

Norfolk Public Schools

Science Learning in Place Plan: Science 6 Lessons

Week 4: April 6 – 10, 2020

Monday	Tuesday	Wednesday	Thursday	Friday
<p>Important Resources</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Read the article entitled, “Human Impact on Ecosystems” <ul style="list-style-type: none"> ○ Highlight or Underline key definitions or phrases in the passage ○ Research and record any words you do not know the definitions (dictionary, online, phone, ask family, etc) 	<p>Important Resources</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Reread the article entitled, “Human Impact on Ecosystems” • Answer the questions on the “Human Impact on Ecosystem Analysis Questions” 	<p>Important Resources</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Read “Death of a Sea” on pp.499 • Answer the following: <ul style="list-style-type: none"> ○ Extend (18-20) ○ Identify the Independent Variable(Cause) and the Dependent Variable(Effect) in the death of a sea. 	<p>Important Resources</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Review this week’s articles • Write an essay using the articles you read this week to explain to your family what you think are the three actions humans can take to protect our natural resources. 	<p>Important Resources</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Review this week’s articles • Answer the four questions on Lesson Review and justify each.

Week 5: April 13 – 17, 2020

Monday	Tuesday	Wednesday	Thursday	Friday
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Spring Break

Week 6: April 20 – 24, 2020

Monday	Tuesday	Wednesday	Thursday	Friday
<p>Renewable and Nonrenewable Energy</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Read the article entitled, “Renewable & Nonrenewable Sources of Energy” <ul style="list-style-type: none"> ○ Highlight or Underline key definitions or phrases in the passage ○ Research and Record any words you do not know the definitions (dictionary, online, phone, ask family, etc) 	<p>Renewable and Nonrenewable Energy</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Read the article entitled, “Renewable & Nonrenewable Sources of Energy” • Complete the worksheet to compare and contrast renewable and non-renewable sources of energy. 	<p>Renewable and Nonrenewable Energy</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Read “The Northeast Blackout of 2003” on pp.433 • Answer the following: <ul style="list-style-type: none"> ○ Extend (16-18) ○ Identify the Independent Variable(Cause) and the Dependent Variable(Effect) in The Northeast Blackout 2003. 	<p>Renewable and Nonrenewable Energy</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Review this week’s articles • Write an essay to explain the seven (7) ways that you can reduce your own personal consumption of energy. 	<p>Renewable and Nonrenewable Energy</p> <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • Review this week’s articles • Answer the four questions on Lesson Review and justify each.

Human Impact on Ecosystems

Human activity is a major threat to the planet's **biodiversity**. This is because human population growth thus far has been exponential, meaning that its growth rate stays the same regardless of population size. This makes the population grow faster and faster as it gets larger.

Populations may grow exponentially for some period, but they ultimately reach a *carrying capacity* when they become limited by resource availability. Humans, however, have continued to work around carrying capacity as they develop new technologies to help support the ever-growing population.

This threatens biodiversity because the more humans there are, the more this displaces other species and reduces *species richness*.



Deforestation for resource mining or urbanization can displace native organisms. Destruction of forest in Madagascar. [Wikimedia, CC BY 4.0.](#)

Human-mediated causes of biodiversity loss

- **Land-use change:** Humans may destroy natural landscapes as they mine resources and urbanize areas. This is detrimental, as it displaces residing species, reducing available habitats and food sources.
- **Pollution:** Pollution can occur from the runoff or disposal of chemical substances, or from energy sources (noise and light pollution).
- **Introduced species:** Humans may intentionally, or unintentionally introduce a non-native species into an ecosystem. This can negatively effect an ecosystem because the introduced species may outcompete native organisms and displace them.
- **Resource exploitation:** Humans constantly consume resources for their own needs. Some examples include the mining of natural resources like coal, the hunting and fishing of animals for food, and the clearing of forests for urbanization and wood use.

Extensive overuse of **nonrenewable resources**, like fossil fuels, can cause great harm to the environment. Recycling products made from nonrenewable resources (such as plastic, which is made from oil) is one way to reduce the negative impacts of this resource exploitation. In addition, the development and use of **renewable resources**, like solar or wind energy, can help decrease the harmful effects of resource exploitation.

