

Option C.2 Project

Skills

Comparison of pyramids of energy from different ecosystems.

Construction of Gersmehl diagrams to show the inter-relationships between nutrient stores and flows between taiga, desert and tropical rain forest.

Analysis of data showing primary succession.

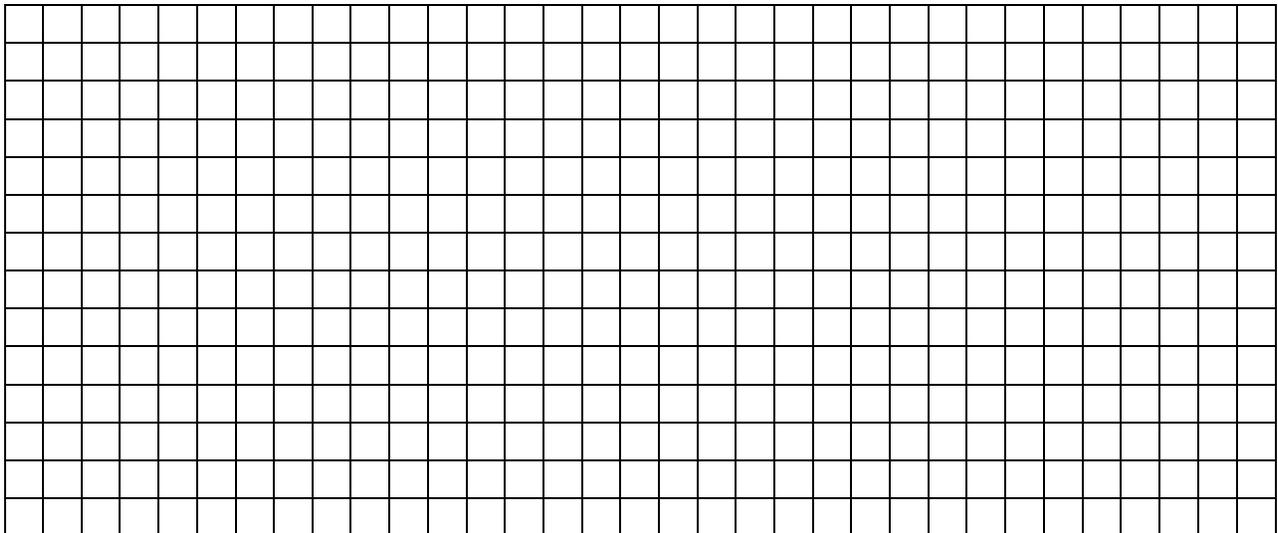
Investigation into the effect of an environmental disturbance on an ecosystem.

Activity 1

Communities differ in their energy conversion efficiency.

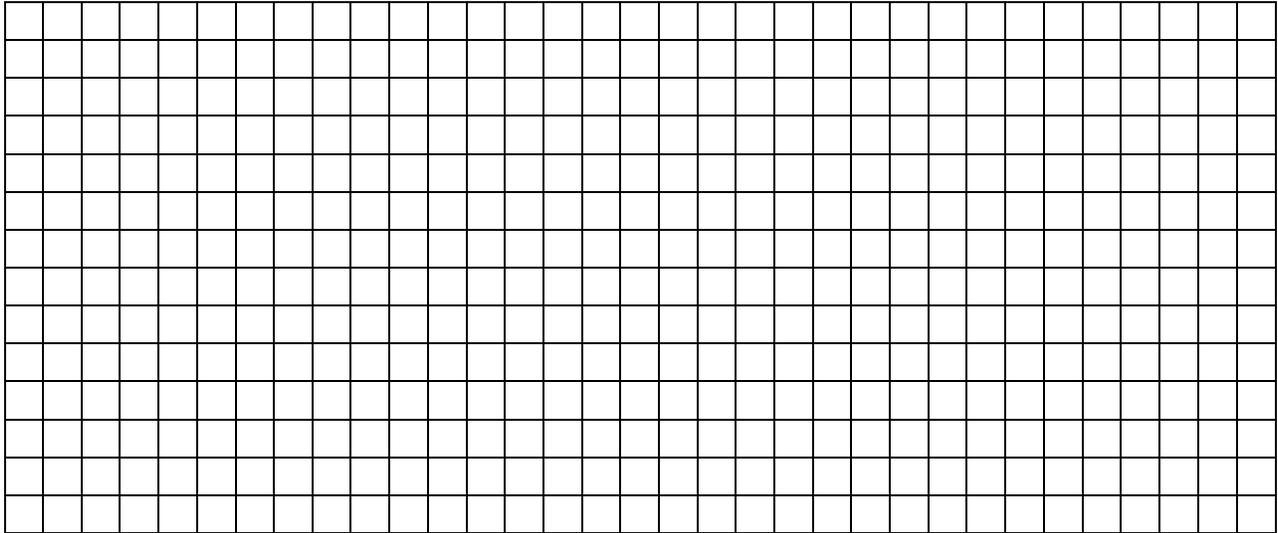
1. For each of the following communities, construct energy pyramid models, drawn to scale, based on the energy conversion efficiency shown.
 - a) an upwelling area with a 20% energy conversion efficiency.

