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Advancing geography
and geographical learning

Comparing Forest Ecosystems



Comparing Forest Ecosystems

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Objectives

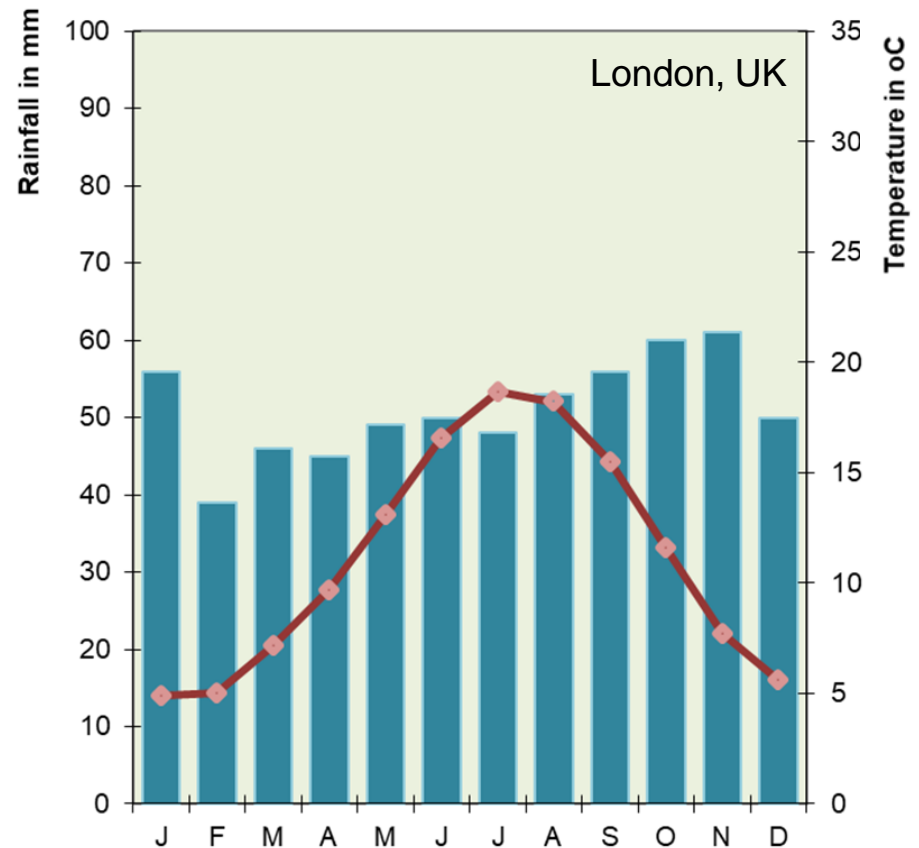
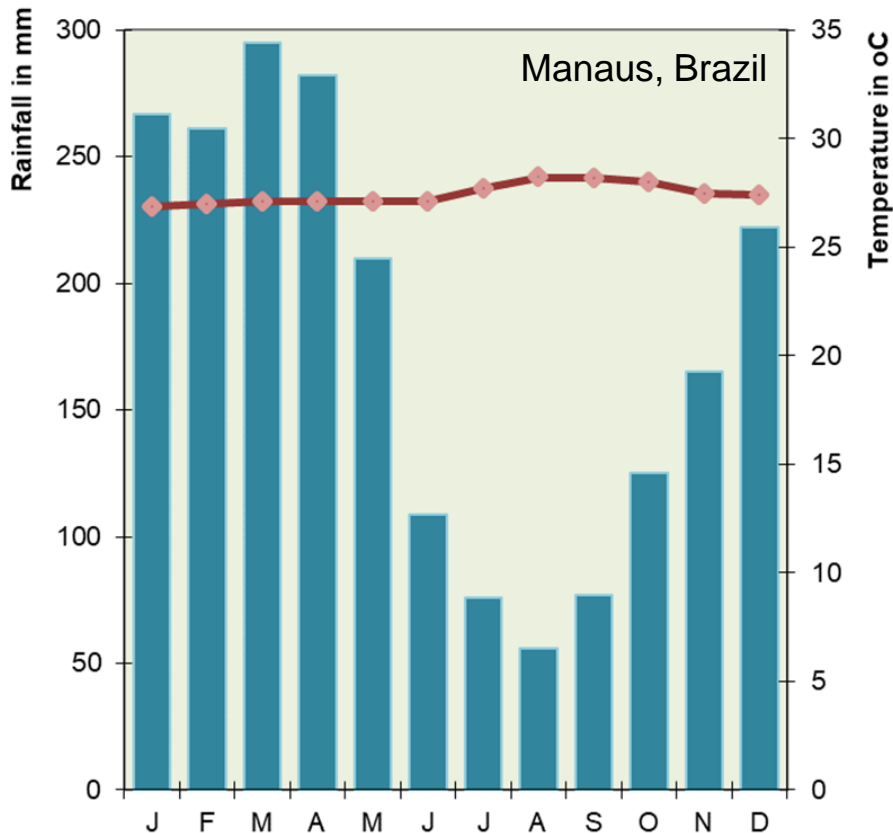
To undertake a statistical analysis related to species abundance