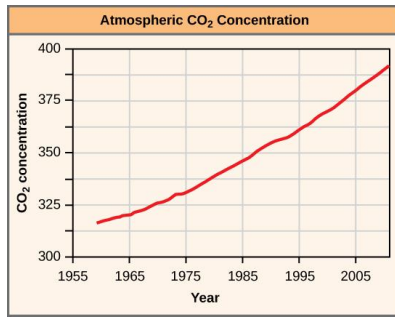
Climate change and biodiversity

The current **climate change** Earth is facing is caused by the increase in global temperatures. Human activity is changing Earth's atmosphere faster than it has ever changed during its history.



The burning of fossil fuels in industry and by vehicles releases carbon dioxide and other greenhouse gases into the atmosphere.

The burning of fossil fuels and the growth of animal agriculture has caused large amounts of greenhouse gases (such as carbon dioxide and methane) in the atmosphere. Higher concentrations of greenhouse gases trap more heat in the biosphere and result in global warming. In turn, this drives climate change.



The atmospheric concentration of CO₂ has risen steadily since the beginning of industrialization.

When climate change affects an environment so much that it is unable to sustain organisms, they must adapt, relocate, or face extinction. Because of this, climate change can have a huge effect on biodiversity.

Conservation

Conservation efforts work to protect species and the places in which they live. There are many different kinds of conservation efforts. Species protection is one way to help combat **extinction**. Although extinction is a natural process, it is occurring at a much faster, much higher rate than normally expected.

The creation of local, national, and international *legislation* can help prevent the loss of **endangered species**. In addition, *captive-breeding programs* may help protect endangered species by maintaining a healthy population of endangered species in captivity. Habitat protection, preservation, and restoration is essential in protecting biodiversity. This ensures that the protected species have places to live that can support them. Ultimately, saving one habitat can have a cascading effect, and help to protect an entire ecosystem. Scientists have determined several **biodiversity hotspots**, which are high priority in protecting.

Common mistakes and misconceptions

- **The extinction rate is currently 1,000-10,000 times higher than the natural extinction rate.** Some people think that extinction is not a relevant issue, but it is actually more relevant than ever! Historically, the natural extinction rate is between 1-5 extinctions per year. Human impact has caused this rate to jump to a significantly higher rate, offsetting the balance of biodiversity.
- **The greenhouse effect is not all negative.** Although we talk about greenhouse gases producing a negative impact (global change), the greenhouse effect serves a natural purpose: maintaining the warmth that sustains life on Earth. The problem arises when too much heat is trapped, causing a rise in average global temperature.
- **An individual person can have an effect on biodiversity.** Although biodiversity loss may be a large-scale problem, reducing threats to biodiversity can begin with a single individual. Smaller efforts, such as reusing or recycling items, or even purchasing sustainable foods, can have a culminating effect. That is, if each person did these things, even just a little, they would add up and help reduce biodiversity loss!

Human Impact on Ecosystems Analysis Questions

1. How does human activity affect climate change? _____

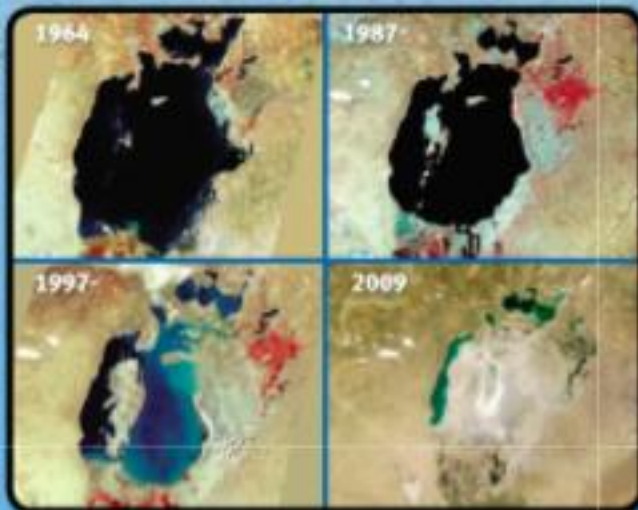
2. Why does the increase in human population affect biodiversity? _____

3. List and describe three types of biodiversity loss by humans? _____

Why It Matters

Death of a Sea

The Aral Sea in Central Asia was once the world's fourth-largest inland salty lake. But it has been shrinking since the 1960s. In the 1940s, the courses of the rivers that fed the lake were changed to irrigate the desert, so that crops such as cotton and rice could be grown. By 2004, the lake had shrunk to 25% of its original size. The freshwater flow into the lake was reduced and evaporation caused the lake to become so salty that most of the plants and animals in it died or left the lake.



