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WATER AND DECOMPOSITION

Decomposition Handout

Look up the definition of **decomposition** in the *Canopy In The Clouds* glossary. Write the definition below.

DECOMPOSITION: _____

_____

Where have you seen decomposition occurring in your everyday life or in the ecosystem around you?

_____

_____

Decomposition is a process carried out by insects, worms, bacteria, fungi and other organisms known as decomposers. This process is essential to the health of every ecosystem, especially the tropical montane cloud forest. The immense amount of living organic matter in the cloud forest creates a high demand for nutrients, which are made available by the decomposition of leaf litter and non-living organic matter on the forest floor by decomposers. These nutrients are absorbed very quickly after decomposers make them available.

The speed, or rate, at which decomposition occurs is affected by many factors. First and foremost, decomposers must be present! Just because you don't see them, doesn't mean an ecosystem is void of these valuable organisms. Decomposers may be microscopic bacteria that are invisible to the naked eye, or large earthworms that create nutrient-rich waste through the digestion of non-living organic matter. Decomposers are heterotrophs, which means they cannot create their own energy. Oxygen must be present in order for decomposers to turn organic matter into inorganic nutrients via decomposition.

Temperature and soil moisture also affect the rate of decomposition. Warmer temperatures allow decomposition to occur faster, while colder temperatures and locations covered in deep snow will prevent the recycling of nutrients by decomposers. You will be examining the effect of water on the rate of decomposition throughout this lesson and the coming days.

What factors affect the rate of decomposition? _____

_____

Why is decomposition important? _____

_____

Who benefits from decomposition? _____

_____

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Water and Decomposition Observations

Watch the following hotspots and make observations regarding the soil, water, and decomposition information.

Canopy In The Clouds Media	Observations	% Soil Moisture Average
Panorama #1 ~ Hotspot #2 "Soil Sampling Introduction"		
Panorama #1 ~ Hotspot #5 "Dry Leaves and Decomposition"		
Panorama #2 ~ Hotspot #2 "Soil Sampling Introduction"		
Panorama #3 ~ Hotspot #2 "Soil Sampling Introduction"		
Panorama #3 ~ Hotspot #5 "Fallen Debris and Decomposition"		
Panorama #3 ~ Canopy Hotspot #2 "Soil in the Air"		

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Scientific Question

What is the effect of water on decomposition?

Hypothesis

Based on your observations, write a hypothesis for the scientific question. Remember to use the form "I predict…..because….".

_____

_____

_____

What variable is essential in testing this scientific question? _____

Procedure

You will be following a basic procedure for creating, deploying, and weighing your decomposition bags. However, you must determine how to test the variable on your own. With your group, create a procedure that will allow you to test the variable in this scientific question. Write your procedure below.

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Data Table

Create a data table that will be effective in organizing the data you collect, according to the procedure you have created.

Conclusion

After you have collected and analyzed your data, write a conclusion that discusses the following topics:

- Was the hypothesis supported or not supported? How does the data support your statement?
- Summarize your results.
- What problems were faced during the performance of this experiment?
- Discuss the importance of decomposition in the ecosystem used for the experiment, as well as the tropical montane cloud forest.
- Explain the differences between these two ecosystems and the proposed effect of these differences on decomposition.

