CD 3 Biodiversity and Population Interactions

Biodiversity

Biological diversity is a measure of the number of different ______ in an ecosystem.

Extreme conditions tend to ______ biodiversity. For example, there would be ________ species in an arctic than in a rainforest ecosystem. The more species there are in a food web, the more ______ it becomes, and it can ________ to stress more easily. For example, if a food supply in a small food web is ________, its consumers will ________. If however, those consumers have many food sources, the absence of one of them will not cause their ________. Both ________ and ______________ reduce biodiversity.

This reduces an ecosystem’s ability to respond to stress and jeopardizes its ____________.

Populations

A population is the all the individuals of one ______ that occupy a certain area during a certain time. The number of individuals in a given _______ or volume is called the population density. The _______ of an organism is the place where it lives and gathers resources. ex) trout - clean water The niche of an organism is its total ______ in the environment. ex) beaver - to feed on plants, dam streams be food for wolves, and be bitten by deer flies Animals that share a similar niche and habitat will _________. Competition causes fluctuations in _____________. Population density is the number of __________ per unit area. ex) 40 deer in 200 km² = 40/200 = 0.2 deer/km²

There are 4 factors that cause population to change: __________, __________, ______________ (moving into), and _______________ (moving out of). How much the population has changed in 1 year is known as the annual ____________.

growth rate = births - deaths + immigration - emigration \( \times \frac{100}{\text{initial population}} \) 
ex) herd of elk = \( \frac{23b - 14d + 11i - 8e}{120 \text{init}} \) \( \times 100 \% = 10 \% \) growth rate
Canada = 10.28b/1000, 8.42 d/1000, net migration 5.66/1000 (2015 CIA World Factbook)
Canada = % South Sudan = 4.02 % Latvia = -1.06 %
Germany = -0.17 % China = % Ukraine = -0.66 %
Iraq = 2.93 % India = 1.22 % World = %
The doubling time is the time it takes for the population to double.

At 1 % = ____ years  2 % = ____ years  3 % = ____ years  4 % = ____ years

There is a maximum population that an environment can _______based on space and resources.
This is called the __________________. As populations approach or even surpass the carrying capacity, stress is placed on both
the population and environment.
High populations are decreased by
__________ and
__________, sometimes in a
dramatic crash in population.

Sustainability of Ecosystems
Ecology is the study of the ____________ of organisms with their ____________ and with
each other. An ____________ is a living being that depends on its components or organs to
survive, while its environment is the surroundings of that organism, including all the ______
and ______ factors. The biotic factors in an environment are the components that are (or were once) ________, such as animals and plants. The abiotic factors are the ______________ components, such as __________, ____________, and ____________.

Energy usually enters an environment as plants use ____________ to produce their own food by
_____________________. We call these organisms producers and _______________. (self-
nourishment, or self-feeder) Organisms that need to feed on others to get their energy are called consumers and ________________(other-feeder) In a food chain, we number these consumers in order of feeding as ____________, secondary, tertiary, quaternary, etc. The feeding level that an organism occupies is known as the _______ ________. Producers make up the first trophic level, primary _________________ make up the second trophic level, and so on.

We can also classify animals by that on which they _______. For example, a ________________ feeds on plants; a ________________ feeds on animals; an ________________ feeds on both plants and animals; ________________ feed on waste and dead matter from plants and animals. Detrivores would include beetles and worms, as well as ________________ such as fungi and bacteria. Although less visible, detrivores play an important part in food chains and are one of the largest components by ___________. (fig 1.4, p8)

The energy used by an organism is used to stay alive, but most of it is ____ to the environment as waste or heat. Each trophic level only retains _______ % of its available energy to be passed on to other _____________. (fig 1.5A, 1.5B, p9)

Ecological Pyramids

A Pyramid of Numbers considers the ________________ of organisms at a particular trophic level in a food chain. Using this, one can see that the higher the levels on a food chain, the ________ animals can be supported. (fig 1.7, 1.8, p14)

A Pyramid of Biomass considers the total biomass of organisms at each trophic level in a food web. This pyramid is a good indicator of the amount of energy available at each level.
A Pyramid of Energy considers the total chemical _______ that flows through each trophic level. Passing only about ____ % of the energy to the next level, food chains are usually kept to _______ levels or less.

Some animals have developed a method to sustain populations by altering their ___________. For example, when food is scarce, a female wolf might not ____________, and keep the population down until resources improve. Conversely, in a year of abundant food, she might give birth to more pups than usual. Fewer resources causes _____________ between organisms. If the competition is between members of the same species, it is called _______________ competition; If it occurs between species, it is called ________________ competition.

**Productivity**

Plant productivity refers to the amount of new _________ produced each year per unit area. Plants need __________, ______, ______, ____., ______, and warm temperatures to grow. Ecosystems with the highest productivity have warm, humid conditions, with many nutrients - such as a __________. Ecosystems with similar characteristics can exist in different geographical locations if the amounts of these _______ factors are the same.

Not all food produces the same amount of ______ per square metre of land use. By changing our diet, we could greatly ___________ the number of people that could be fed by a given agricultural area. (fig 1.20, p25; activity, p6)
Planting the same crop in large amount creates a ______________. This artificially creates an ________________ food resource for certain animals and insects, which ______________ rapidly. These are called ________ - organisms that people consider harmful or inconvenient in a situation, such as weeds, insects, fungi and rodents. To control pests, people have used ________________, which can have harmful effects throughout a food chain.

**Bioaccumulation**

When substances such as pesticides are introduced into a food chain, increasing concentrations of that toxin ________________ in the bodies of the consumers at each succeeding trophic level. This is known as _______________ or _________________. (p30) An important example of this is the pesticide dichloro-diphenyl-trichloroethane or ________. This insecticide can have a ______________ (remain active) for up to 15 years. DDT is fat soluble, highly toxic and has devastated populations, especially by interfering with _________________.

Pesticides also affect humans, as the WHO estimates that pesticides cause __________ deaths and ______________ poisonings yearly. Even though harmful pesticides such as DDT have been ______________ in Canada, they are still used in developing countries, because they are effective and ___________. This can affect food chains all over the world due to ______________, imports and exports.