The food chain consists of phytoplankton → anchovy

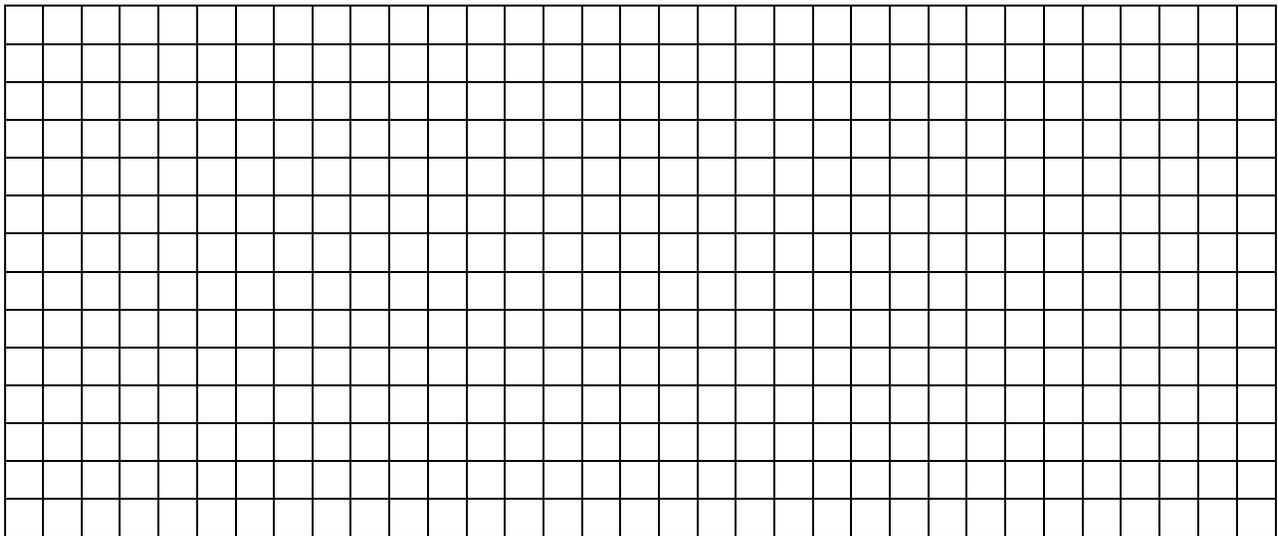


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b) a coastal region with a 15% energy conversion efficiency
phytoplankton → herbivorous zooplankton → carnivorous zooplankton → herring



c) the open ocean with 10% energy conversion efficiency
phytoplankton → herbivorous zooplankton → carnivorous zooplankton →
carnivorous fish → tuna



