

Name _____ Class period _____

ECO 2---CDL 12

Biodiversity & Ecosystem Health

The **biodiversity** of an ecosystem is the variation, or differences, among living organisms within that ecosystem. This includes genetic variation within a species as well as the variety of different species within an ecosystem. The biodiversity of an ecosystem increases with the number of different species of organisms that live in that ecosystem.

Biodiversity is not evenly distributed on Earth. Some ecosystems are more diverse than others. Usually, the more diverse that an ecosystem is, the healthier and more sustainable it is. Biodiversity in Earth's land-based ecosystems is generally highest at the equator and lowest at the poles.



A large number of different and unique species live in rainforests.

Disturbances, such as those caused by human activity, can cause ecosystems to become unstable. When an ecosystem is disturbed, individual organisms, as well as entire species, can die out. This can cause the biodiversity of an ecosystem to decrease. Disturbances can include habitat destruction, climate change, and the introduction of invasive species that outcompete native ones.



Disturbances, such as the habitat destruction that occurs when land is cleared, can cause a decrease in the biodiversity of an ecosystem.

Ecosystems can better handle disturbances whenever there is already a high amount of biodiversity within that ecosystem. The more varied the organisms within an ecosystem, the more likely it is that some of them could use their specialized and unique adaptations to survive major changes or disturbances in the ecosystem. If biodiversity is reduced in an ecosystem, the ecosystem becomes less stable.

Preserving Biodiversity in Ecosystems

The preservation of the biodiversity of the Earth is important for many ecological, economic, and cultural reasons. As discussed above, biodiversity increases ecosystem stability because greater species diversity ensures the natural sustainability of all life forms within that ecosystem. Ecosystems are also highly interconnected and the removal of even a few species can cause ecosystem disruption.

The preservation of biodiversity is also important because humans cannot replicate the ecosystem services provided to them by the diverse organisms of Earth's ecosystems. These ecosystem services include the generation of soil that is typically done by microbial and animal species, the maintenance of air quality that is done by plants, the decomposition of wastes that is done by the Earth's decomposers, and the maintenance of water quality that is done by wetland ecosystems.



Wetland ecosystems are typically very diverse. They also perform many important ecosystem services, such as nutrient recycling and water filtration.

Maintaining the biodiversity of an at-risk ecosystem can be accomplished by determining and executing an action plan. During the selection of any action plan to maintain biodiversity, several factors must be considered. These factors include the cost of the plan, the estimated effectiveness of the plan at protecting the targeted populations, and how the plan will affect both humans and other populations in the area. Often multiple action plans will be developed and compared before any action is taken.

1. Microorganisms living in the soil form a major component of soil biodiversity. They play an important role in recycling nutrients in ecosystems by decomposing soil organic matter (SOM), which contains dead and living plant and animal materials. They convert these materials into simpler compounds that are important for maintaining soil quality and sustaining plant growth. Various agricultural practices such as crop rotation, tillage, fumigation, and use of pesticides and fertilizers affect the microbial biodiversity in the soil.

Which solution could best be implemented to restore or increase soil microbe biodiversity in a particular area?

- A. Add sewage sludge containing heavy metals to the soil.
- B. Spray weed-killing pesticides and chemical fertilizers on the soil.
- C. Add manure or compost to the soil.

2. In 2006, the United States government created the largest marine wildlife preserve in the world. The preserve is located around the northwestern Hawaiian Islands. How do government-controlled wildlife preserves affect the environment?

- A. They ensure that none of Earth's species will go extinct.
- B. They lead to the overdevelopment of sensitive habitats.
- C. They help preserve an area's biodiversity.

Rainforests are a habitat for a large variety of plants and animals. Due to extensive human intervention, rainforests are facing a major threat of habitat fragmentation. When a rainforest habitat is fragmented, a large area of the habitat is divided into small patches that are isolated from each other by degraded landscapes. Species living in these patches become more vulnerable to extinction due to overcrowding and competition.

3. Which of the following is the best solution to minimize the effects of habitat fragmentation on the biodiversity of a rainforest ecosystem?

- A. Build boundaries and fences around each habitat patch.
- B. Build concrete roads across the original habitat to join all of the patches together.
- C. Introduce new species that compete with the existing species in each habitat patch.
- D. Build natural green pathways across the original habitat to join all of the patches together.

4. Mikah is creating a poster for her science class to illustrate the major factors responsible for reducing the amount of global biodiversity on the Earth. Which of the following should most likely be included on her poster?

- A. the conservation of natural ecosystems
- B. the observation of wild organisms by scientists
- C. the destruction of plant and animal habitats by humans
- D. the wise management of natural resources by humans