

## Virtual Lab - Ecosystems Pyramids of Numbers and Energy

Virtual Lab
Model Ecosystems
X

**Question**

**How does energy flow through an ecosystem?**

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An ecosystem consists of a community of living organisms interacting with each other and the environment. The source of energy that fuels most ecosystems is the Sun. Plants use the Sun's energy to produce food in a process called photosynthesis. Organisms that use energy from the Sun or energy stored in chemical compounds to produce their own nutrients are called autotrophs. They are also called producers because most other organisms depend on autotrophs for nutrients and energy. Heterotrophic organisms that cannot make their own food may obtain nutrients by eating other organisms. A heterotroph that feeds only on plants is called an herbivore. Herbivores are also called first order heterotrophs. Carnivores that feed on herbivores are called second order heterotrophs. Carnivores that feed on other carnivores are called

Deciduous Forest Ecosystem

**Field Notes**

**Deciduous Forest Ecosystem**

**Plants:**

- Deciduous Trees
- Ferns
- Berry Bushes
- Wild Flowers
- Grasses

**Mammals:**

- Chipmunks
- Deer
- Foxes
- Opossums
- Rabbits
- Wolves

**Birds:**

- Hawks
- Woodpeckers
- Owls
- Chickadees

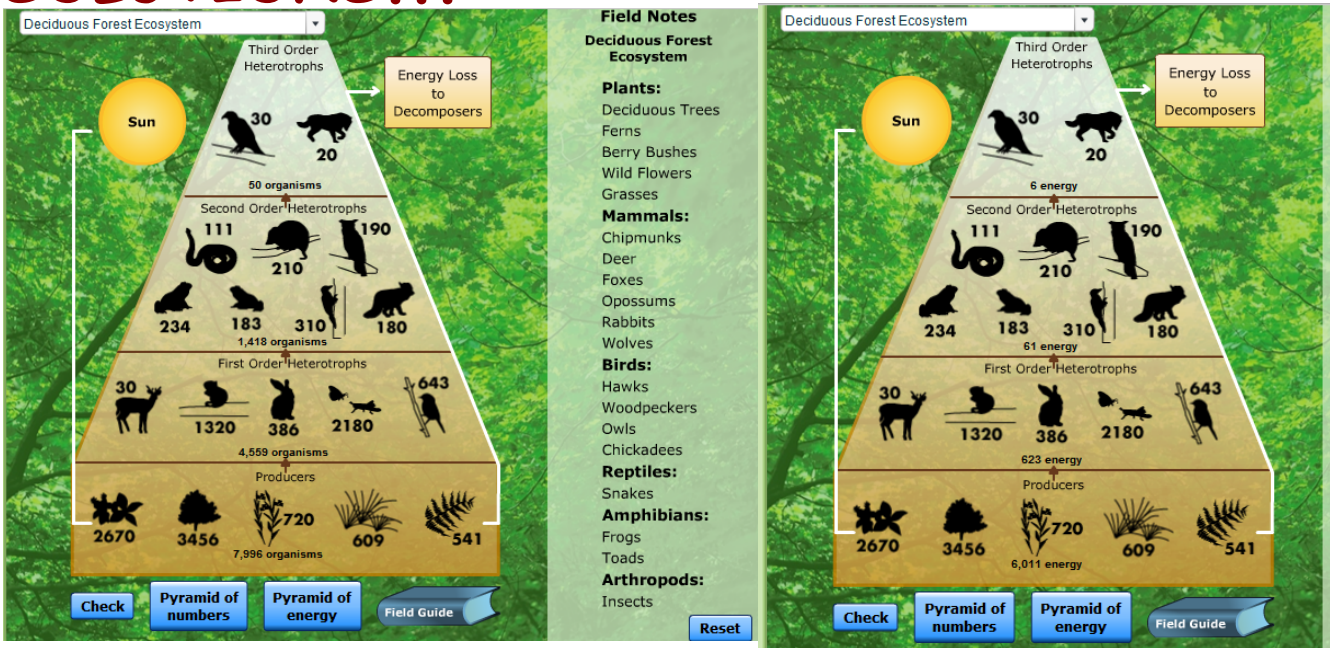
**Reptiles:**

- Snakes

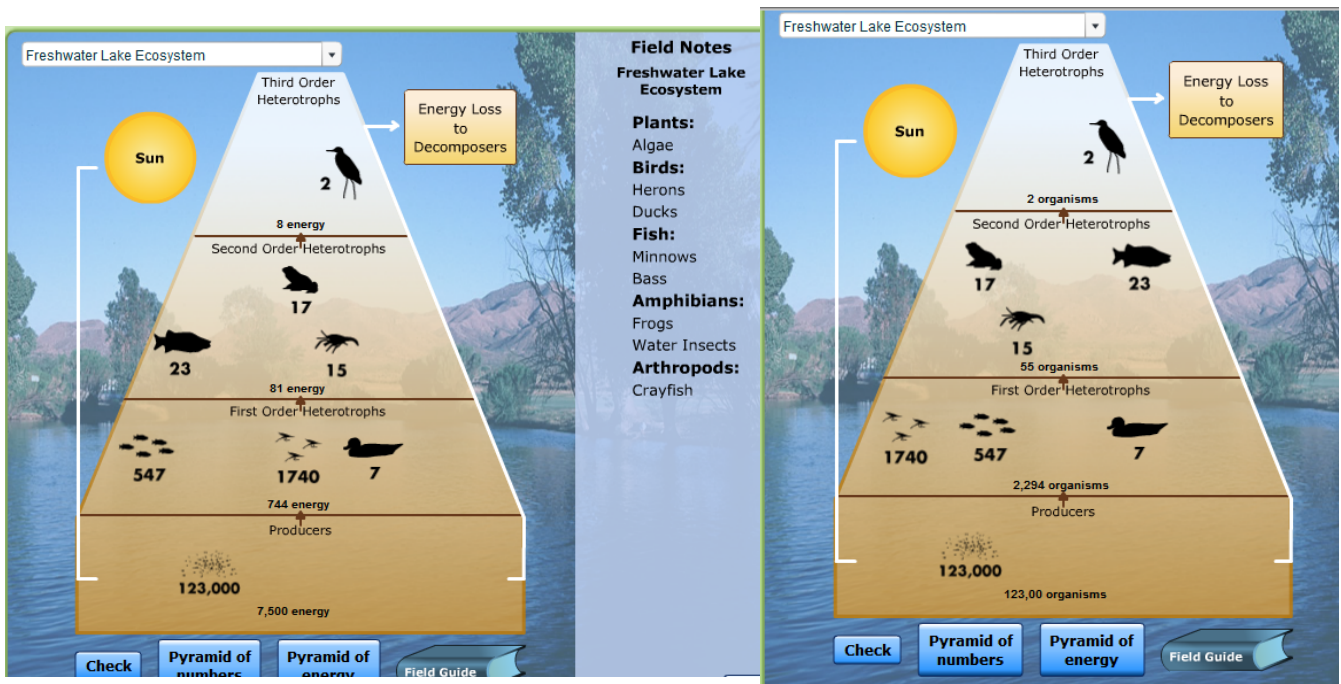
**Amphibians:**

- Frogs
- Toads

# SOLUTIONS...



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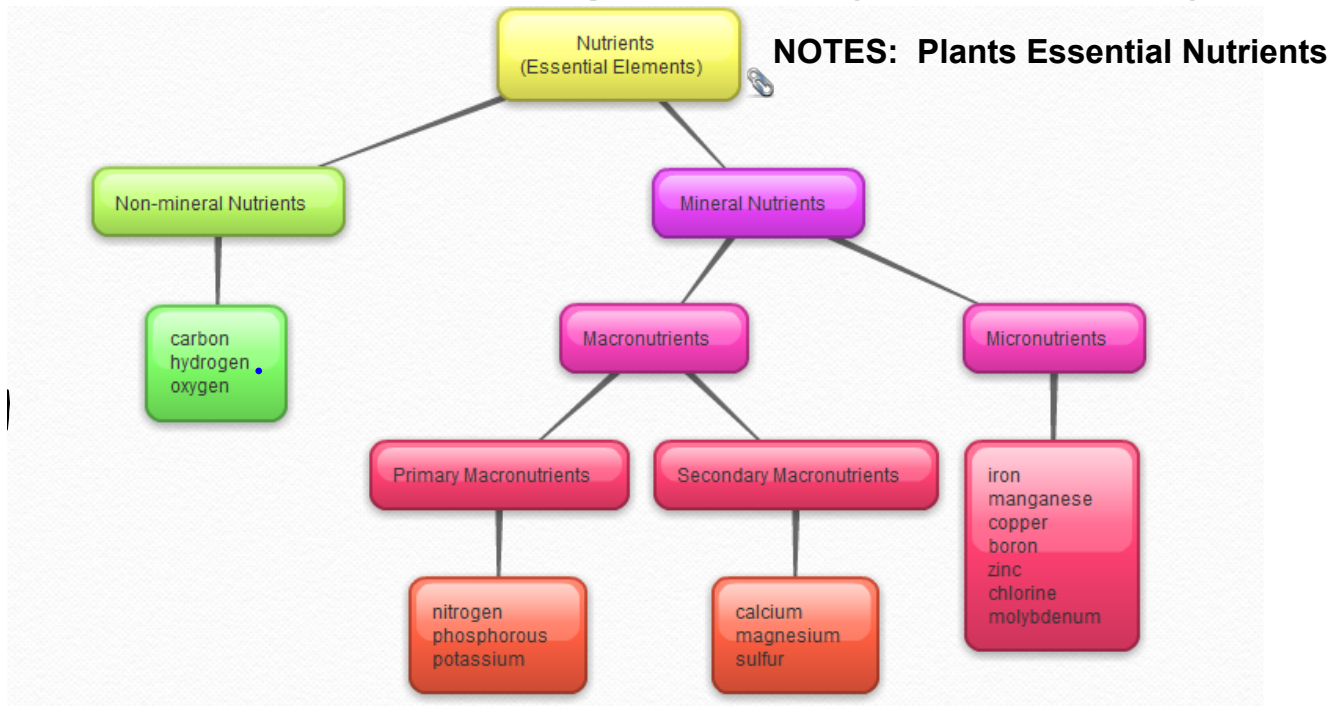
## Matter in Ecosystems

An ecosystem needs more than energy to function. It also needs matter. Matter is used by organisms in ecosystems for life processes. Most ecosystems need over 20 elements. Just the plants in most ecosystems need 16 elements. These essential elements are called **nutrients**.

