

Energy flow in ecosystem

Definition

Energy flow is the flow of energy through living things within an ecosystem. All living organisms can be organized into producers and consumers, and those producers and consumers can further be organized into a food chain. Each of the levels within the food chain is a trophic level. In order to more efficiently show the quantity of organisms at each trophic level, these food chains are then organized into trophic pyramids. The arrows in the food chain show that the energy flow is unidirectional, the head of the arrows show the direction energy is moving in, and that energy is lost as heat at **each step along the way**.

Introduction

The unidirectional flow of energy and the successive loss of energy as it travels up the food web are patterns in energy flow that are governed by Thermodynamics, which is the concept of energy exchange between systems. Trophic dynamics relates to Thermodynamics because it deals with the transfer and transformation of energy (originating externally from the sun via solar radiation) to and among organisms.

Primary production

A producer is anything that performs photosynthesis. Producers are important because they convert energy from the sun into a store-able and usable chemical form of energy, glucose. Once the sun's energy is converted into glucose, the producers themselves can use it to perform cellular respiration. Or, if the producer is consumed by herbivores in the next trophic level, some of the energy is passed on up the pyramid. The glucose stored within producers serves as food for consumers, and so it is only through producers, that consumers are able to access the sun's energy. Some examples of primary producers are algae, mosses, and other plants such as grasses, trees, and shrubs.

Secondary production

Secondary production is the use of energy stored in plants converted by consumers to their own biomass. Different ecosystems have different levels of consumers, all end with one top consumer. Most energy is stored in plants, and as the consumers eat these plants they use a small amount of energy. This energy in the herbivores and omnivores is then consumed by carnivores. There is also a large amount of energy that is in primary production that ends up being waste or litter, referred to as detritus. The detrital food chain includes a large amount of microbes, macroinvertebrates, meiofauna, fungi, and bacteria. These organisms are consumed by omnivores and carnivores and are a large amount of secondary production. Secondary consumers can vary widely in how efficient they are in consuming. The efficiency of energy being passed onto consumers is estimated to be around 10%. Energy flow through consumers differs in aquatic and terrestrial environments.

Detritivores

Detritivores consume organic material that is decomposing then are consumed by carnivores. Predator productivity is correlated with prey productivity. This is continuing to show that the primary productivity in ecosystems effects all productivity following.

Detritus is a large portion of organic material in ecosystems. Organic material in temperate forests is mostly made up of dead plants, approximately 62%.

In an aquatic ecosystem, leaf matter that falls into streams gets wet and begins to leech organic material, it happens rather quickly and will attract microbes and invertebrates. The leaves can be broken down into large pieces called coarse particulate organic matter (CPOM). The CPOM is colonized by microbes rapidly. Meiofauna is extremely important to secondary production in stream ecosystems. Microbes breaking down and colonizing on this leaf matter is very important to the detritivores. The detritivores make the leaf matter more edible by releasing compounds

