

The 10% Rule

All of the energy on Earth originally comes from the sun. Producers, or plants, can use that radiant energy and turn it into chemical energy (glucose) that the plant can use. An energy pyramid's shape shows the amount of useful energy that enters each level. Each level in a food chain is called a trophic level. The chemical energy, in the form of food, decreases as it is used by the organisms in that level.

Both plant and animal cells need energy to survive and grow. They can break down glucose to release the chemical energy inside. This process is called cellular respiration. The problem is that even though a lot of energy may be taken in at any level, the energy that is stored and available for the next level is far less. Scientists have calculated that an average of 90% of the energy entering each level is stored and stays at that level. Only 10% of the energy is available to the next level.

For example, a plant will use 90% of the energy it gets from the sun for its own growth and reproduction. When it is eaten by a consumer, only 10% of its energy will go to the animal that eats it. That consumer will use 90% of that energy and only 10% will go on to the animal that eats it. By the time you get to the top level, there is only a minor fraction of the original energy.

The tertiary consumers at the top of the energy pyramid will have much less available energy to support them than the primary and secondary consumers below them. That's why their population numbers are fewer in most food chains. The amount of useful energy left eventually cannot support another level. That's why energy flow is shown in the shape of a pyramid and most chains are rarely longer than three or four trophic levels.

Trophic Levels

