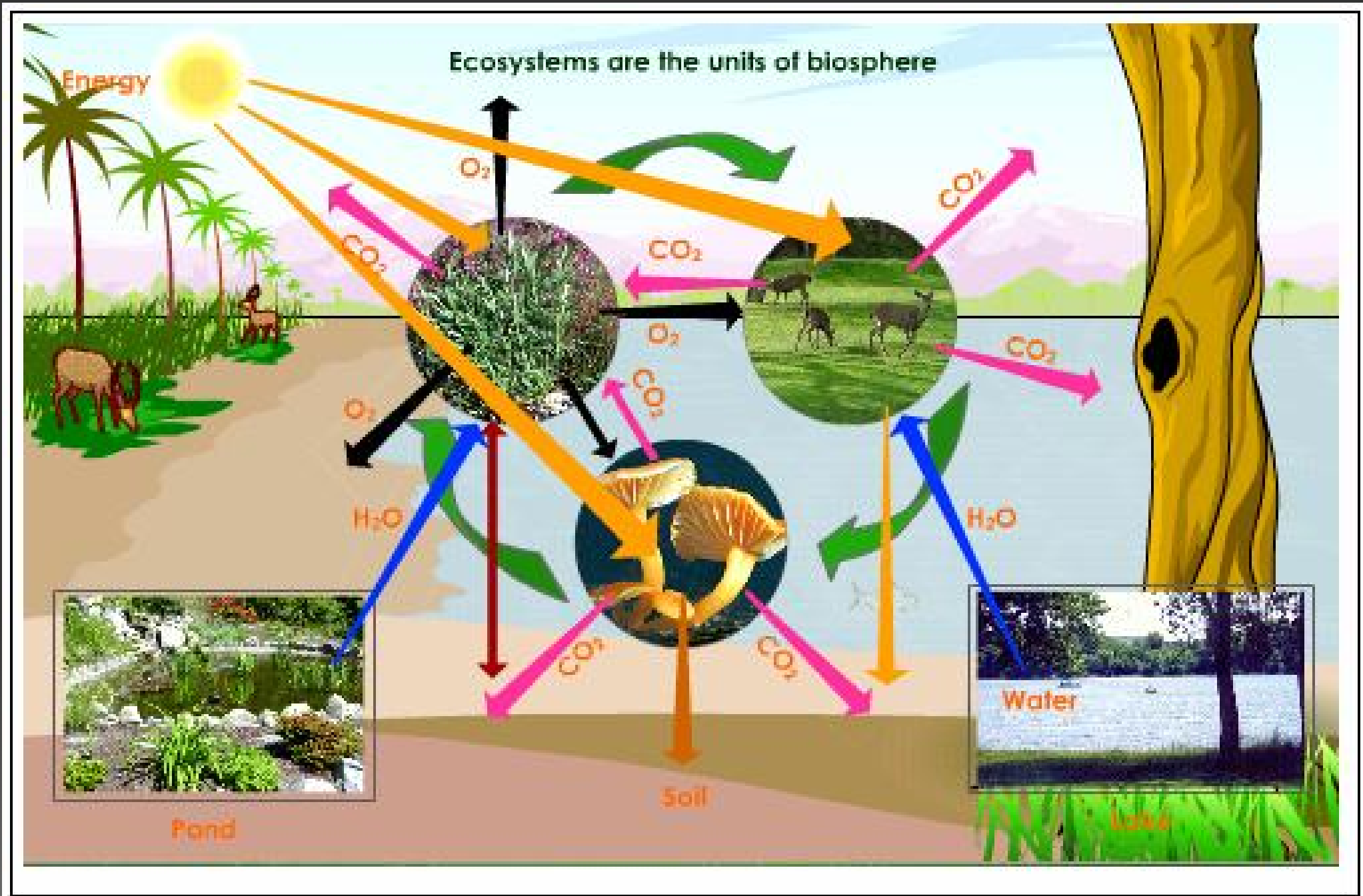


Ecological Concepts



Reference Section

What is an ecosystem?



An ecosystem is both place and a process...

- It contains all the living organisms (plants, animals, bugs, etc.)
- And all the "non-living" elements (air, sun, water, rocks, etc...)
- Think of the "place" as all the material (matter) in an ecosystem
- Think of the "process" as all the energy that moves through an ecosystem
- The Biosphere is the largest ecosystem, which is the planet earth



Ecosystems are dynamic

- As energy moves through a system, it constantly changes and rearranges the environment
- Although constantly changing, this energy actually "flows" in predictable patterns
- The most basic pattern is a cycle



NETWORKS (The Web of Life)

- All members of an ecosystem are connected.
- These relationships are what defines each member
- Example: Bees and flowers have a special connection. This connection forms a relationship that defines both the bee and the flower. The flowers provide nectar and pollen for the bee, and the bee provides pollination for the flower.
- Everything in nature has these connections, and when you add them all up, you get a NETWORK.

