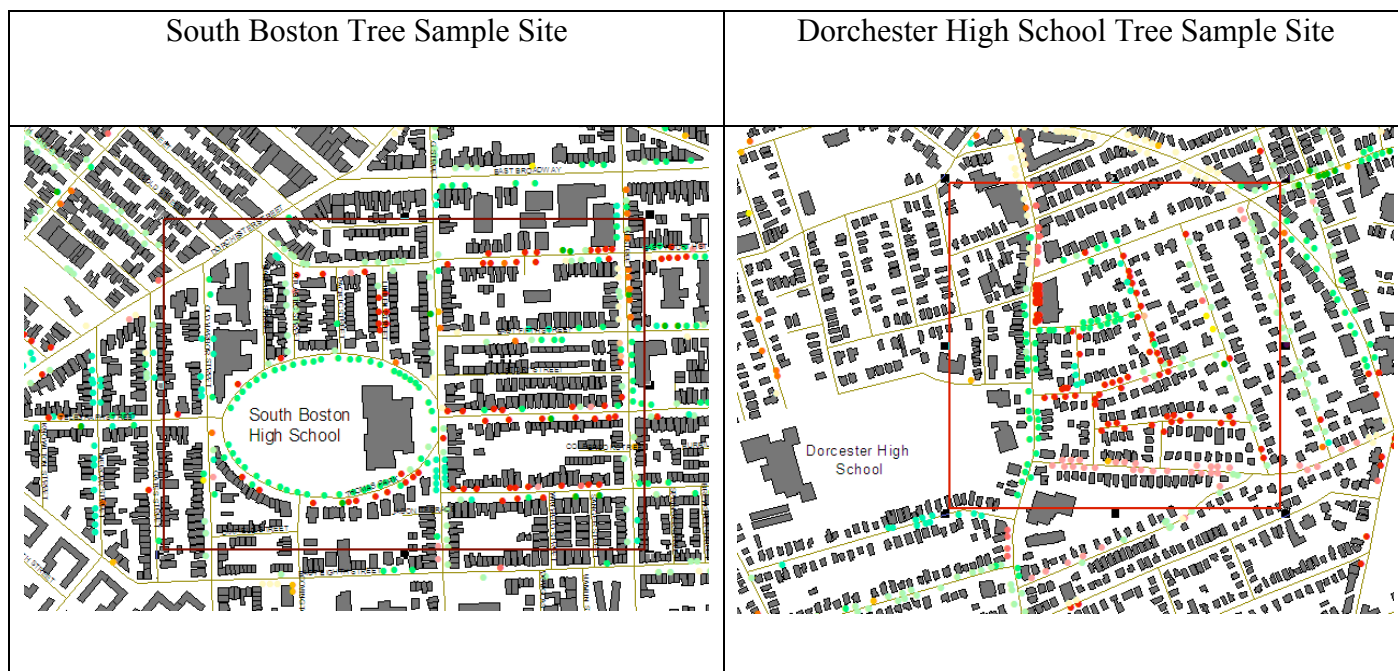
Conclusion

1. Do you think the biodiversity of your field site is high or low? What is your evidence for this?
2. Do your results from the biodiversity indices surprise you? Why or why not?

Name: _____ Period/Class: _____ Date: _____

Lesson 2.4: Measuring biodiversity using tree data – Version 2**Background**

During the summer of 2006 a group of volunteers conducted an urban street tree inventory and collected data about trees in the entire city of Boston. Below are two images from the neighborhoods of South Boston and the Codman Square area near Dorchester High School. The square is the study area in which trees were sampled and each dot represents a tree. The gray areas are buildings. The different color dots represent a different species of tree.



South Boston Tree Sample	
American Elm	3
American Sycamore	5
Elm hybrids	5
Green Ash	8
Honey Locust	65
Japanese Tree Lilac	6
Japanese Zelkova	6
Littleleaf Linden	64
London Planetree	12
Norway Maple	38
Total Trees	212
Total Species	10

Dorchester High School Tree Sample	
Callery Pear	7
Ginkgo	26
Green Ash	14
Honey Locust	49
Littleleaf Linden	68
Norway Maple	33
Total Trees	197
Total Species	6

Prediction

Looking at the data, predict which area do you think has the greatest tree biodiversity? Why?

Results

Record below the species richness. Then use the excel sheet to calculate the Shannon Weaver and Simpson indices for both sites. Record both indices below.

Site	Species Richness	Simpsons	Shannon-Weaver
South Boston			
Dorchester High School			

Conclusion

1. Which site has a higher biodiversity? What is your evidence that it has a higher biodiversity?
2. What do you think is the best indicator of biodiversity, the number of species, the number of individuals, the evenness, or a combination of all three indicators? Why?