To understand what the results of a statistical analysis mean for biodiversity

To be able to plan a method for measuring species abundance in the field

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Describe how a tropical climate is different to a temperate climate





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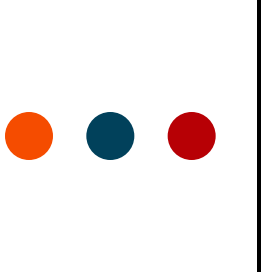
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What would we define each of these terms?

Mean:

Mode:

Median:



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What would we define each of these terms?

Mean: the sum of all the values in the data set divided by the number of values within the data set

Mode:

Median:



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What would we define each of these terms?

Mean: the sum of all the values in the data set divided by the number of values within the data set

Mode: the value that occurs most frequently within a dataset

Median:



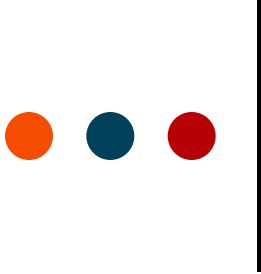
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What would we define each of these terms?

Mean: the sum of all the values in the data set divided by the number of values within the data set

Mode: the value that occurs most frequently within a dataset

Median: the middle value when the data set is put in value order



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Choose either precipitation or temperature.

Work out the mean, median and mode for each of the two locations.

Are there any notable differences between the figures?

Which of the three methods do you favour?



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You are going to compare the levels of biodiversity in a tropical rainforest and a temperate woodland.

Step One: Write a Hypothesis

Which ecosystem do you think will have the higher level of biodiversity?
How much greater will biodiversity be in one ecosystem than the other?

Write your hypothesis as a single statement.



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Step Two: Work out the Simpson's Diversity Index for an area of temperate woodland

The **Simpson's Diversity Index** is used to calculate the degree to which an area is considered diverse compared to another area. It relates the number of individuals of a kind to the total number of individuals in an area.

In this case, the two areas are the two habitats we are studying.



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Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807		
Alder	6		
Hazel	1856		
Hawthorn	82		
Blackthorn	40		
White willow	101		
Wayfaring tree	78		
Guelder Rose	84		
Oak	1036		
Dogwood	29		
Total (N)		Total	

A tree survey was conducted in a set area of temperate woodland.

The following numbers of trees were recorded

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White willow	101		
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Oak	1036		
Dogwood	29		
Total (N)		Total	

Calculate the total number of trees found in the temperate woodland area. This is given the letter **N**.

Write this number in the table.

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Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807		
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Dogwood	29		
Total (N)	4119	Total	

Calculate the total number of trees found in the temperate woodland area. This is given the letter **N**.

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Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807	0.196	
Alder	6	0.001	
Hazel	1856	0.453	
Hawthorn	82	0.020	
Blackthorn	40		
White willow	101		
Wayfaring tree	78		
Guelder Rose	84		
Oak	1036		
Dogwood	29		
Total (N)	4119	Total	

For each species of tree, divide the number of that tree (the abundance or *n*) by the total number of trees (*N*).

Write these answers in the first empty column. The first four have been done for you.

Comparing Forest Ecosystems

Species	Abundance (n)	= n/N	= (n/N) ²
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Guelder Rose	84	0.020	
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Dogwood	29	0.007	
Total (N)	4119	Total	

For each species of tree, divide the number of that tree (the abundance or n) by the total number of trees (N).

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Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807	0.196	0.0384
Alder	6	0.001	0.0000
Hazel	1856	0.453	0.2052
Hawthorn	82	0.020	0.0004
Blackthorn	40	0.010	
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Wayfaring tree	78	0.019	
Guelder Rose	84	0.020	
Oak	1036	0.252	
Dogwood	29	0.007	
Total (N)	4119	Total	

These answers should then be squared.

Write the answers in the last column. The first four have been done for you.

Comparing Forest Ecosystems

Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807	0.196	0.0384
Alder	6	0.001	0.0000
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Oak	1036	0.252	0.0635
Dogwood	29	0.007	0.0000
Total (N)	4119	Total	

At the bottom of that last column there is space to write the total of these squared answers.

Calculate this and write it in.