Example of a network:



Can you think of more examples of networks?

Nested Systems



Nested Systems

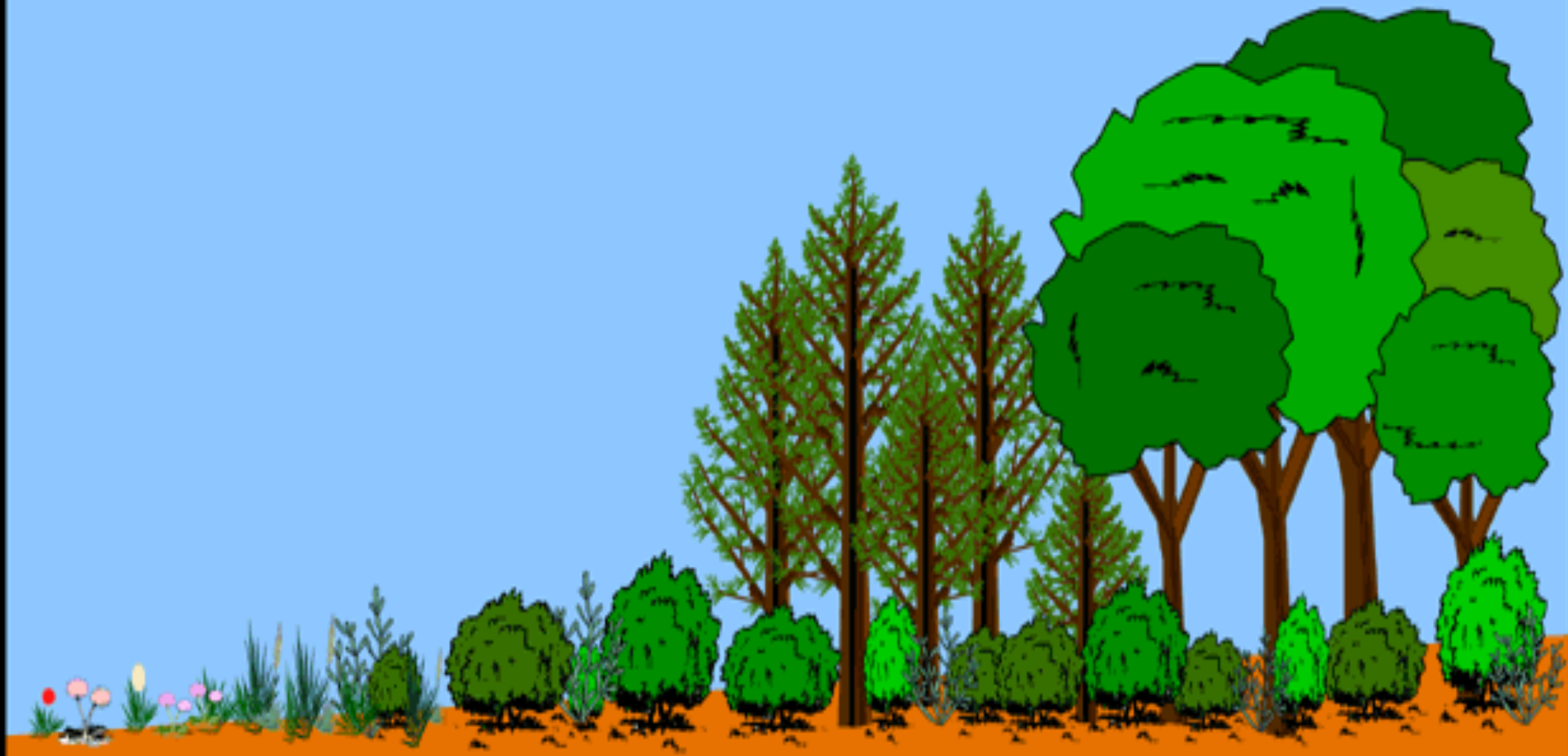
- In nature, we find layers of systems that are part of larger systems.
- Like a leaf is part of a branch, which is part of a tree, which is part of a forest, which is part of an ecosystem, which is part of a larger ecosystem, which is part of the earth.



Nested Systems

- For example, cells in an animal are nested within organs, which are nested within systems such as respiration or digestion within individual organisms. Organisms in turn are nested in ecosystems, along with other living organisms and nonliving components such as air and water.
- Can you think of more examples?