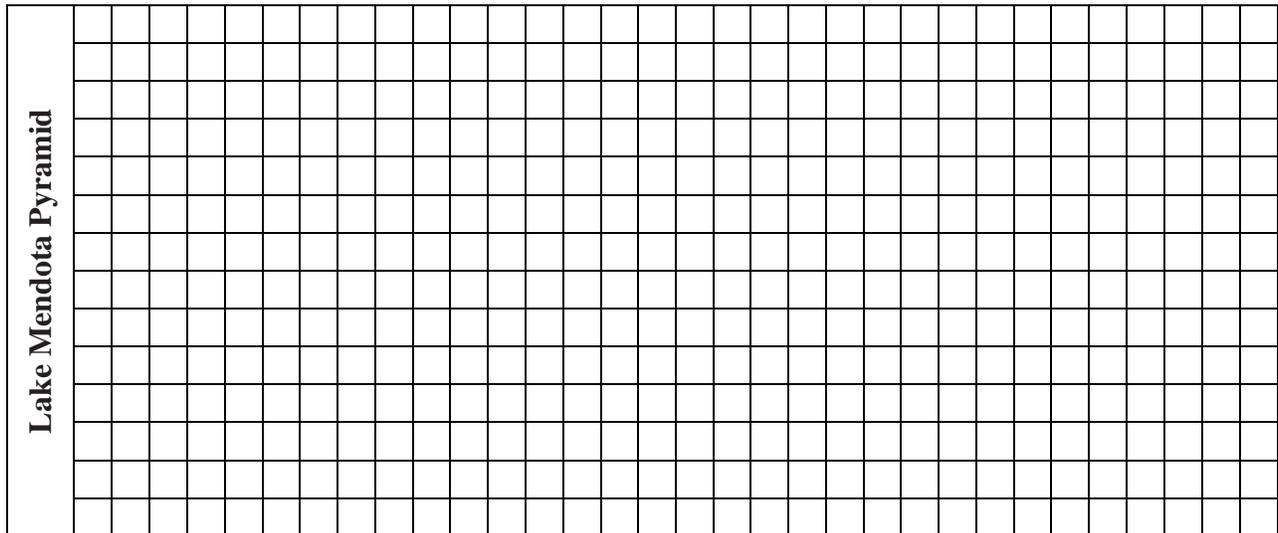
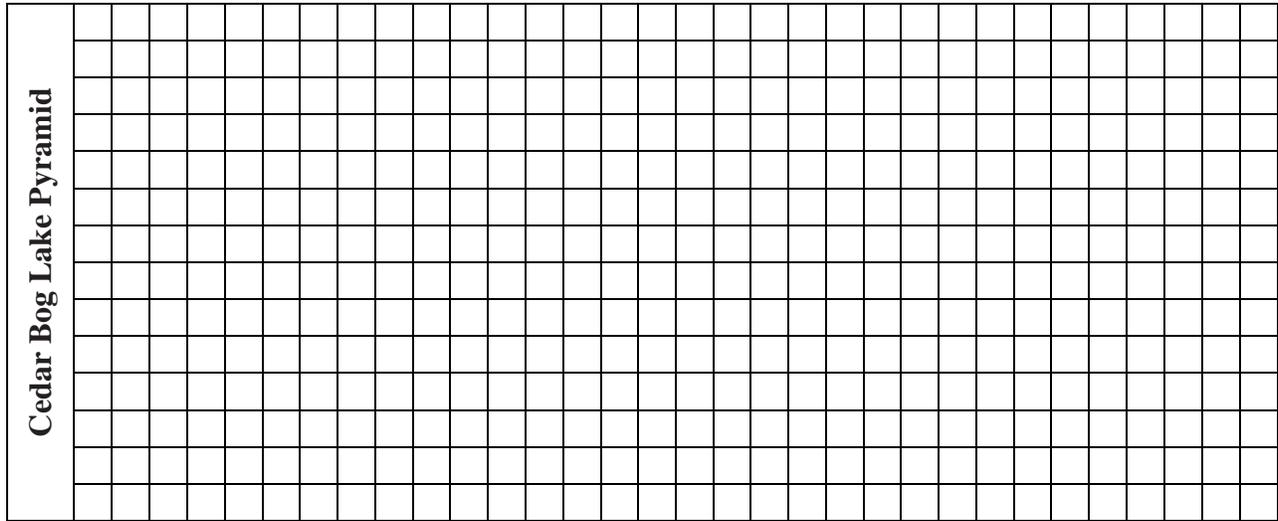
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2. Table 3 shows the annual energy fixed in biomass in joules per square centimeter in each trophic level of two separate ecosystems.

Table 3: Annual energy fixed in biomass in joules per square centimeter in each trophic level of two separate ecosystems

Trophic Level	Cedar Bog Lake	Lake Mendota
Tertiary Consumers	-	0.2
Secondary Consumers	0.8	1.4
Primary Consumers	3.6	35.1
Producers	27.1	104.4

- a) Use the data to construct two separate pyramids of energy. They should both be drawn to the same scale.



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- b) Compare the two pyramids.

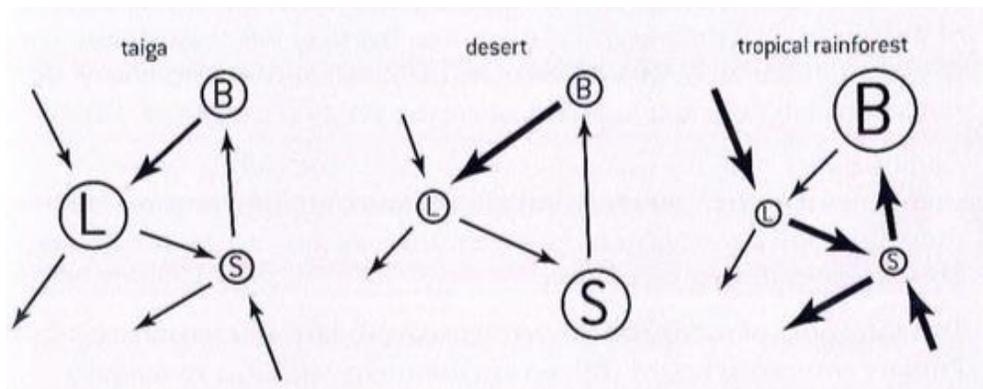
- c) Explain the low biomass and low numbers of organisms in higher trophic levels.