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Species	Abundance (n)	= n/N	= (n/N) ²
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Wayfaring tree	78	0.019	0.0004
Guelder Rose	84	0.020	0.0004
Oak	1036	0.252	0.0635
Dogwood	29	0.007	0.0000
Total (N)	4119	Total	0.309

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Taking the sum of the squared answers away from 1 gives you a final value for the Simpson's Diversity Index (***D***).

$$D = 1 - 0.309$$

D should always be a value between 0 and 1. The higher the value the more diverse the habitat.



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Taking the sum of the squared answers away from 1 gives you a final value for the Simpson's Diversity Index (D).

$$D = 0.691$$

D should always be a value between 0 and 1. The higher the value the more diverse the habitat.



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Step Three: Compare the values for the Simpson's Diversity Index

Temperate woodland: $D = 0.691$

Tropical rainforest: $D = 0.901$

What does this tell you about the relative diversity of each habitat?

(Remember: The higher the value the more diverse the habitat.)



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Step Four: Draw a conclusion based on your hypothesis

Look back at your predictive hypothesis – were you correct?

Now write a short conclusion based on your findings from calculating the Simpson's Diversity Index.

This study is not perfect. What else should be included to **really** measure biodiversity?

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Sampling Equipment

Point Frame
Quadrat

Ranging Pole

Open Quadrat

Clipboard

Magnifier

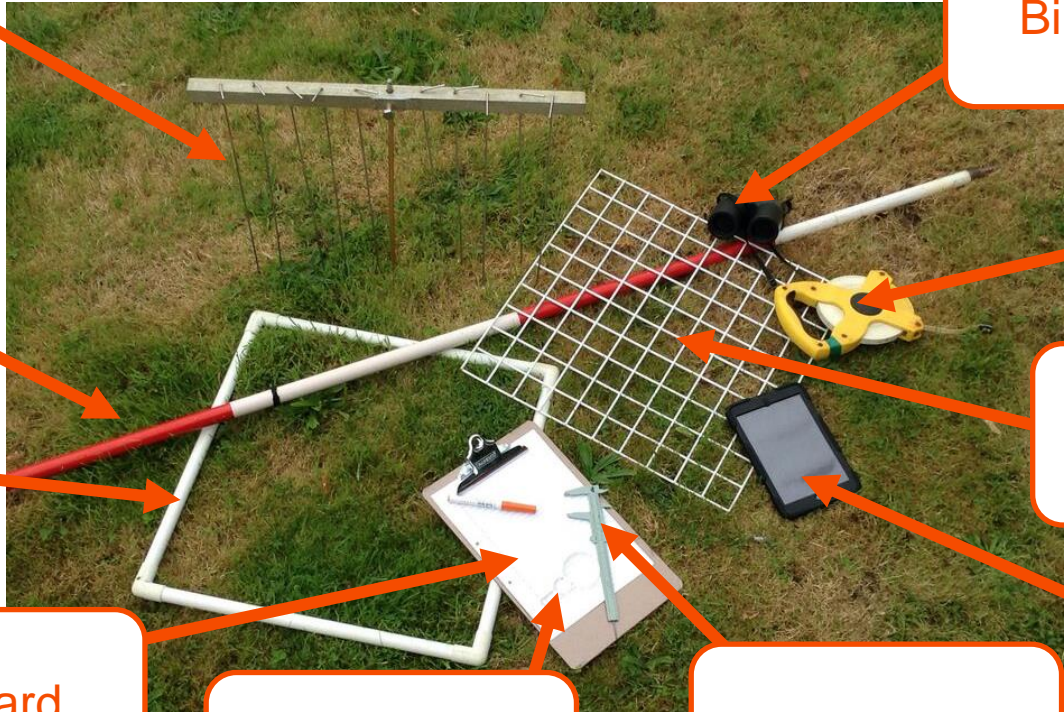
Calipers

Binoculars

Measuring
Tape

Closed
Quadrat

iPad





Simpson's Diversity Index



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Calculate the total number of trees found in the temperate woodland area. This is given the letter **N**.

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Species	Abundance (n)	= n/N	= (n/N) ²
Field maple	807	0.196	
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Species	Abundance (n)	= n/N	= $(n/N)^2$
Field maple	807	0.196	
Alder	6	0.001	
Hazel	1856	0.453	
Hawthorn	82	0.020	
Blackthorn	40	0.010	
White willow	101	0.025	
Wayfaring tree	78	0.019	
Guelder Rose	84	0.020	
Oak	1036	0.252	
Dogwood	29	0.007	
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Species	Abundance (n)	= n/N	= (n/N) ²
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Oak	1036	0.252	
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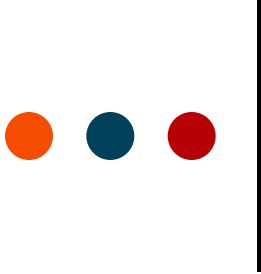
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