

PHILADELPHIA ZOO

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Habitats and Conservation (9th-12th)

Essential Question

How does an animal's natural habitat relate to its conservation status?

Objectives

1. Students will define habitat and identify features that make up a habitat.
2. Students will identify interdependent relationships in ecosystems, including food chain roles and the importance of balance in an ecosystem.
3. Students will identify threats to habitats, including human impact and habitat loss through deforestation.

Vocabulary

Biotic: all living things in an environment.

Ecosystem: All the biotic and abiotic factors interacting as a system

Habitat: A place which contains all the necessary factors needed for a species to survive.

Endangered Species: Any living species existing in such small numbers that it is in danger of becoming extinct.

Deforestation: Deforestation is the removing or clearing of a forest to include the cutting of all trees, mostly for agricultural or urban use.

Habitat fragmentation: habitat loss which results in the division of large, continuous habitats into a greater number of smaller patches isolated from one another by dissimilar habitats

Recommendations

Read:

["100 Heartbeats"](#) – Jeff Corwin

["Last Chance to See"](#) – Douglas Adams and Mark Carwadne

Research:

-Animals that are threatened by habitat loss in the United States

-Habitat loss reasons and rates around the world

Discuss:

-Is habitat loss only a problem in other areas of the world?

-Can our daily actions impact wildlife in other areas of the world?

Classroom Activity

Habitat Loss and Extinction of Species: Have students read the included paper, "Near-Complete Extinction of Native Small Mammal Fauna 25 Years After Forest Fragmentation" by Luke Gibson, *et. al.*

Individually: Have students read the paper individually and highlight what they feel are important pieces of information.

In groups: Students should form groups to discuss in detail the key points of the paper. Students should work together to answer the included questions.

As a class: Go over the entire paper and summary questions as a class.

Standards

PA Academic: 3.4 E2, 3.4 E7, 4.1 D

Next Generation Science: HS-LS2-1, HS-LS2-2, HS-LS2-7, HS-LS2-8, HS-LS4-6

New Jersey Core Curriculum: 5.1, 5.3B, 5.3C

Common Core: CCSS.ELA-LITERACY.RST.4, CCSS.ELA-LITERACY.RST.7, CCSS.ELA-LITERACY.W.7, CCSS.ELA-LITERACY.SL.1

Habitat Loss and Extinction of Species

Questions for Consideration

Read the entire paper and highlight important information. Work together in a group to answer the following questions.

1. Where did the authors conduct their study?
2. What occurred in this region to generate habitat fragmentation?
3. How many years after the fragmentation was the first set of data collected? How many years for the second set?
4. What size was the smallest island? The largest?
5. Do the authors think that the size of the island had an impact on the rate of extinction? Explain your answer.
6. The authors mention how many species of small mammal are evident on the islands after 5-7 years. How do they know that this number is a decline from the original number?
7. Referring to the last question, why do the authors make the assumption that the decline of species on the islands is linked to habitat fragmentation?
8. The authors mention that there is another factor, in addition to habitat loss, that comes into play during a fragmentation event and is a secondary driver of extinction on these islands. What is it?
9. The authors used a formula to figure out the rate of extinction in fragmented habitats and discovered that the 'half-life' of these islands is 13.9 years. What does this mean? What implication does this hold for other fragmented habitats?
10. What is the overall conclusion of this study? What do the authors suggest should be the focus of conservation efforts?

Answer Key

1. Chiew Larn Reservoir in Thailand (pg. 1)
2. The reservoir was formed in 1986-1987 when a large portion of forest was flooded, creating over 100 islands in the process (pg. 1)
3. 5-7; 25-26 (pg. 1)
4. 0.3 hectares (ha); 56.3 ha (pg. 1)
5. Yes. 'Species richness on islands was most strongly correlated with area...' (pg. 2, see also Table 1)
6. They compared the number of small mammal species present on the islands to the number of species present on the mainland, which used to be connected before the fragmentation. It can be assumed that the small mammal populations on the island used to be part of the populations on the mainland and were separated during the fragmentation event. Thus, if there was no species decline occurring on the islands, the same species richness would be apparent in both locations. (pg. 1)
7. The authors also surveyed small mammal populations in the forest on the mainland and found no decline in diversity. This indicates that other factors, outside of habitat fragmentation, are likely not the cause (pg. 2)
8. Invasive species; in this case, a rat. Invasive species can have a devastating effect on populations, particularly those who live in restricted habitat situations, such as fragments or islands (or, in this case, both). (pg. 3)
9. This 'half-life' number indicates the number of years after a fragmentation event occurs when half of the species originally present will have gone extinct. This is an average number and factors in the number of species originally present, the size of the fragment, and the time since fragmentation. This number has important implications on other studies because it can help conservation biologists figure out how much time they have to study and save fragmented habitat before it is too late to save the species there. (pg 2 and abstract)
10. The authors conclude that extinction rates on islands and fragmented habitats can occur much more rapidly than we previously thought, and that mammals are at high risk. They state that there is a need to maintain large forest blocks, rather than small fragmented blocks, to sustain biodiversity. (pg. 3)