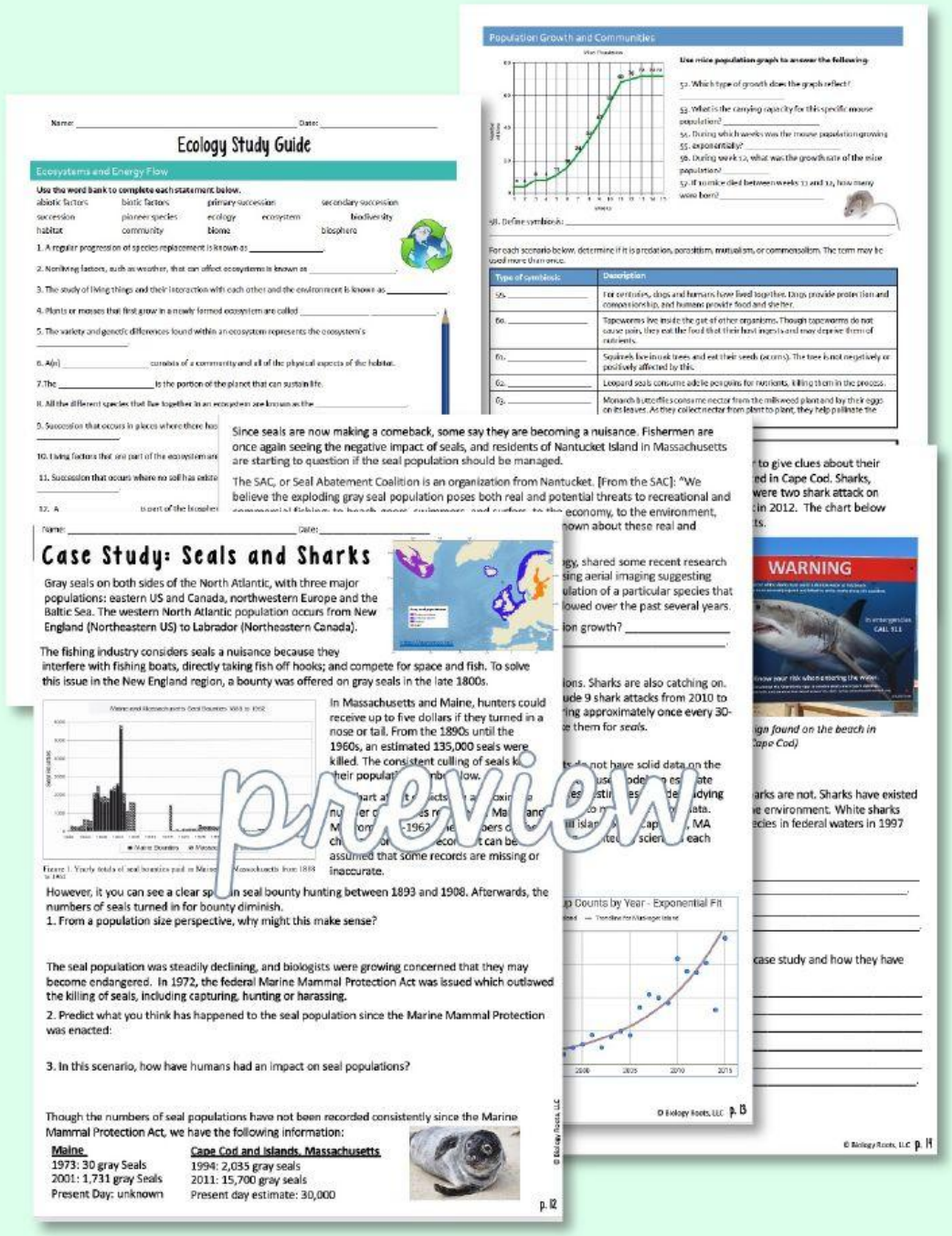
ecology unit

Types of resources included:

- ✅ Editable PowerPoint with 2 types of student notes
- ✅ Optional foldables (interactive notebook activities)
- ✅ Open and closed note quizzes
- ✅ Guided inquiry
- ✅ Case Studies
- ✅ Web Quests
- ✅ Viewing Guides
- ✅ Task Cards
- ✅ Review materials

... plus more!



biology roots

Features in a Nutshell:

