

The Eco-bottle Project: A Study of Sustainability



Purpose:

In this project, you will work in groups of **two or three students** to create your own aquatic ecosystem. Over the next few weeks you will monitor your ecosystem, observing both the **abiotic and biotic components**, assessing the health and sustainability of the ecosystem and watching for changes.

Materials:

Materials such as gravel, plants and animals (fish and snail) will be provided to your group. Eco-bottles will be provided but if you want to take it home at the end of the project, you will need to bring in your own bottle to do so.

Procedure:

Your group will be responsible for setting up, maintaining and monitoring an eco-bottles with the components outlined below.

→ must have **ONLY** the following: *water, gravel, aquatic plants, 1 or 2 fish, 1-4 snails.*

Observations:

1. Daily Log:

(**Communications 10 marks**)

- Your group is required to submit a detailed journal of this experiment.
- One daily log per group!
- In your journal, you will use the **Eco-bottle Daily Log** to record your qualitative and quantitative observations. Note the date and any changes, even minor changes.
- **Describe** the changes that are observed.
- Measure the pH, nitrate level and temperature of the water each day.

Analysis and Discussion

2. Worksheets and exercises

(**Knowledge and Inquiry 10 marks**)

Using your observation and drawing on the material covered in class, you will complete a number of exercises (worksheets) that will lead you through an analysis of the data you collect.

3. Poster (by hand or computer)

(**Communication 10 marks**)

Each group will be responsible for all of the following tasks. There are three different posters that need to be created. You will plan the posters as a group and then assign each person in the group with one of the tasks. If you only have 2 people in your group, you will have to share the third task.

- a) Draw a **food web** of the organisms in your eco-bottle.
- b) Draw a fully labelled diagram or flow chart of the components of your ecosystem, showing how the **carbon cycle** is at work in your eco-bottle. You should use arrows to show the flow of carbon from one component to another.
- c) Draw a clearly labelled diagram showing how the **nitrogen cycle** is at work in your eco-bottle. Be sure to include the form in which nitrogen is found.

Conclusion

Evaluation

(**Application 10 marks**)

At the end of the unit, you will have the choice between a written, oral or visual evaluation (depending on your learning style preferences) of what you learned about sustainability of ecosystems through this project.

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Part Two: Knowledge

1. Eco-bottle Components

- a) Identify abiotic and biotic components of your eco-bottles by listing them in the appropriate column in the table below..

Abiotic Components	Biotic Components

- b) Complete the chart below, indicating the roles of the various organisms and other components in your eco-bottle.

Producers

Name of plant	Distribution <i>(where and how much?)</i>	Consumers that eat the plant

Consumers

Type of consumer	Organisms present in ecosystem <i>(or evidence of its presence)</i>	Ecological role <i>(what do they do for the ecosystem?)</i>
Herbivores (primary consumers)		
Carnivores (secondary consumers)		
Tertiary consumers		
Omnivores		
Scavengers		
Detritus feeders		
Decomposers		

Part Two: Inquiry

1. Humans have a great impact on most terrestrial and aquatic ecosystems. Predict the effects of the following disturbances on your ecosystem.
 - Explain your answers fully, discussing **HOW** you expect these factors to affect your ecosystem and **WHY** they would have an effect. You will need to do some research so that you can back-up your predictions and give a solid explanation.
 - You may answer in the space below or attach another page.

CHOOSE TWO of the following disturbances.(5 marks each)

- a) A small amount of soap or shampoo is added on a regular basis.
- b) A new species such as the zebra mussel is added.
- c) The temperature of the bottle is raised to 35 °C.

2. **Describe** at least two ways in which your ecosystem would be different from a similar ecosystem in a local pond near the Credit River. Be sure to **explain** your reasons. (5 marks)