

Name: _____

Period: _____

Ecosystems Exam Review

1. What is biodiversity and how do we measure it?

Biodiversity means variety of life. An area with high biodiversity would have not only many living organisms, but also many different kinds of living organisms. We measure biodiversity by species richness: the number of different species, and relative abundance: population of each species.

2. Why is nitrogen important for life?

Nitrogen is a key molecule in both proteins and DNA.

3. What forms of nitrogen are useable by living organisms? How is it changed from a non-useable form to a useable form?

Plants and animals cannot use atmospheric nitrogen (N_2). It is converted or "fixed" by nitrogen fixing bacteria in the soil, that are able to break the bonds in N_2 , and create ammonia. Ammonia is useable by plants, but it is not the most common form they use. Through nitrification, bacteria can turn ammonia into nitrate and nitrite. Nitrate is the most common form used by plants. Animals in a food web cannot get nitrogen unless it starts out in plants. Even carnivores that get their nitrogen from meat are eating another animal that ate plants.. or another animal that ate another animal that ate plants. You get the idea.

4. What are human impacts on the nitrogen cycle and what effect does that have on the ecosystem? (think about farming practices, city dumping, water runoff, etc.)

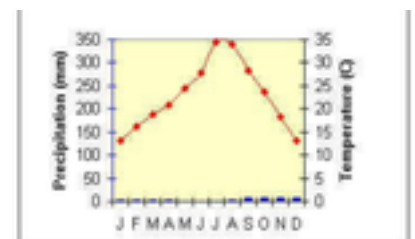
- Burning fossil fuels releases nitrogen into the atmosphere that had been stored in the biosphere for millions of years, creates excess nitrogen gas
- Farmers use nitrogen based fertilizers in large quantities to fertilize crops. Most of that nitrogen ends in runoff that then leads to bodies of water (lakes rivers etc.) This is the cause of eutrophication.
- Cities can cause eutrophication in the same way the farmers to ^^^ people use fertilizers in their yard, dog poop contains nitrogen, and chemicals washed away from car washes all eventually end up in water runoff into bodies of water
- We have also removed a lot of the natural components of the nitrogen cycle by clearing away land for building cities and homes. In Tacoma, before it was developed into a city, there were trees that would shed leaves and other organic matter, which would be broken down by fungi and bacteria in the soil, and then the nitrogen was effectively recycled for use. There are no longer trees and other organic matter decomposing on the ground, there are roads and buildings. There are no longer mushrooms and other decomposers, we use many different chemicals to get rid of these 'nuisances'.

5. Below are two climate graphs showing temperature and precipitation data for two locations around the world.

- Do these graphs show biotic or abiotic factors?
- Which one has more biodiversity? Explain your answer.

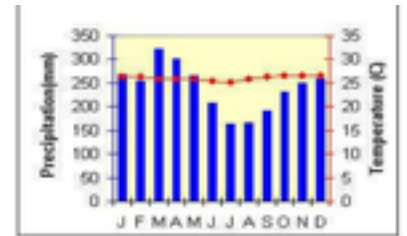
Abiotic factors are shown (non-living)

The bottom graph has the most biodiversity. It has a constant warm temperature and consistent amounts of rain. Whenever there is a lot of variance in temperature, that means that the organisms that live there must be adapted to survive in both kinds of weather. When the temperature is not only constant, but also note extreme (like super hot or super cold)



many different life forms can survive year round. The constant rain means a lot of plant life, which as you know is the beginning of any food chain.

6. Define specialist and generalist. Which type of organism (a specialist or a generalist) has a more secure position in the food web? Why?



Specialist- eats only one thing

Generalist- gets food from many different sources

Generalists have a more secure position in the food web because if one source of food goes extinct or becomes less available, they have other things to eat.

7. An animal that eats only plants is a herbivore
8. An animal that eats plants and animals is a omnivore
9. An animal that eats only other animals is a carnivore
10. Fungus and bacteria that consume dead organic matter and release nutrients back into the ecosystem are called decomposers
11. Why are autotrophs so important to any food chain? Why are they always found at the bottom of an energy pyramid?