Answer keys included

Editable items included

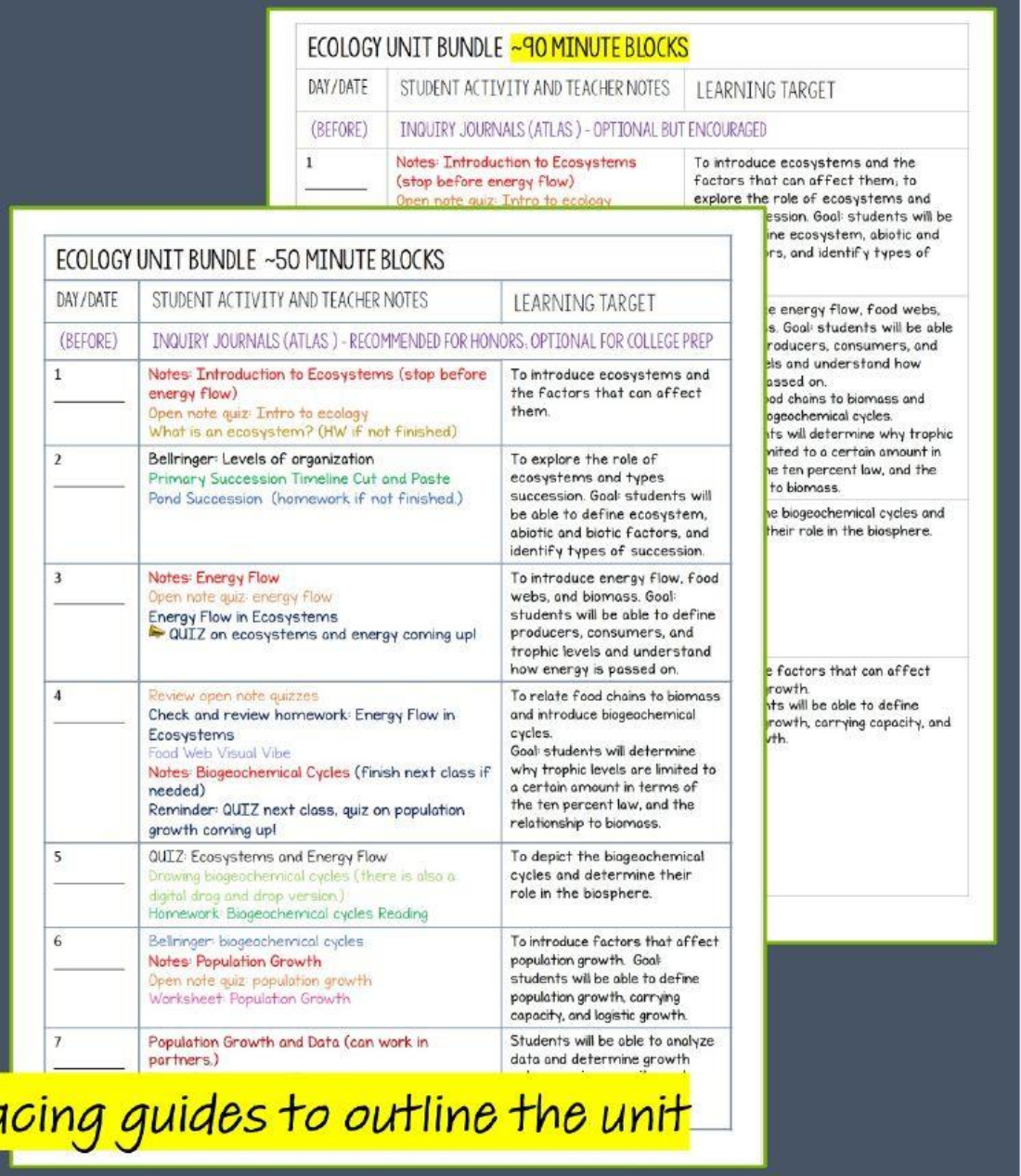
200+ pages

Pacing Guides
(50 and 90 minute)

Print and Digital
(Google Slides)

Hands on activities

20 days of lessons, ready to teach



ECOLOGY UNIT BUNDLE ~90 MINUTE BLOCKS

DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
(BEFORE)	INQUIRY JOURNALS (ATLAS) - OPTIONAL BUT ENCOURAGED	
1 _____	Notes: Introduction to Ecosystems (stop before energy flow) Open note quiz: Intro to ecology	To introduce ecosystems and the factors that can affect them, to explore the role of ecosystems and

