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Teacher Guide & Answer Key

How Water Loss Affects Biodiversity

Grade level: 4th – 6th
Standard/ GLE Code: SC.4.3.5, SC.5.2.2, SC.MS.2.7
Time commitment: 40 minutes
Materials needed:

- Student worksheet

Educational Messages:

- Students learn the impacts of limited water through a reading comprehension assignment provided by ReadWorks.
- Topics include drought, climate change, natural habitats, human impact on plants and animals.
- Students answer reading comprehension questions to assess understanding.
- Students discuss ways to reduce water loss.

In order for humans to live, they need access to fresh water. There are many ways in which humans can affect access to fresh water. Droughts can also have a negative impact on the biodiversity of a region. While droughts are natural, and in many places, a frequent occurrence, there are many things that humans do to increase the severity of these droughts.

Suggested format:

1. Have students read "How Water Loss Affects Biodiversity" either individually, as small groups or as a class.
2. Have students answer the reading comprehension questions.
3. Discuss ways students can help reduce water loss.

How Water Loss Affects Biodiversity – STUDENT READING PASSAGE

In order for humans to live, they need access to fresh water. While nearly 70% of the earth's surface is water, most of it is salt water, which humans cannot drink. Only a small percentage, about 3%, is fresh water. Of this, about 69% is currently frozen as ice caps and glaciers, while another 3% is held underground in the soil or in rock. This means that only one percent of the world's fresh water-or .03% of the world's total water-is surface water that humans can access to drink. The small amount of potable (suitable for drinking) water makes its conservation incredibly important so that water shortages already occurring in some regions do not spread further. If they do spread, this may lead to conflicts over the right to use this water.

There are many ways in which humans can affect access to fresh water. For example, humans can pollute bodies of water, thereby making them undrinkable. In some cases, they may make physical changes to the land by building over wetlands or damming up rivers. While wealthy countries can afford to make the investments necessary to make sure their residents have access to fresh water, poorer countries often cannot. This means that poorer countries are at greater risk of devastating droughts, which can lead both to dehydration and starvation, as the country is unable to water its crops.

Droughts can also have a negative impact on the biodiversity of a region. Biodiversity refers to an abundance of different types of plants and animal species within a region. The prefix "bio" means living, while "diversity" refers to different types of things. Around the world, more than 125,000 animal species live entirely in freshwater habitats, including 15,000 species of fish 4,300 species of amphibians, and 5,000 species of mollusks, such as clams and oysters. Millions of other species, including humans, depend on fresh water to drink. When an area loses a large percentage of its fresh water, many animals die off. In some cases, species go entirely extinct. This leads to a decrease in the region's biodiversity.

While droughts are natural, and in many places, a frequent occurrence, there are many things that humans do to increase the severity of these droughts. For one thing, the world's population has doubled in the last 50 years, so humans have been using much more fresh water to drink and grow crops than they did in the past. Humanity's increasing water consumption represents a growing threat to biodiversity.

In Africa, where droughts are common, they have been more prolonged than in the past. This is due in part to climate change, as well as a greater demand for water as the continent's population has increased. During a drought in Kenya that lasted from 2007-2009, over 60 elephants died-some of dehydration, others of starvation due to lack of vegetation to eat, and others of diseases that became fatal due to the elephants' weakened states. Some other endangered animals, such as the white rhinoceros, died too, which brought them closer to extinction.

When the biodiversity of a region declines, the human population suffers as well, in different ways. When a region experiences a significant drought, many animals many die from lack of water and food. If the region is one like Kenya, which depends on its wildlife to draw tourists, the effects of the drought can be devastating. If tourism declines due to high wildlife casualties, then the locals who depend on the income from tourism will lose their livelihood. People may then turn to farming to earn money, but crops will require water to grow. This can place further strain on the water supply and worsen the original problem of the drought. Sometimes, an imbalance in the system, such as a lack of water, can enter into the feedback loop where the situation only gets worse and worse.

Losses in biodiversity can also lead to problems with the availability of food. As we've discussed, a lack of water can prevent farmers from growing crops, which can lead to starvation. However, when a region loses its biodiversity, it disrupts the food chain in many ways. For example, if a species goes extinct, all of the species used to feeding on it must find another source of food. Say a population of freshwater frog dies because its habitat has been depleted in a drought. This means the population of birds that feeds on this frog may decline as well, as it lacks sufficient food. Conversely, the insects that the frogs fed on may increase in number, as the frogs are no longer around to keep their population in check.

One of the many advantages of biodiversity is that there are certain natural processes that plants and animals perform that humans simply cannot. The billions of bees in the world play a critical role in pollinating

the world's flowers. If they did not do this, the food supply would dwindle, and the human population would suffer greatly.

Biodiversity can play an important function in the cleaning of water. When water passes through lakes, wetlands, and streams, it often encounters different species of fungi, algae, and bacteria. Many of the microbes actually filter microscopic particles out of the water, making it safe for humans to drink. Even some larger species do similar work. For example, the caddisfly constructs nets underwater that filter out different kinds of particles, which it then eats. Wetlands rich with these underwater organisms act as natural water filtration systems. When the biodiversity of a region declines, many of the organisms critical to this filtering process can disappear. Therefore, pressures on the freshwater supply can cause biodiversity to decrease, which can cut the drinkable water supple even further.

While humans do have some water filtration plants, these plants are expensive and take a lot of energy to maintain. For centuries the water that flowed into New York City was naturally filtered by a northern watershed. As the water flowed south, it was purified. However, as the watershed was polluted and diverted, the water flowing to New York City was no longer filtered. The city faced a choice of spending $6 billion to $8 billion to build a water filtration plant, or just $1 billion to restore the natural watershed. The city wisely chose the latter option.

Comprehension questions answer key on next page.

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How Loss of Water Affects Biodiversity
COMPREHENSION QUESTIONS
ANSWER KEY

1. What is biodiversity? *An abundance of different types of plant and animal species within a particular region.*

2. The cause of humanity's increased water consumption is an increased population. What is the effect?
   A. Less potable water, a growing threat to biodiversity
   B. More potable water, a growing threat to biodiversity
   C. Less potable water, a decreased threat to biodiversity
   D. More potable water, a decreased threat to biodiversity

3. What is this passage mostly about?
   A. The effects of water loss on biodiversity
   B. The drought in Kenya from 2007-2009
   C. The distribution of the world's fresh water
   D. The effects of population growth on the water supply

4. Read the following sentences: "Say a particular species of freshwater frog dies because its habitat has been depleted in a drought. This means the population of birds that feeds on this frog may decline as well, as it lacks sufficient food. Conversely, the insects that the frogs fed on may increase in number, as the frogs are no longer around to keep their population in check."

   What does the word "conversely" mean?
   A. In the same vein
   B. For this reason
   C. As an example
   D. On the other hand

5. Choose the answer that best completes this sentence: Humans can affect access to fresh water in many ways, _____ polluting bodies of water and building dams.
   A. Finally
   B. Such as
   C. Initially
   D. Although

6. What makes the conservation of fresh drinking water so important? *The small amount of drinking water makes its conservation important so that water shortages occurring in some regions do not spread further.*

7. Describe a problem caused by losses in biodiversity. *i.e. If tourism in Kenya declines due to high wildlife casualties, then the locals who depend on income from tourism will lose their livelihood.*

8. How might humans help prevent losses in biodiversity? Use information from the passage to support your answer. *Humans can keep bodies of water clean, reduce impacts from dams and build wetlands.*

Source: ReadWorks