They use energy from the sun to make food available for the rest of the food chain, therefore making energy available for the rest of the food chain. This food contains carbon and nitrogen, two things that we would not exist without. They are found at the bottom of the food chain because they are the beginning of the food chain. They perform photosynthesis and without that the food chain would never begin.

12. What happens to the producers and secondary consumers if you remove a primary consumer from the food web?

Producers increase. Secondary consumers decrease. *Unless the secondary consumer is an omnivore, in which case the food chain would stay slightly more balanced. The secondary consumers population would decrease, and the producers population would remain unchanged at first.

13. Why isn't a food chain balanced when there are equal amounts of primary, secondary, and tertiary consumers?

Organisms need to consume much more food as you move up the food chain because they are getting the least amount of total energy in the ecosystem, and they are usually bigger as well. If you have the same number of tertiary consumers as you do secondary consumers, they are going to wipe out the population of secondary consumers rather quickly. The same rule applies between each trophic level in the food chain. Remember that when you played the food chain game and there were equal amounts of each population, everyone died out very quickly because they were all eaten by predators, and the hawks were all starved to death.

14. Explain the difference between MATTER and ENERGY. List 3 examples of matter, and 3 examples of types of energy.

Matter is the 'stuff' that makes up our physical world. It has mass (weight). All molecules are matter, even if you cannot see them... like the nitrogen and oxygen in the air. Energy is much more elusive. It is defined as the ability to do work. Your food is made up of matter. You get energy from it because energy is stored in the bonds that hold the molecules in your food together. This is called chemical energy. There is also thermal (heat) energy, electrical energy, radiant (solar) energy from the sun, magnetic energy, mechanical, nuclear, there are many. The important thing is that you understand what this means for a food web. Plants capture energy from the sun and create molecules of sugar with that energy trapped in the molecular bonds. This is the beginning of the food chain. When an animal eats, it is not getting energy from the molecules in the food itself.

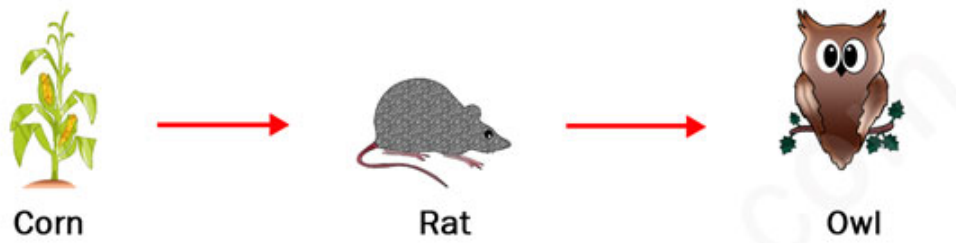
15. What does the 10% energy rule mean?

90% of the total energy obtained at any trophic level is used by the individuals through respiration, heat, movement, growth, etc. 10% of the energy is stored as biomass (protein, fat, the 'stuff' that makes up the body of the organism) and can be transferred to the next trophic level when organisms are consumed. This means that the energy decreases as you go up an energy pyramid, and that within a given ecosystem the biomass decreases as you go up each trophic level.

16. In an aquatic ecosystem phytoplankton use the sun's energy to make their own food. Zooplankton feed on the phytoplankton. Flying fish feed on both the zooplankton and the phytoplankton. Tuna eat flying fish. Make an energy pyramid and a food web using the information above. Label each trophic level.

I cannot really make this on word. You should have an energy pyramid with phytoplankton at the bottom labeled producers. Zooplankton should be above them labeled primary consumers, Flying fish are next, labeled secondary consumers. Tuna are next they are tertiary consumers. In your food web you should have 2 arrows pointing at flying fish because they eat both types of plankton.

17. Below is an image of a food chain. Rats eat approximately 26kg of corn each, per year. If the biomass of corn in the ecosystem is 10,000kg, how many rats can this ecosystem support for one year?



approx.. 385 rats.