

# HOW IS ENERGY TRANSFER AND MATTER CYCLING AFFECTED IN A CHANGING ECOSYSTEM?

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## Research Assistant Notebook

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Student Name

**PHASE 1: GATHER**

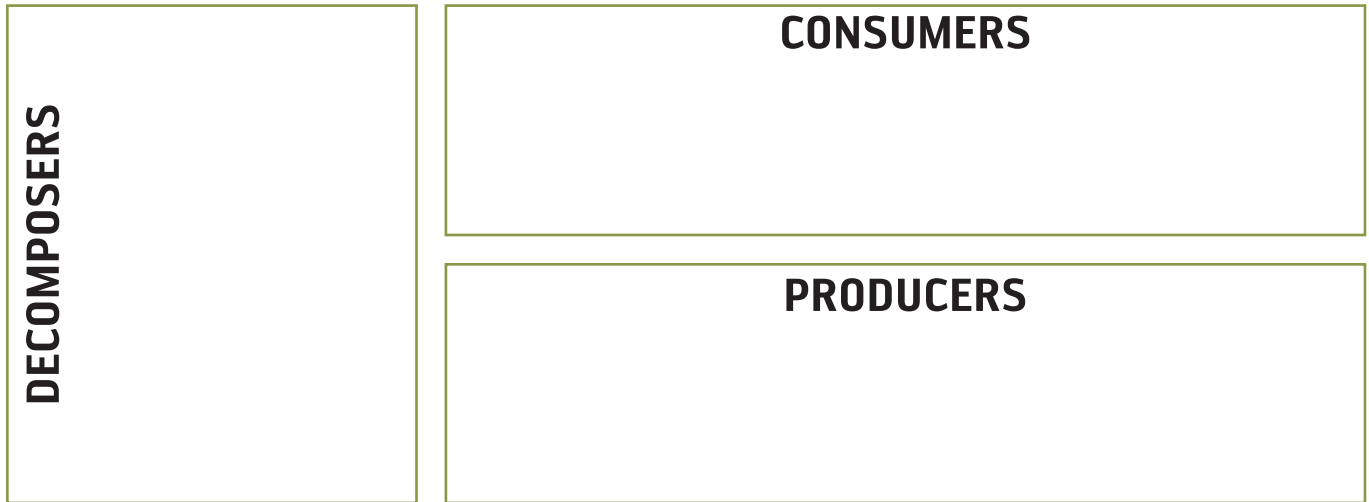
Steps 1-2

Your Task: Create a trophic energy model and use the model to gather data for the kinds of organisms that make up these trophic levels.

Note, the step numbers on the left of this page match with steps in your online investigation.

**STEPS**

2 **GATHER:** Describe these trophic levels.



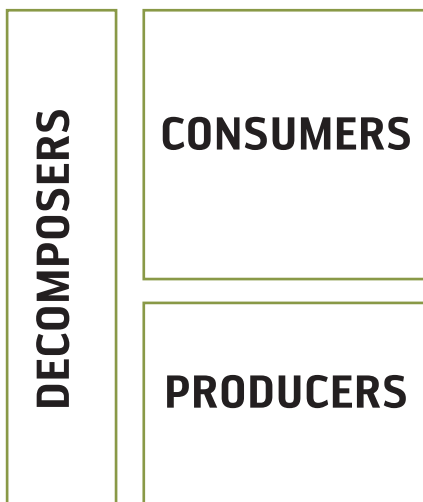
**PHASE 2: ANALYZE**

Steps 3-7

Your Task: Analyze how energy flows between trophic levels (producer, consumers, and decomposers), compare your model with Dr. Mitch's trophic model, and use a simulator to analyze how energy and matter move through an ecosystem.

4 **ANALYZE:** Draw arrows in the model above to show how energy flows in a simple system.

5 **COMPARE:** Compare your trophic energy model with Dr. Mitch's model. Draw new arrows based on what you learned.



**REFLECT:** Reflect, discuss and answer these questions with your partner.

a) How was your model the same or different than Dr. Mitch's model?

b) How did this model help you understand something new?