ECOLOGY UNIT BUNDLE ~50 MINUTE BLOCKS

DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
(BEFORE)	INQUIRY JOURNALS (ATLAS) - RECOMMENDED FOR HONORS, OPTIONAL FOR COLLEGE PREP	
1 _____	Notes: Introduction to Ecosystems (stop before energy flow) Open note quiz: Intro to ecology What is an ecosystem? (HW if not finished)	To introduce ecosystems and the factors that can affect them.
2 _____	Bellringer: Levels of organization Primary Succession Timeline Cut and Paste Pond Succession (homework if not finished.)	To explore the role of ecosystems and types succession. Goal: students will be able to define ecosystem, abiotic and biotic factors, and identify types of succession.
3 _____	Notes: Energy Flow Open note quiz: energy flow Energy Flow in Ecosystems QUIZ on ecosystems and energy coming up!	To introduce energy flow, food webs, and biomass. Goal: students will be able to define producers, consumers, and trophic levels and understand how energy is passed on.
4 _____	Review open note quizzes Check and review homework: Energy Flow in Ecosystems Food Web Visual Vibe Notes: Biogeochemical Cycles (finish next class if needed) Reminder: QUIZ next class, quiz on population growth coming up!	To relate food chains to biomass and introduce biogeochemical cycles. Goal: students will determine why trophic levels are limited to a certain amount in terms of the ten percent law, and the relationship to biomass.
5 _____	QUIZ: Ecosystems and Energy Flow Drawing biogeochemical cycles (there is also a digital drag and drop version) Homework: Biogeochemical cycles Reading	To depict the biogeochemical cycles and determine their role in the biosphere.
6 _____	Bellringer: biogeochemical cycles Notes: Population Growth Open note quiz: population growth Worksheet: Population Growth	To introduce factors that affect population growth. Goal: students will be able to define population growth, carrying capacity, and logistic growth.
7 _____	Population Growth and Data (can work in partners.)	Students will be able to analyze data and determine growth

Pacing guides to outline the unit

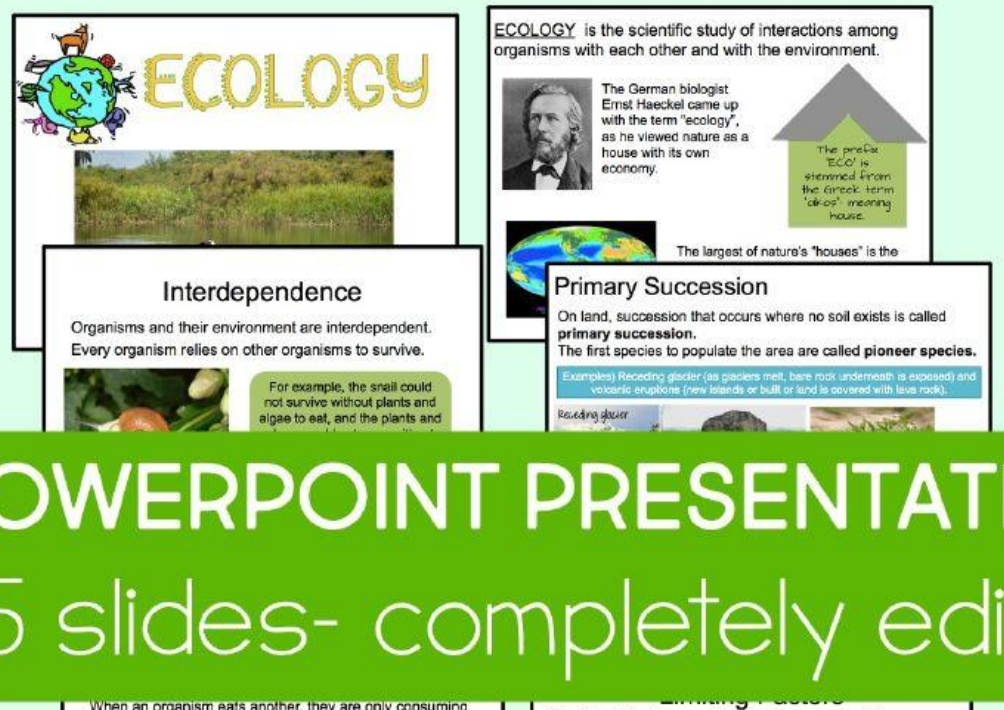
★★★★★

This resource has been an absolute game-changer in my classroom. It's well-organized, engaging, and aligns perfectly with my curriculum. The materials are visually appealing, making learning fun for my students. The clear instructions and variety of activities cater to different learning styles, ensuring that all my students are actively involved.

Alex C.