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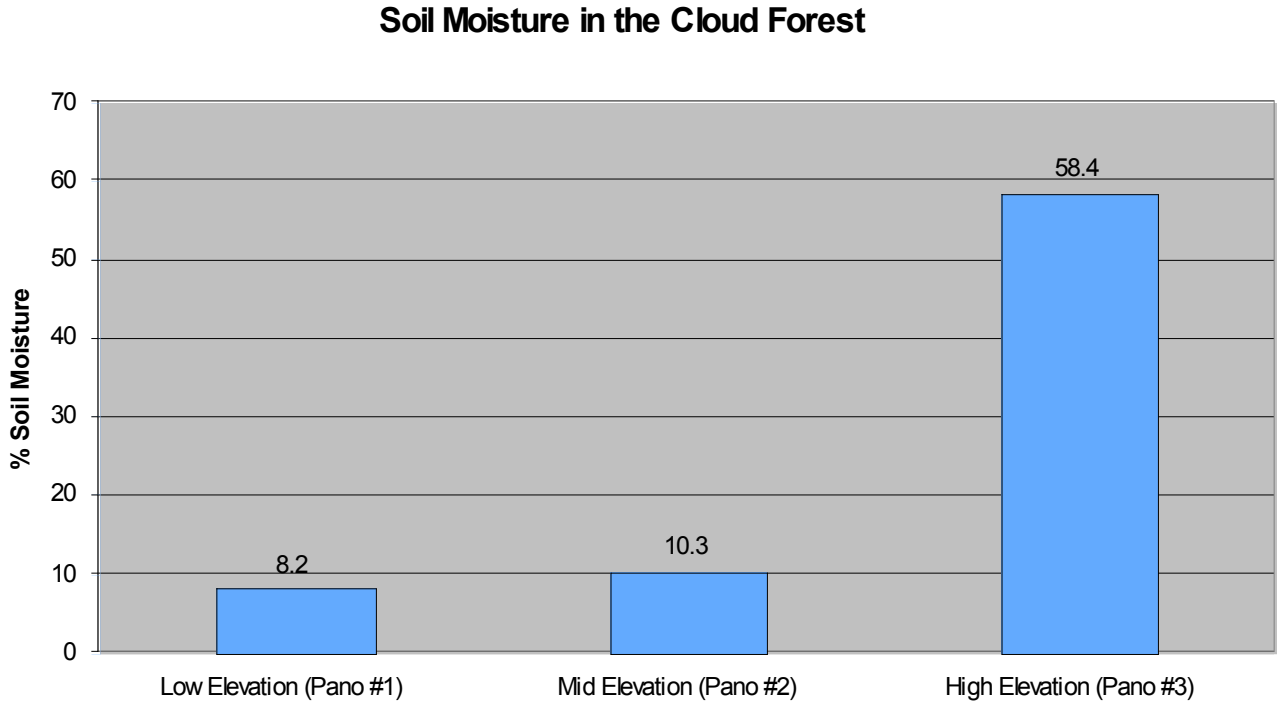
Soil Moisture Data & Graph

PERCENT SOIL MOISTURE			
Measurement #	*Low Elevation Panorama #1*	*Mid Elevation Panorama #2*	*High Elevation Panorama #3*
1	11	10	74
2	9	10	52
3	8	11	61
4	8	9	49
5	8	14	55
6	9	10	63
7	5	10	48
8	7	9	63
9	8	9	60
10	9	11	59
Average			



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WATER AND DECOMPOSITION
Sample Student Data Table

	Date	Decomposition Bag #1	Decomposition Bag #2	Decomposition Bag #3
Initial Weight ***(biodegradable material only)***				
Collection #1				
Collection #2				
Collection #3				
Final Weight				
% change in weight				

WATER AND DECOMPOSITION
Construction of Decomposition Bags

Materials Needed:

Black fiberglass window screen or heavy duty nylon mesh (1 x 2 mm mesh size)
Glue gun or polyester thread and needle
Biodegradable paper (brown grocery bag)
Additional bags or containers for transportation
Heavy duty scissors
Stapler
Wooden paint-stirrers
Sharpie marker
Electronic scale
Gloves
Any additional materials needed as determined by student-created portion of procedure

Constructing the Bags:

Cut 20cm x 20cm squares of mesh. Glue or sew three sides of the mesh together to make an open-ended pouch. Cut 2cm x 10cm strips of the biodegradable paper. Count out equal numbers of paper strips for each bag used (about 10 strips). Each bag should have an equal total mass of paper strips. Cut strips as needed to reach an equal mass. Weigh the strips dry, record the mass, and then place them in the bag. Fold over the top and staple closed. Thread string through one end of the bag and securely

attach it to the paint stirrer. Using a sharpie, label the paint stirrer with the group name, bag number, and location. It may be helpful to paint the tops of the stirrers with bright colors to make the bags easier to find.

Deploying the Bags:

Determine locations for the decomposition bags to be placed. Each group should have locations that are similar, to control variables, yet not too close, to allow for the water variable to have an effect. Make sure the substrate (soil) is similar in each location. At the predetermined locations, lift off and set aside any leaf litter currently present. This may vary greatly, depending on the season. Winter is not an advisable time to begin decomposition experiments. Place the decomposition bag on the ground, securing it in place with the wooden paint stirrer, label up. Replace the leaf litter. Make a map of the area being used by the experiment and allow students to mark the map with the approximate location of each of their decomposition bags.

Weighing Decomposition:

When it is time to collect the bags, bring one additional bag or container to place the decomposition bag in. This will prevent the loss of any organic material during transportation. Remove the staples and take out the contents of the bag, placing it in a collection container. Using gloves, remove roots, soil, insects, and other materials that have entered the decomposition bag. Find any remaining pieces of paper strips and lay them out to dry. It is essential to weigh dry material only, as water weight will impede the ability to determine the loss of mass due to decomposition. If decomposition bags are being deployed again, place the paper strips back in the bag and staple shut. Re-deploy in the same locations.