By 2007, the lake had shrunk to 10% of its original size and had split into three separate, smaller lakes.

Polluted Land

The Aral Sea is also heavily polluted by industrial wastes, pesticides, and fertilizer runoff. Salty dust that is blown from the dried seabed damages crops and pollutes drinking water. The salt- and dust-laden air cause serious public health problems in the Aral Sea region. One of the more bizarre reminders of how large the lake once was are the boats that lie abandoned on the exposed sea floor.

Extend

Inquiry

- 18 Identify** What human activity has created the situation in the Aral Sea?
- 19 Apply** Research the impact that one of these two large water projects has had on people and on the environment: The Three Gorges Dam or the Columbia Basin Project.

- 20 Relate** Research a current or past water project in the area where you live. What benefits will these projects have for people in the area? What risks might there be to the environment?

Importance of Resources Lesson Review

Directions: Justify your answers to the following questions:

1. Which of the following would be least harmful to an endangered species?

- A. Harvesting local natural resources
- B. Releasing excess carbon dioxide into the atmosphere
- C. Introducing a competitor species into the local habitat
- D. Reducing the human population

2. How might an introduced species threaten biodiversity?

- A. It may not be able to survive in its new habitat.
- B. It may compete with native species for resources.
- C. It may breed with native species and produce new species.
- D. It may become prey for native species.

3. Which of the following would help ensure the natural survival of the mulgara population?

- A. Removing all other animal species from the habitat
- B. Introduce another small carnivorous species to mate with the mulgara
- C. Clear the habitat of plant life and build mulgara shelters
- D. Limit human activities in the mulgara habitat

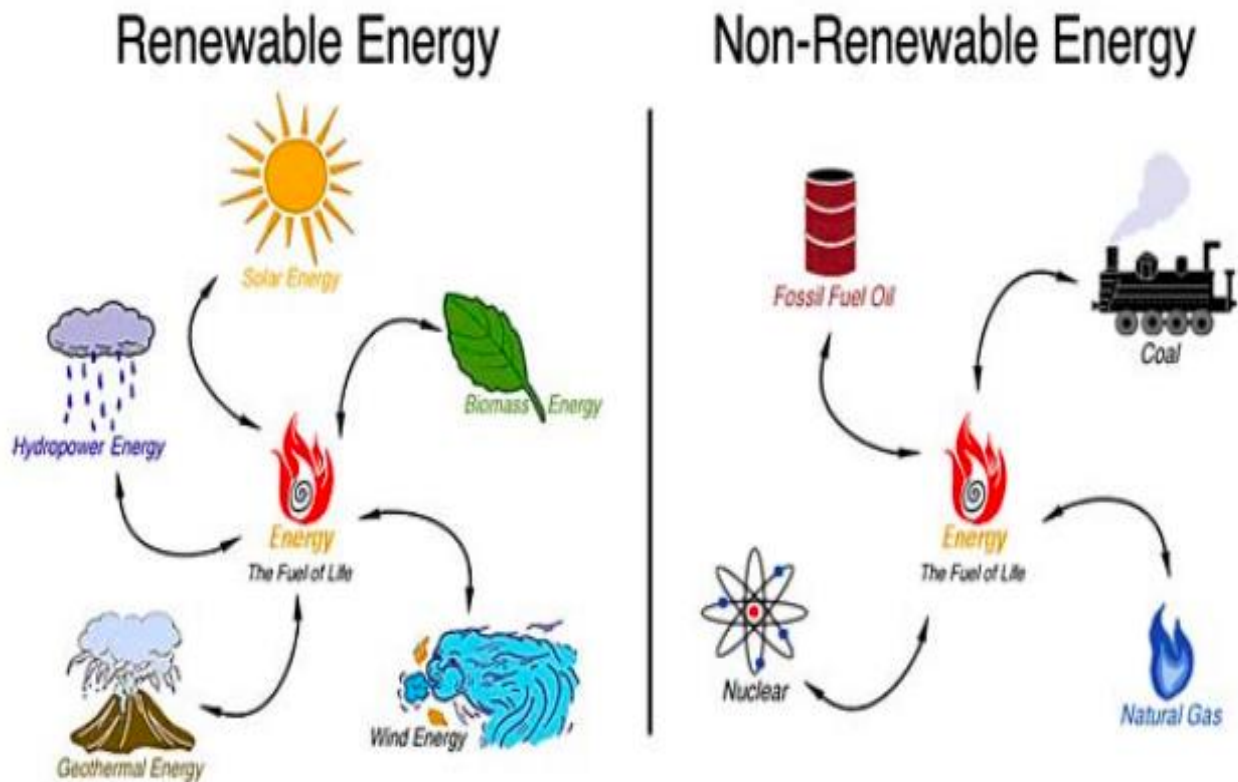
4. Which human activity would have the largest negative effect on biodiversity?

