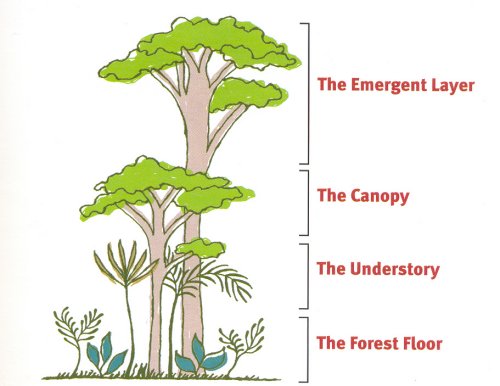
**From floor to canopy**

The abiotic factors in an ecosystem are not the same in all parts of the ecosystem. The environmental conditions they create determine what lives there.

A tropical rainforest is a good example of how different the environmental conditions can be in different parts of an ecosystem.

The diagram shows a tropical rainforest. A rainforest ecosystem consists of 4 layers: the rainforest floor, the understory, the canopy and the emergent layer.



**To do in your pair**

Read the information below. It describes the environmental conditions in each of the layers of the rainforest. It also lists some organisms that may be found in each layer.

|  |  |  |
| --- | --- | --- |
| **Rainforest layer** | **Description of environmental conditions** | **Examples of organisms inhabiting the area** |
| Emergent layer | Lots of light available  Less moisture  Few trees, those that are there are spaced out | Insects  Some birds – e.g Harpy eagle  Bats |
| Canopy | Tress grow tall (100-150ft)  Moisture and humidity are high | Orangutans  Parrots  Sloths |
| Understory | Dark and humid  Little light available | Large number of insects |
| Floor | Very little light  Very humid | Okapis (mammal)  Jaguars |

**To talk about in your pair**

1. Light intensity will vary in the different layers of the rainforest. Put the layers in order, starting with the layer that gets the **highest** light intensity, down to the layer that gets the lowest.
2. Some plants in the rainforest have very broad leaves. Which layer do you think they will inhabit? Explain why.
3. Explain why the forest floor is most likely to have the highest humidity.
4. Scarlet macaws can be found in the canopy of the rainforest. Suggest why they live here.
5. A boa constrictor will feed on small rodents and birds. Which layers of the rainforest are you most likely to find boa constrictors in?
6. Harpy eagles are one of the few species to be found in the emergent layer of the rainforest. Suggest why.
7. In which layers of the rainforest would you expect to find insects?
8. Decomposers are found on the floor of the rainforest. What is their role?
9. Would you expect the floor of the rainforest to be rich in nutrients? Explain your answer.

*Biology > Big idea BOE: Organisms and their environments > Topic BOE2: Organisms in their environments > Key concept BOE2.1: Ecosystem components and dynamics*

|  |
| --- |
| **Response activity** |
| **From floor to canopy** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The environmental conditions in different ecosystems, and in different parts of an ecosystem, affect and are affected by the organisms that live there. |
| Observable learning outcome: | Recognise that there are different environmental conditions within ecosystems, and this affects what lives there. |
| Activity type: | Discussion |
| Key words: | ecosystem, abiotic, habitat |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic question:

* Diagnostic question: Inside an ecosystem

**What does the research say?**

An assessment of middle school student understanding of ecological concepts found that when asked ‘What is an ecosystem?’ most students understood that an ecosystem was “a habitat” or a place where an organism lives; very few students elaborated on this with only 24% giving more sophisticated responses. Most students did not demonstrate an understanding of the interaction of multiple living and non-living parts or “a sense that these parts have varying levels of speciality” (Jordan et al., 2009).

Research investigating children’s ideas about the wildlife found in rainforests suggests students are more familiar with mammals and reptiles but are less familiar with the insects and annelids that inhabit these areas, despite the fact that they will be found in greater abundance (Dove, 2000; Palmer, Suggate and Joy, 2004).

Common misunderstandings about rainforest ecosystems include the idea that there is dense vegetation on the floor of the rainforest, and many students do not fully understand why rainforest soils are relatively infertile (Dove, 2012).

**Ways to use this activity**

Students should complete this activity in pairs. The focus of the activity should be on group discussion to answer the questions relating to the differing environmental conditions within the rainforest ecosystem and how these conditions in turn affect where organisms live within the ecosystem.

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each pair will often give you insights into how your students are thinking. The quality of the discussions can be improved with a careful selection of pairs, or by allocating specific roles to students in each pair. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers; they may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each pair should be prepared to report the key points of their discussion to another pair, or to the class.

**Expected answers**

1. Highest light intensity – emergent layer, canopy layer, understory, floor – lowest light intensity.
2. Plants with broad leaves are most likely to be found in the understory. The light levels here are low due to the trees in the canopy blocking out the light. The leaves of these plants are broad to allow them to absorb as much light as possible.
3. The forest floor is likely to have the highest humidity because it is covered by many trees. Transpiration by trees will occur and the trees will trap moisture rich air. There will be little air circulation in this part of the rainforest.
4. Scarlet Macaws will be found in the canopy as there is a good supply of food (fruits, nuts and seeds). The trees also provide the perfect place for building nests (they build nests in the hollows of trees).
5. Boa Constrictors are most likely to be found on the rainforest floor and in some of the trees in the canopy. Most of their food will be in these areas.
6. Harpy eagles are one of the few species found in the emergent tress as they will be one of a small group of species able to reach that layer, they are apex predators and this position in the trees gives them the perfect view of prey, which can include animals such as sloths found in the canopy layer.
7. It will depend on the species of insect, but insects are likely to be found in all layers of the rainforest.
8. Decomposers break down dead organic matter.
9. Rainforest ground is relatively infertile; the layer of soil can be thin. A combination of some leaching by rainwater (though this is greater when forests have been cleared) and the rapid recycling of nutrients by vegetation are responsible for this.

**Acknowledgments**

Developed by Elizabeth Lupton (UYSEG)

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