80 reviews

Grades taught: 10th





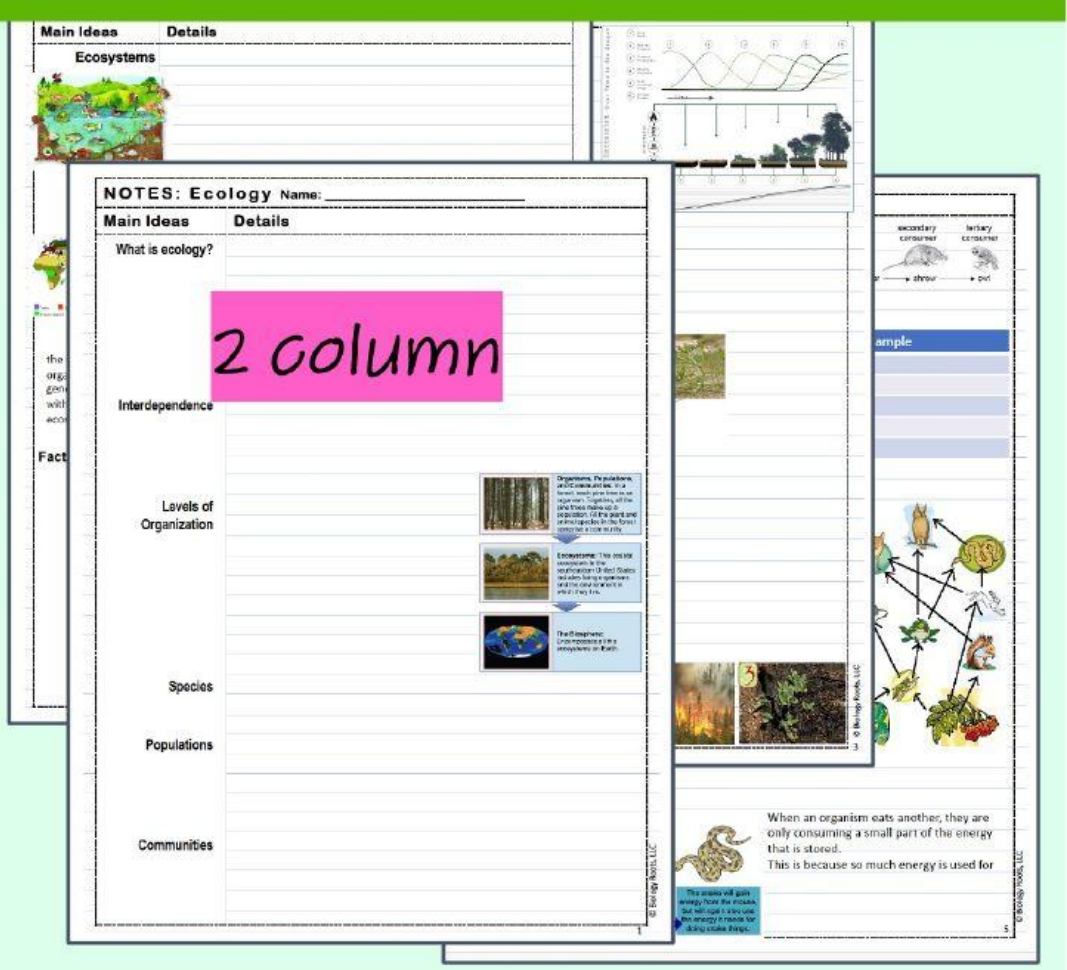
POWERPOINT PRESENTATION-