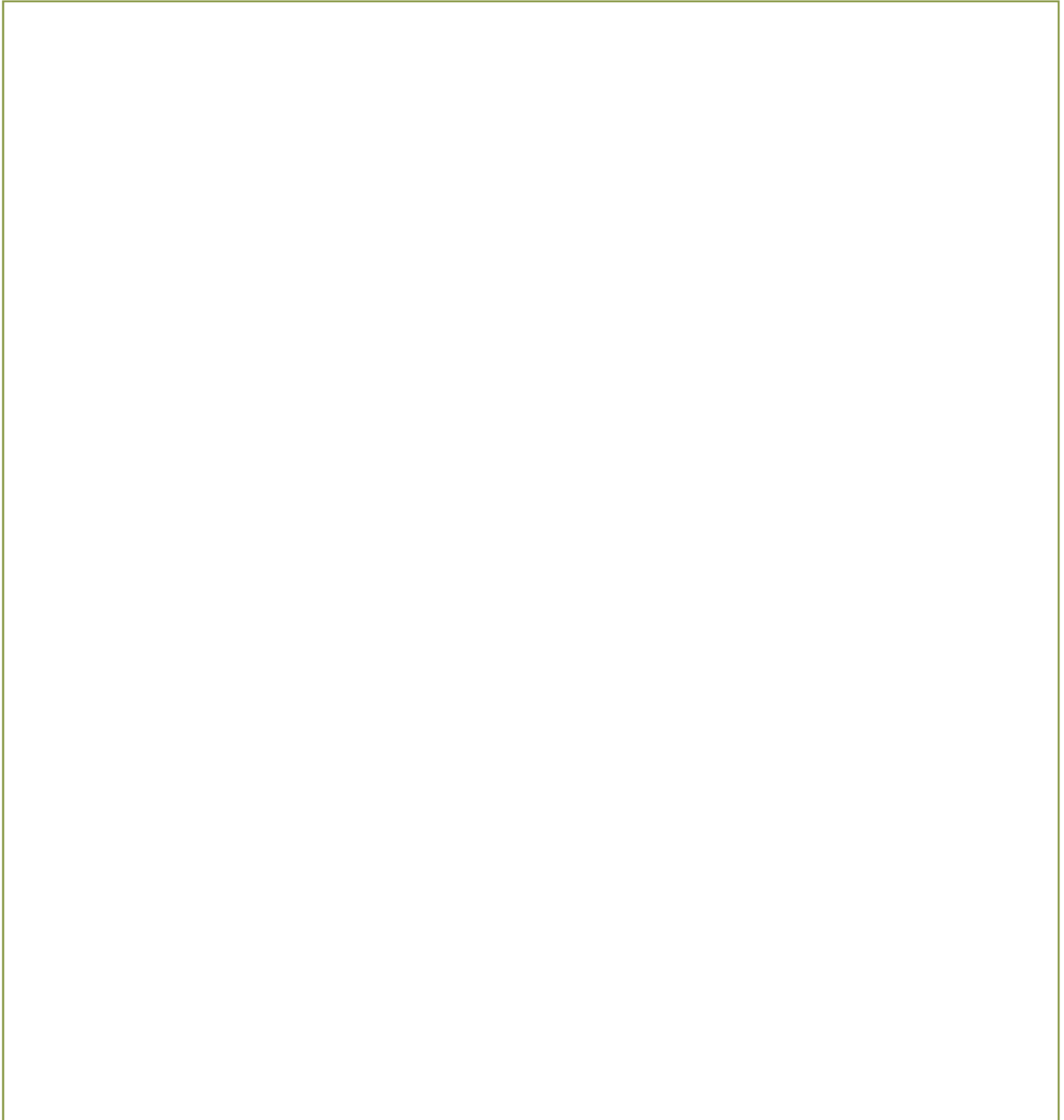
I used to think:

Now I think:

**PHASE 2: ANALYZE (CONTINUED)**

Steps 3-7

- 7 **ANALYZE:** Select 2 factors to draw and label a scene (model) that tells your own story of how energy and matter cycle in an ecosystem.



**PHASE 3: INTERPRET**

Steps 8-10

Your Task: Use the current and future trophic models to reason about which organisms could best preserve the current flow of energy in this ecosystem.

- 9 **INTERPRET:** Discuss with your partner how the decline of lodgepole pine trees may impact the energy flow between the trophic levels. Complete the model below using the evidence you've collected.

**DECOMPOSERS**  
The decline of lodgepole pines might affect decomposers because

**CONSUMERS**  
The decline of lodgepole pines might affect consumers because

**PRODUCERS**  
The decline of lodgepole pines might affect producers because

- 10 **REVIEW:** Summarize your predictions in the space below or type your explanation online and download it.