## Correct Matches

- non-mineral nutrients** → nutrients which enter an ecosystem in the form of water and carbon dioxide  
- oxygen, carbon, hydrogen  
(building blocks of life)
- mineral nutrients** → nutrients which enter an ecosystem from bedrock
- macronutrients** → required in greater amounts than micronutrients
- primary macronutrients** → needed in relatively large amounts for plant growth (found in commercial fertilizers)  
-nitrogen, phosphorus and potassium
- secondary macronutrients** → magnesium - one of the atoms in a chlorophyll molecule
- micronutrient** → iron - needed to make hemoglobin molecules in red-blooded animals

- 16 elements which most plants need (excludes nickel)...



Essential and Beneficial Elements in Higher Plants																	
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt									
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb		
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		

■ Essential Mineral Element  
■ Beneficial Mineral Element  
■ Essential Nonmineral Element



**Remember: Energy flows through an ecosystem in one direction.**

## Nutrient Cycles

Nutrients are recycled through ecosystems...

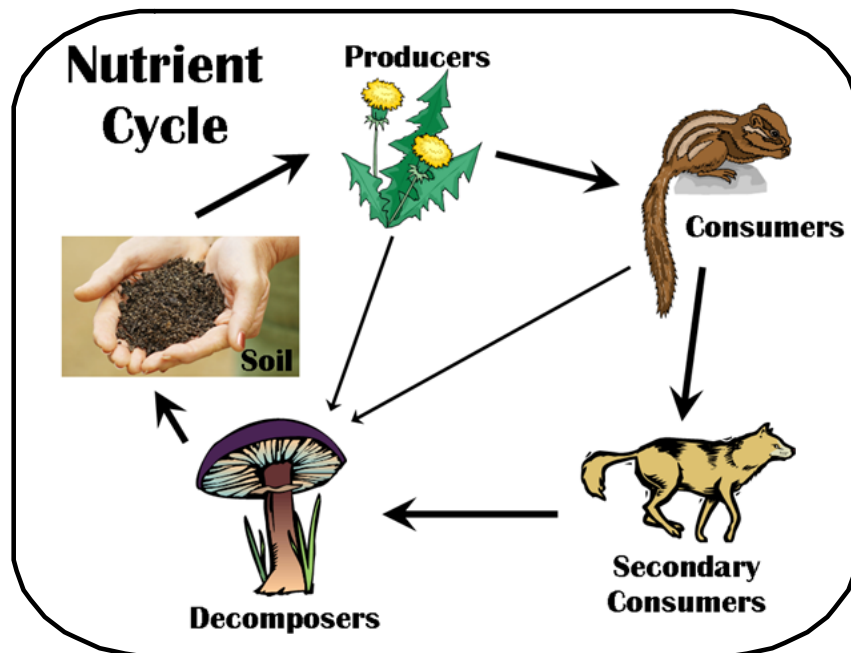
**Producers** get their nutrients from the soil, water and air.

**Herbivores** get nutrients when they eat producers.

**Carnivores** get nutrients when they eat herbivores.

**Decomposers** break down animal wastes and dead organisms.

The actions of decomposers release nutrients back into the soil, water and air so producers can use them again.



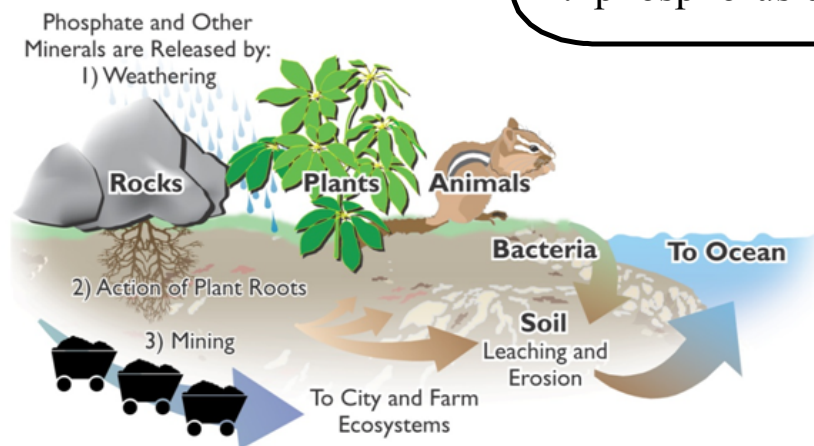
(Water and air not shown in this diagram.)

## Mineral Cycle

 [Notes - Cycles.pdf](#)

### Cycles to be studied:

1. water cycle
2. carbon cycle
3. nitrogen cycle
4. phosphorus cycle





## Attachments

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Essential Nutrients for Plants.pdf

Notes - Cycles.pdf