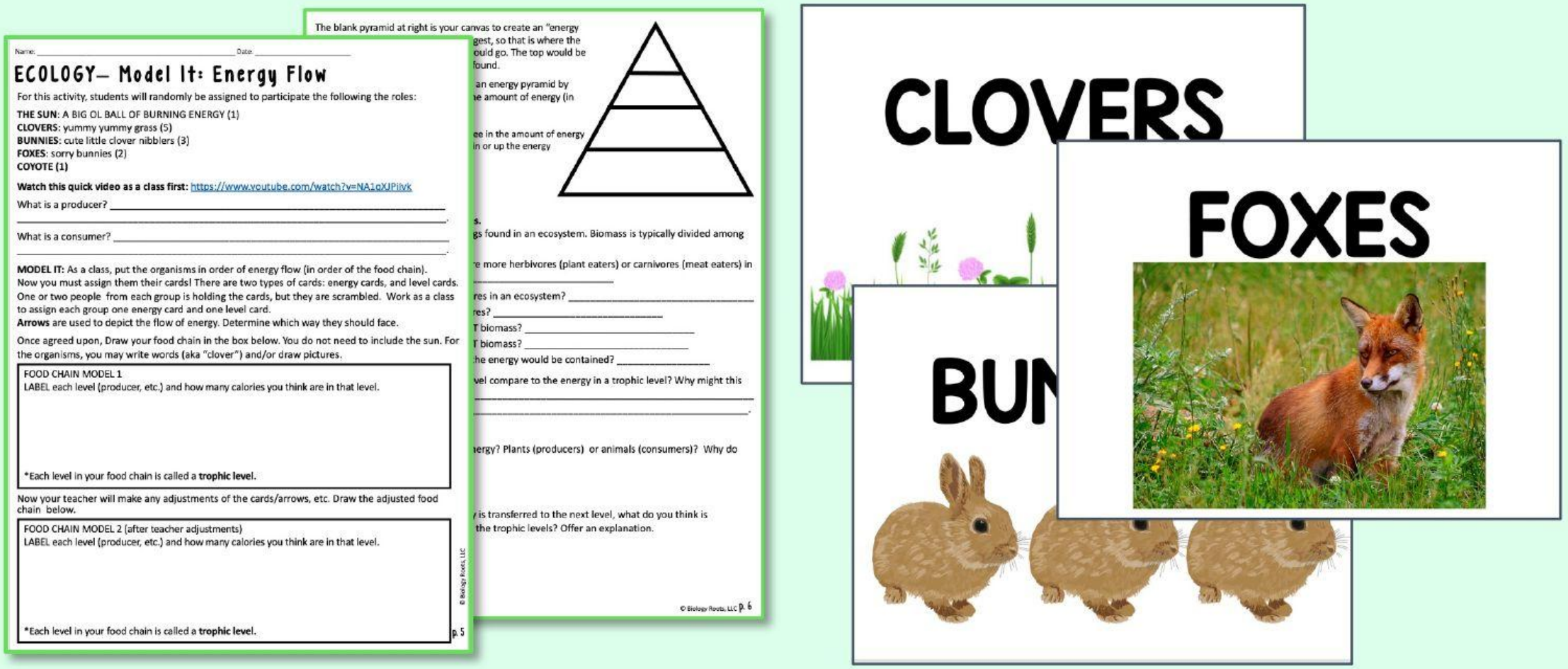
75 slides- completely editable

STUDENT SHEET FOR RECORDING NOTES INCLUDED

(2 types to choose from)