Ecological Succession



Annual
Plants

Perennial
Plants and
Grasses

Shrubs

Softwood
Trees - Pines

Hardwood
Trees

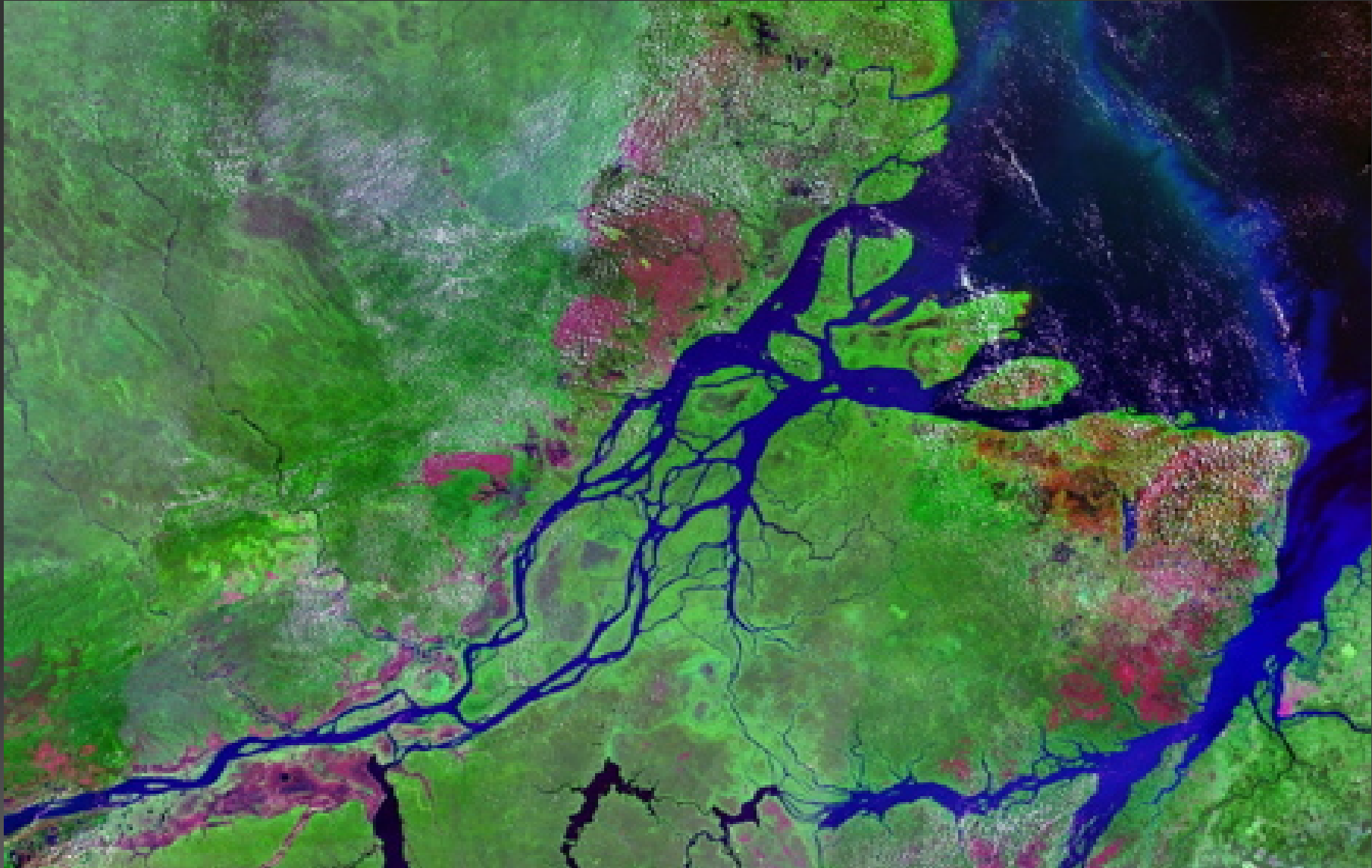
Time 

Disturbance

- A necessary, sometimes dramatic change to ecosystem.
- Usually the result of a build up of matter and energy resulting in a sudden shift
- Fires, floods and storms are examples



SCALE



Scale





Creative Interplay

- The unfolding of life
- Evidenced as development and learning at the individual level and as evolution at the species level
- Involves interplay of creativity and mutual adaptation in which organisms and environment co evolve
- For example, humming birds and certain flowers have evolved in ways that are mutually beneficial, as the humming bird's color vision and slender bill coincide with the colors and shapes of the flowers.

Creative Interplay



Edge Effect

- When two ecosystems overlap, they create a unique boundary or space.
- This new space allows for more biodiversity, as organisms from both ecosystems, and new ones, can be found in the edge.
- Where a forest meets a meadow is a common example



Continuous Energy

- All organisms are open systems, which means that they need a continual flow of energy to stay alive.
- The constant flow of solar energy sustains life and drives most ecological cycles, as seen in a food web.
- **EXAMPLE:** A blade of grass converts energy from the sun to chemical energy through photosynthesis. A mouse eats the blade of grass, a garden snake eats the mouse, a hawk swoops down and eats the snake. In each transfer of energy, some is lost to the universe as heat, requiring an ongoing energy flow into the system.