- A. Regulating industrial pollution
- B. Passing legislation to protect an endangered species
- C. Developing wildlife sanctuaries
- D. Reproducing at an uncontrolled rate

Renewable and Nonrenewable Sources of Energy

You have learned about the different types of energy such as chemical, mechanical, radiant and nuclear. You have also learned that energy can be changed from one form to another. A major energy transformation in our lives is the one that changes various energy sources into electricity. Energy sources can be either renewable or nonrenewable.

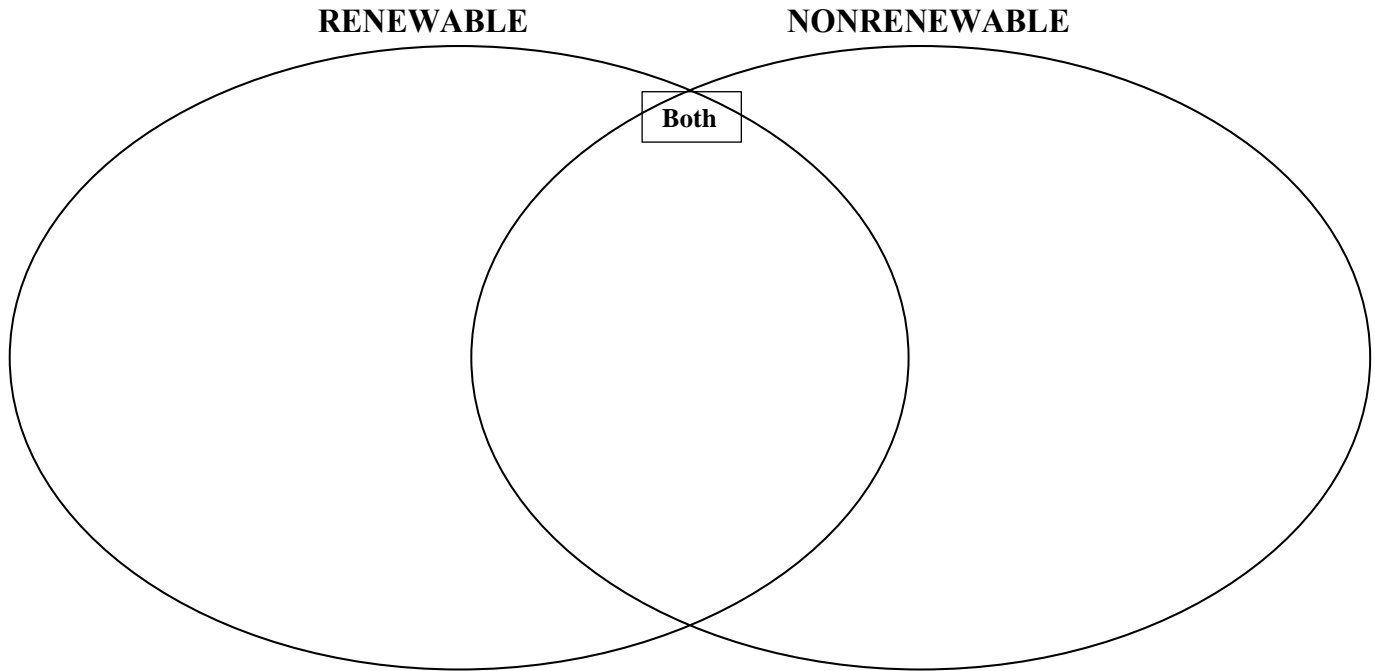
Renewable energy sources are those that can be replaced in a relatively short period of time. Examples of renewable resources are solar energy, wind energy, biomass and hydropower. Nonrenewable energy sources cannot be replaced as they are used. They take millions of years to form. Examples of nonrenewable energy sources are the metal uranium used as the nuclear energy source and fossil fuels such as coal, natural gas and oil. A fossil fuel is formed from the buried remains of plants and animals that lived millions of years ago.



