

Energy flow, food chains and food webs

**What is the principal source of energy input to biological systems?**

Energy flow, food chains and food webs

**Describe the flow of energy through living organisms.**

Energy flow, food chains and food webs

**Is energy cycled or does it flow through an ecosystem?**

Energy flow, food chains and food webs

**What does a food chain show?**

Energy flow, food chains and food webs

**What is a food web?**

Energy flow, food chains and food webs

**How can overharvesting a food species affect a food web?**

Energy flow, food chains and food webs

**How can a foreign species introduced to a habitat affect a food web?**

Energy flow, food chains and food webs

**Define a producer.**

Light energy from the Sun becomes chemical energy in producers, passes along food chains, and is eventually transferred to the environment as heat.

The Sun.

The transfer of energy from one organism to the next, beginning with a producer.

It flows in one direction through organisms and is transferred to the environment. It is not recycled.

Its population falls, so its predators have less food and its prey may increase.

A network of interconnected food chains.

An organism that makes its own organic nutrients, usually using energy from sunlight, through photosynthesis.

It may eat or compete with native species, so their populations fall.

Energy flow, food chains and food webs

**Define a consumer.**

Energy flow, food chains and food webs

**Name the four classes of consumer in order.**

Energy flow, food chains and food webs

**Define a herbivore.**

Energy flow, food chains and food webs

**Define a carnivore.**

Energy flow, food chains and food webs

**Define a decomposer.**

Trophic levels and ecological pyramids

**Define a trophic level.**

Trophic levels and ecological pyramids

**Name trophic levels 1 to 5 in order.**

Trophic levels and ecological pyramids

**What does a pyramid of numbers show?**

Primary, secondary, tertiary and quaternary consumers.

An organism that gets its energy by feeding on other organisms.

An animal that gets its energy by eating other animals.

An animal that gets its energy by eating plants.

The position of an organism in a food chain, food web or ecological pyramid.

An organism that gets its energy from dead or waste organic material.

The number of organisms at each trophic level.

Producers, primary consumers, secondary consumers, tertiary consumers and quaternary consumers.

Trophic levels and ecological pyramids

**What does a pyramid of biomass show?**

Trophic levels and ecological pyramids

**Why can a pyramid of numbers be inverted?**

Trophic levels and ecological pyramids

**Give an advantage of a pyramid of biomass over a pyramid of numbers.**

Trophic levels and ecological pyramids **Supplement**

**What does a pyramid of energy show?**

Trophic levels and ecological pyramids **Supplement**

**Give an advantage of a pyramid of energy over pyramids of numbers or biomass.**

Trophic levels and ecological pyramids **Supplement**

**Why is energy transfer between trophic levels often not efficient?**

Trophic levels and ecological pyramids **Supplement**

**Write the equation for efficiency of energy transfer.**

Trophic levels and ecological pyramids **Supplement**

**Why do food chains usually have fewer than five trophic levels?**

One large producer, such as a tree, can support many small consumers. Numbers ignore the size of organisms.

The mass of living material at each trophic level.

The energy flowing through each trophic level in a given area over a period of time, such as kJ per m<sup>2</sup> per year.

It takes the size of the organisms into account and is usually pyramid-shaped.

Parts are not eaten, some is lost as faeces and urine, and respiration transfers energy as heat to the environment.

It is always pyramid-shaped and shows the rate of energy flow over time.

Energy is lost at each level, so too little remains to support another level.

Efficiency (%) = energy transferred to the next level ÷ energy available at the previous level × 100.

Trophic levels and ecological pyramids **Supplement**

**Why is it more energy efficient for humans to eat crop plants than livestock fed on crops?**

Nutrient cycles

**Which process removes carbon dioxide from the air?**

Nutrient cycles

**Which processes return carbon dioxide to the air?**

Nutrient cycles

**How are fossil fuels formed?**

Nutrient cycles

**How does carbon pass from plants to animals?**

Nutrient cycles **Supplement**

**What form of nitrogen do plants absorb?**

Nutrient cycles **Supplement**

**What is nitrification?**

Nutrient cycles **Supplement**

**What is nitrogen fixation?**

Photosynthesis, by plants and algae.

There are fewer trophic levels, so less energy is lost, and more people can be fed from the same land.

From dead organisms that were buried and not fully decomposed, over millions of years.

Respiration, decomposition (decomposers respire) and combustion.

Nitrate ions from the soil, absorbed through the roots.

By feeding. Carbon compounds in plant tissues are eaten by animals.

Nitrogen gas is changed into nitrogen compounds, by lightning and by nitrogen-fixing bacteria.

Nitrifying bacteria change ammonium ions into nitrate ions.

Nutrient cycles **Supplement**

**What is denitrification?**

Nutrient cycles **Supplement**

**What is deamination?**

Nutrient cycles **Supplement**

**What do decomposers produce from dead protein?**

Populations

**Define a population.**

Populations

**Define a community.**

Populations

**Define an ecosystem.**

Populations

**Which four factors affect the rate of population growth?**

Populations

**Name the four phases of the sigmoid growth curve.**

The removal of the nitrogen-containing part of amino acids to form urea, in the liver.

Denitrifying bacteria change nitrates in the soil into nitrogen gas.

A group of organisms of one species, living in the same area, at the same time.

Ammonium ions, which are released into the soil.

A unit containing the community of organisms and their environment, interacting together.

All of the populations of different species in an ecosystem.

Lag, exponential (log), stationary and death phases.

Food supply, competition, predation and disease.

Populations

**What does the stationary phase look like on a graph?**

Populations **Supplement**

**Why is growth slow in the lag phase?**

Populations **Supplement**

**Why is growth rapid in the exponential phase?**

Populations **Supplement**

**Why does the population level off in the stationary phase?**

Populations **Supplement**

**Why does the population fall in the death phase?**

There are few individuals reproducing, so the birth rate is low.

The curve levels off. The population size stays roughly constant.

Limiting factors restrict growth, so birth rate equals death rate.

Plentiful resources and little competition; birth rate is much higher than death rate.

Resources run out and waste or disease builds up, so the death rate exceeds the birth rate.