Activity 2

Gersmehl Nutrient Cycle Diagrams

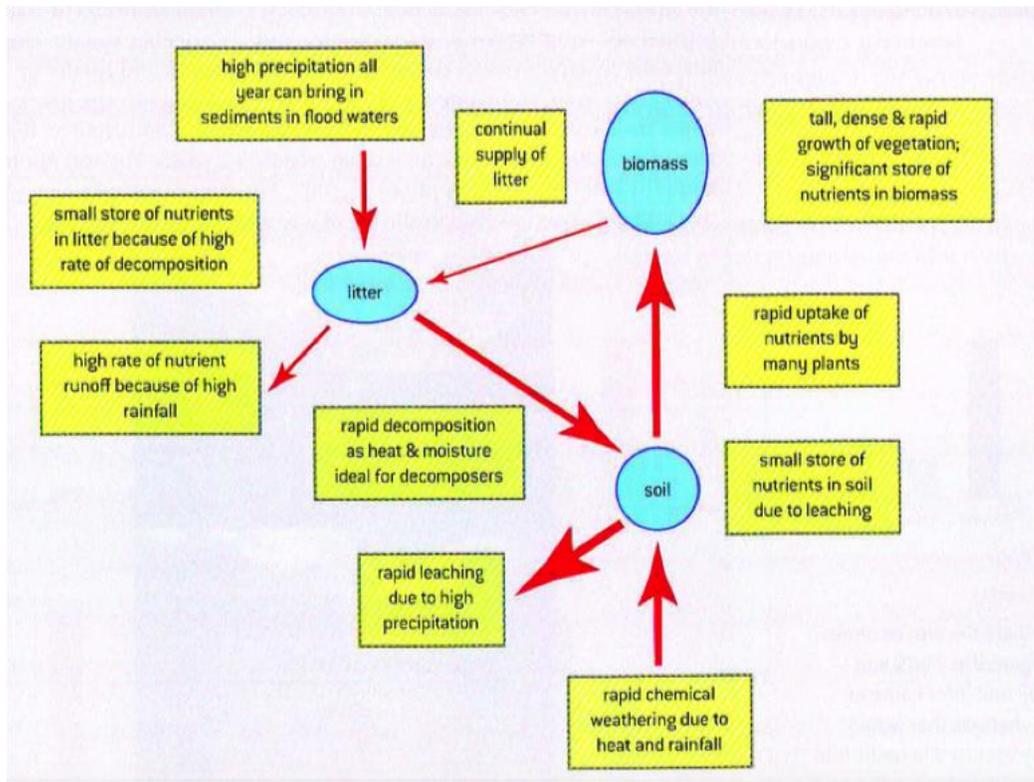
A Gersmehl diagram is a model of nutrient storage and flow for terrestrial ecosystems. Figure 6 shows three Gersmehl diagrams for three different ecosystems. Figure 7 provides a detailed explanation of the diagram for a tropical rainforest. The model presumes three storage compartments: biomass, litter, and the soil. Storage compartments, or pools, are represented by circles or ovals. Arrows represent nutrient flows, or fluxes. The thickness of the arrows represent rates of flow of nutrients. One arrow can represent more than one process.

Figure 6: three Gersmehl diagrams for taiga, desert, and tropical rainforest



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Figure 7: explanation of the diagram for a tropical rainforest



Look at figure 6.

1. Identify the ecosystem type with the largest nutrient store being the soil.
2. Identify an ecosystem type where the rate of litter decomposition is low.
3. On Figure 6, identify arrows which could represent the following processes:
 - a) run-off (color blue)
 - b) mineral absorption by plants (color brown)
 - c) regurgitation of an owl pellet (color yellow)
 - d)
4. Compare the nutrient cycles of taiga, desert and tropical rain forests.

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Activity 3

Use the data in table 1 to construct a food web. (draw or find pictures of the organisms)

Table 1: Species feeding relationships

	Species	Feeds On Species #
1	Caribou	4
2	Ground Squirrels	4
3	Jaguars	1,4,8
4	Grasses and Sedges	-
5	Grizzly Bears	4,2
6	Gulls	8
7	Owls and Hawks	2,8
8	Voles and Lemmings	4
9	Weasels	2,8
10	Wolves	1,2,8