Renewable and Nonrenewable Sources of Energy

How are Renewable and Non-Renewable resources similar?
How are they different?

Directions: Use the reading above, word bank below, and your own research to fill in the Venn diagram



Word Bank		
Can be replaced	Produces electricity	Gives us power
Cannot be replaced	Sunlight	Fossil fuels
Oil	Natural gas	Water
Does not cause pollution	Wood	Coal
Energy resource	Causes pollution	Wind

Why It Matters

SOCIETY AND TECHNOLOGY

The Northeast Blackout of 2003

One of the largest power outages in history took place on August 14, 2003, at 4:11 p.m. EDT. It occurred during a scorching-hot summer day when temperatures reached 90 °F plus. The cause of the failure: a high-voltage power line in Ohio brushed against overgrown trees and shut down, leaving places as far away as New York City (shown) in the dark.



The North Goes Dark

The loss of electrical power affected about 50 million people in a 240 million-km² area that stretched across northeastern Canada and the northeastern United States. The areas that were without power are shown in purple.



At a Standstill

The power loss grounded passenger flights at airports, stopped subway traffic, knocked out traffic lights, and stopped all trains. In an attempt to return home, thousands of people in New York City walked across the Brooklyn Bridge.

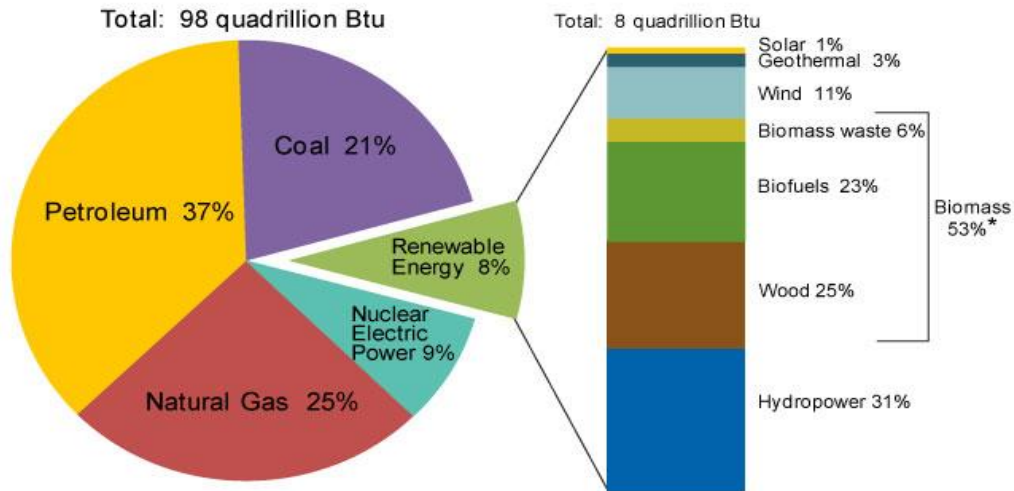
Extend

Inquiry

- 16 Describe** What are possible health risks associated with blackouts?
- 17 Infer** What might be the benefit of a rolling blackout or an intentional blackout?

- 18 Research** Find out how scientists, engineers, and government officials are working together to prevent future mass blackouts. Present your findings in an oral report, a written report, or a poster presentation.

U.S. Energy Consumption by Energy Source, 2010



* Note: Sum of biomass components does not equal 53% due to independent rounding.
 Source: U.S. Energy Information Administration, Monthly Energy Review, Table 10.1 (June 2011), preliminary 2010 data.

Energy consumption in the United States is extraordinarily high. Despite having only 4.5% of the world's population, Americans consume over 26% of the world's energy. **What are 7 ways that you can reduce your own personal consumption of energy? Write complete sentences.**

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Lesson Review

Directions: Justify your answers to the following questions:

<p>1. Renewable resources are those that – A. cannot be replaced after they are used up. B. can be replaced after 100 years C. can be replaced after a short amount of time D. cannot be used to create energy</p>	<p>3. Examples of renewable resources are – A. oil and natural gas B. wind and solar C. coal and biomass D. water and fossil fuels</p>
<p>2. Nonrenewable resources are those that – A. cannot be replaced after they are used up. B. can be replaced after 100 years. C. can be replaced after a short amount of time. D. cannot be used to create energy</p>	<p>4. Examples of nonrenewable resources are - A. oil and natural gas B. wind and solar C. coal and biomass D. water and fossil fuels</p>