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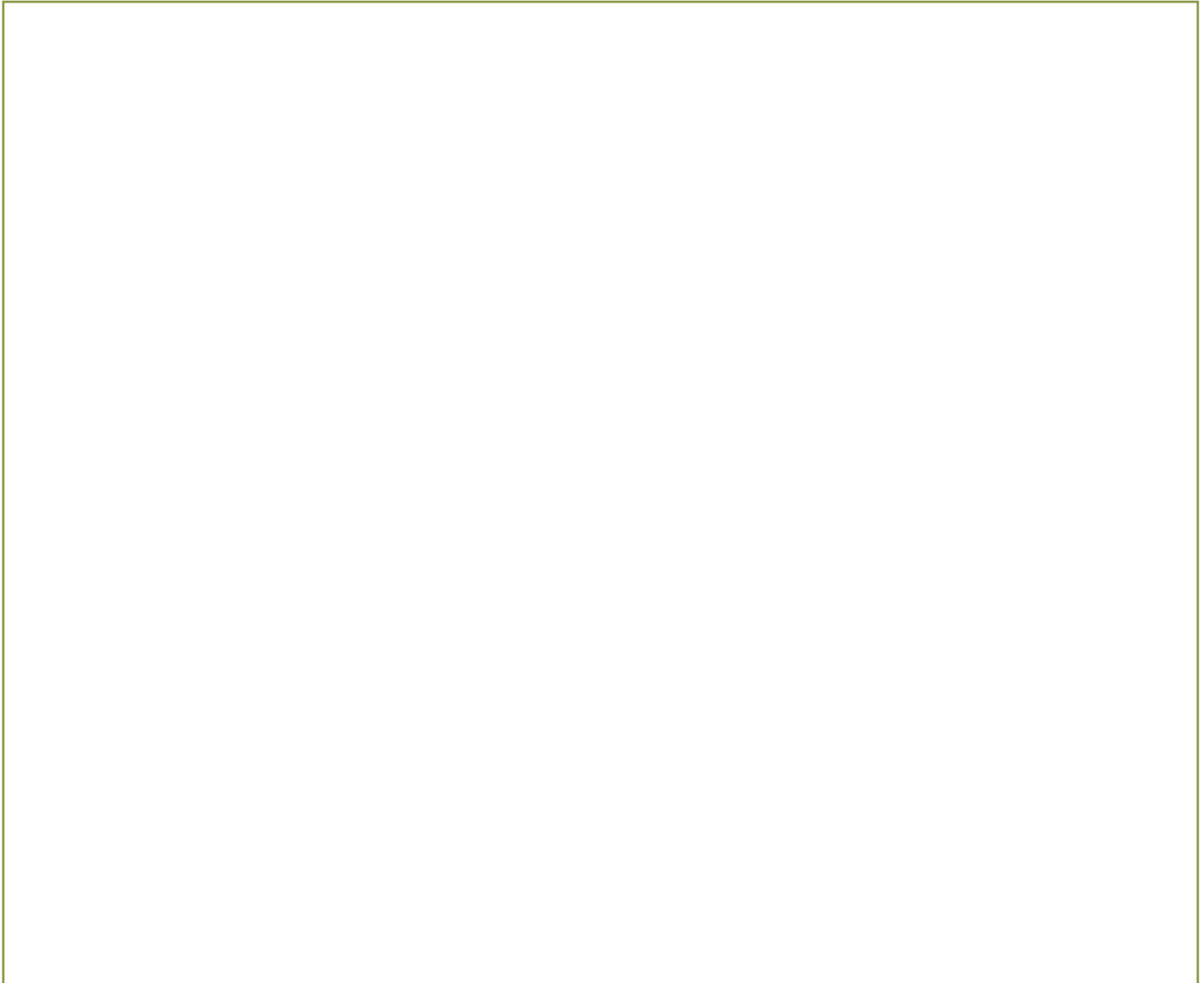
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### PHASE 4: COMMUNICATE

Steps 11-12

Your Task: Communicate your prediction for how energy transfer and matter cycling will be affected in a changing ecosystem. Use the impacts to trophic levels (Step 10) to support your prediction.

- 11 REFLECT & COMMUNICATE:** Select an organism and write a diary entry or draw a comic strip (short graphic story) that shows a day in the life of your organism. In that day, you could show how they took in matter and energy and how they expended it. As part of this comic you could include who benefits from their matter or energy.



- 12 VIDEO REVIEW**  
**Discuss:** How does Dr. Mitch's prediction for what he thinks could happen in the Uinta mountains in the future if lodgepole pines continue to die at their current rate compare to your prediction?