

CHALLENGE 4: PLANT COMMUNITIES & YOU

Student Guide

Materials:

- Camera (smartphone camera preferable)
 - Access to iNaturalist
 - An iNaturalist account that has joined the Ontario Envirothon 2023 project
 - Measuring tape of at least 5 meters
 - Field guides for identifying plants (some digitally accessible guides shared in Challenge 1)
 - Plant Communities & You – Data and Comparison Sheet (2 copies per team, to fill out while making observations)
 - 4 meter sticks
 - Review this video on estimating plant cover using quadrats
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Part A: Site Observation and Inventory

Identify 2 different plant communities that are easily accessible to your team. Examples of different communities include a mixed forest, a hardwood forest, a conifer forest, an open field, a marsh, a meadow, a forest edge, etc.

For each site:

1. Designate a circular sample plot with a radius of 5 meters in each location
2. Observe the ecological factors found in the plot, and make note of them on the work sheet.
 - a. What are the biotic and abiotic factors affecting this ecosystem?
 - b. How much sunlight is available in this ecosystem? (direct, indirect, full sun, shaded, partial)
 - c. Is there water nearby? (stream, pond, ephemeral source)
 - d. Are the plants crowded together or spaced out?
 - e. How open is the canopy?
 - f. Are there different layers of vegetation?
 - g. What is the texture of the soil?
 - h. Is there leaf litter or other organic matter? (broad leaves, needles, downed woody debris, etc)
 - i. What name would you give this type of ecosystem?
3. Make note of any evidence of disturbance at the site. (fire, erosion, human development, etc)
4. Identify and record the Species Richness of the site by identifying the plant species found in the plot. You may use a field guide to aid in your identifications; see previous challenges for useful links.
 - a. Upload your observations to the Ontario Envirothon iNaturalist project, using a mobile device or take photos to upload later
 - b. For larger plants (trees/shrubs), teams should make one observation per each individual
 - c. For smaller plants, one observation can be made per patch of the same species (ex. one observation for a patch of partridgeberry)
 - d. Be sure to take multiple clear photos to capture all of the identifying characteristics.
 - e. The total number of plant species identified is the plant Species Richness of the site.

5. Record Species Abundance of the site.
 - a. Perform a rough population survey of the plot. For larger plants, tally each individual. For smaller plants, an approximate percentage cover of the plot area will suffice. A sampling quadrat of known size (1 meter by 1 meter) can be used to help estimate percent cover. The quadrat doesn't need to be fancy – four metersticks taped together to form a square works well!
 - b. Percent cover = area covered by a species/total plot area. See this video for an overview of percent cover.
 6. Record the Species Evenness of the site.
 - a. Do all species present have the same number of individuals, or do certain species dominate the landscape? Which species? Why do you think this is?
 7. Using the information collected and recorded at this site, answer the following
 - a. Using your knowledge of all the species found in your sample plot, explain why these particular species occur here.
 - b. What adaptations do the common species have that makes them successful in this ecosystem?
 - c. Are there any species that you found and did not expect? Why do you think they are present?
 - d. What are some types of disturbance that you might expect in this ecosystem? What effects do you think that these disturbances have on the ecosystem?
 - e. Write down any additional observations you made about this ecosystem.
 8. Repeat the above steps for each chosen site.
 - a. As a team, submit at least 14 observations, 7 from each site, to this form[BMFO1] . Label your iNaturalist observations in the "notes" field with the site number and name of the ecosystem you found the plant in.
 - b. This is a great time to collect observations for the previous challenges, if not completed!
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Part B: Site Comparison

Review all information that your team has gathered from your different sites. Discuss the ecological themes and principles present in your observations with your advisor and teammates.

Use the following open-ended questions to explore the relationships and trend that you noticed among the different ecosystems. You may answer on your own or work as a team.

1. How ecologically similar were your sites, based on observed biotic and abiotic factors?
 - a. What ecological factors varied the least?
 - b. What ecological factors varied the most?
2. What do you think are the top three ecological factors that helped you easily differentiate one ecosystem from another? Why are these three factors important?
3. How did the similarities and differences among your observed sites affect which species were found there?
4. What species were found at both sites? Were there any? Why do you think these species were so common?

5. Were there any species unique to one site?
 - a. What factors do you think limited the range of this species?
 - b. What are its habitat requirements?
6. Define the terms generalist species and specialist species. Using your answers from questions 4 and 5 above, answer the following:
 - a. Which species identified were generalists?
 - b. Which were specialists?
 - c. Were any species in between?
7. What adaptations were common among species found at both sites, if any? Why do you think organisms with these adaptations thrive in these ecosystems?
8. Which site had the greatest plant species diversity? Which had the least? Why do you think that is?
9. Which ecosystem was your favourite, and why?
10. Was there anything unexpected that you observed?
 - a. (Optional) Independently research the unexpected observation and share with your teammates why you think you observed it during your investigation.