Quadrat sampling: a biodiversity plant survey

A quadrat is a small area of a habitat. A habitat is the natural home of an animal, a plant, or another living thing. Quadrats are usually selected at random and are used to assess the number of animals or plants living in this habitat.

Generally, a quadrat is a square but depending on what shape is suitable for the area and what materials you have available, a quadrat can also be rectangular, circular or irregular.

Before you start, have a look at this video from the National Biodiversity Data Centre: https://www.facebook.com/watch/?v=238600367220535

The researchers working at the Bio Data Centre use quadrat sampling all the time to learn more about the biodiversity and the changes in biodiversity in different habitats.

Cuckoo Flower
Found in damp meadows, lawns, riversides.
Flowers March-June
Native

Bluebell
Found in woodlands, hedges and grass areas
Flowers April-May
Native

Cuckoo Flower and Bluebell. Two species that are typically found in different habitats. Images taken from the National Parks and Wildlife Service Wildflower Guide.

What you need
• Cardboard, sticks, a hula hoop or other objects that you can use to create a quadrat
• Find two habitats where you want to take samples from
• Sheet of paper
• Pencil, colouring pencils
• Ruler

What to do

1. Create a quadrat from homemade materials such as cardboard, sticks, hula hoop, etc.

2. Record the area (A) of your quadrat:
   If you have a rectangular or square shape, measure the length and the width. Multiply the length (l) with the width (w) to calculate the area of a rectangular shape: $A = l \cdot w$
   If you have chosen a circular shape, measure the diameter (d), divide it in half, multiply the result with itself and then multiply with 3.14 (π): $A = \pi \cdot (d/2)^2$

3. Decide on the two habitats you wish to take samples from. One should be overgrown and wild while the other area should be a section of the garden/park where the grass has been cut and maintained. Ideally the total area of each habitat will be at least 5 metres long by 5 metres wide.
   Take measurements of the two areas (A) you are going to study. Measure the length and the width. Multiply the length (l) with the width (w) to calculate the area of a rectangular shape: $A = l \cdot w$

4. Draw a simple sketch of the habitats being observed and include the direction of North, any nearby buildings, large trees and shrubs, pathways etc.

5. Work out how many times your quadrat fits into the area of each habitat: $\frac{area\ of\ habitat}{area\ of\ quadrat}$

6. Take observations of your surroundings and characteristics of the day.
   For example: *"It is a windy but sunny day. The first area I am surveying is in the local park next to a busy playground. The second area I am surveying is far from the pathway in a quiet area of the park"*

7. Randomly choose a section of the first habitat to place the quadrat – you can do this by throwing a ball or pebble and placing the quadrat where the object lands.

Holly Blue   **Peacock**   **Speckled Wood**

Watch out for butterflies, can you see any Holly Blues, Peacocks or Speckled Woods? Images taken from the National Parks and Wildlife Service Butterfly Identification Chart.

8. Look closely at the plant and insects that are within the perimeter of the quadrat.
    - Observe how many different plants you see and record the results. e.g. Count the number of daisy plants, dandelions, clovers, etc.
    Use the National Parks and Wildlife Service Wildfower Guide (available on www.livingearth.ie) to help with the identification of wildflowers.
    - Count every insect that lands on one of the flowers within the quadrat over the course of 10 minutes.
    The National Park and Wildlife Service Butterfly Identification Chart and their Bug and Insect Guides (available on www.livingearth.ie) can help with this.

9. Move to the second site and repeat steps 7 and 8.

10. Back at home, work out how many of each species you would expect to find in the total area by multiplying the results from your quadrat sample by your answer in step 5.

11. Present your data in a bar chart (template below): the horizontal axis is the plant or insect species, the vertical axis is the frequency.

12. Compare the biodiversity of both habitats:
    - First, find out what biodiversity means. You can find many videos and other sources on www.livingearth.ie
    - Why is biodiversity important? Why do we need to protect biodiversity?
    - Is there a difference between the level of abundance between the two habitats?
    - Why is there a difference?
    - What species did you record in one that you didn't (or barely) recorded in the other?
    - Why? What does this tell you about the habitat that a species prefers?
    - Can you imagine what would happen if one species disappeared?
    - What impact did humans have on the appearance of each of the habitats you monitored?
    - What would the habitats look like without human interference?
    - How can you help to increase the biodiversity in these habitats?

Template: Quadrat Survey

Date, time and duration of observation

Size of your quadrat (Step 2)

Size of each habitat (Step 3)

How many times does the quadrat fit in each habitat (Step 5)

Sketch the habitats and describe the location and setting:
- Where did you carry out the survey? Your garden, a park…
- What were the surroundings like? In town, near or in woodlands…
- What was the weather like? Sunny, cloudy, cold, warm…

Make a bar chart (example below). Label the horizontal axis of the bar chart with the plant species you saw. Create a second one for the insects you recorded.

The vertical axis shows the number of species you estimate to be in each habitat.

Above the species colour as many squares as you calculated in step 10 for expected number of plants (or insects) of this species in each habitat. Use different colours for each habitat.