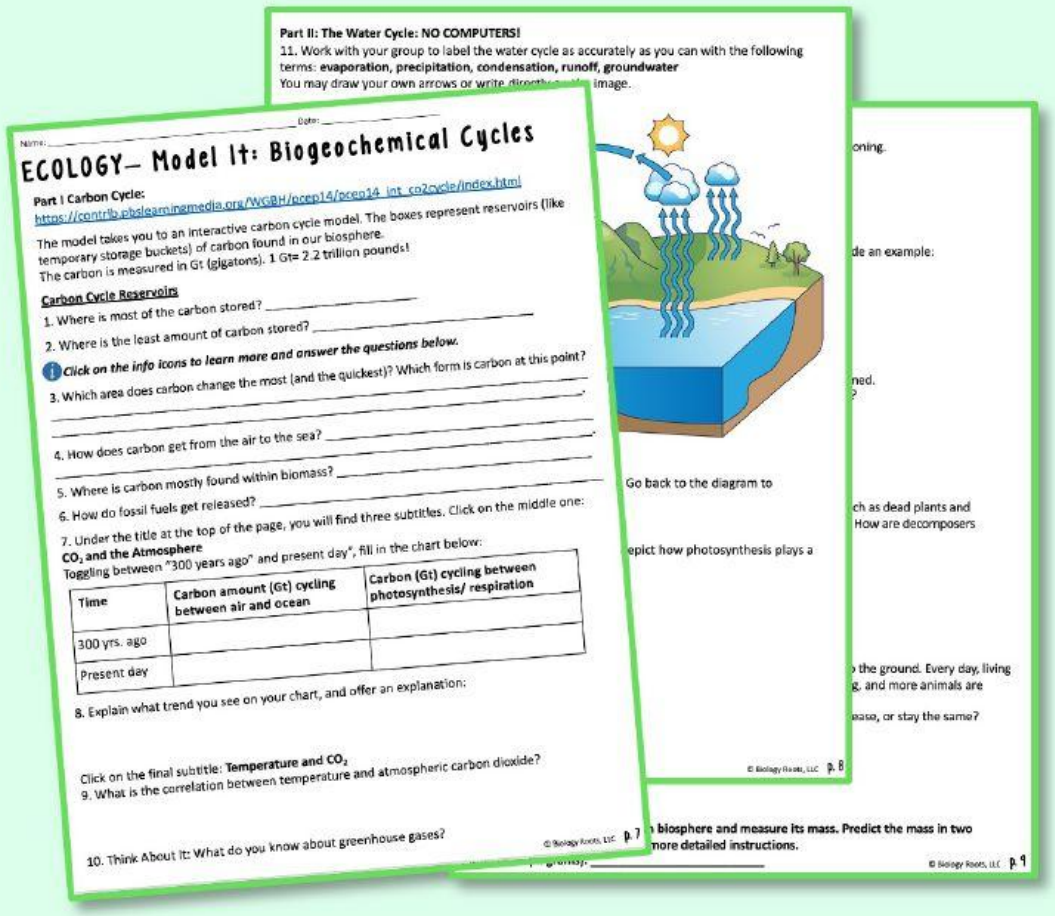


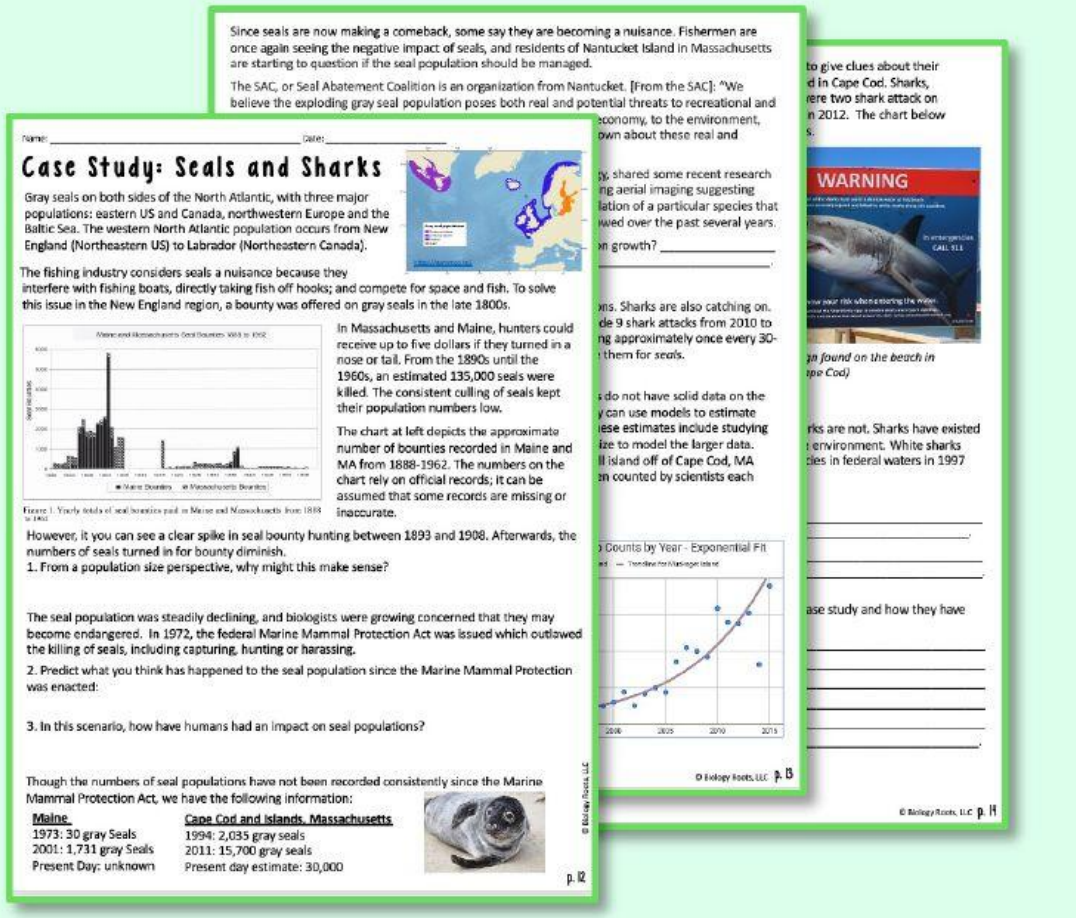




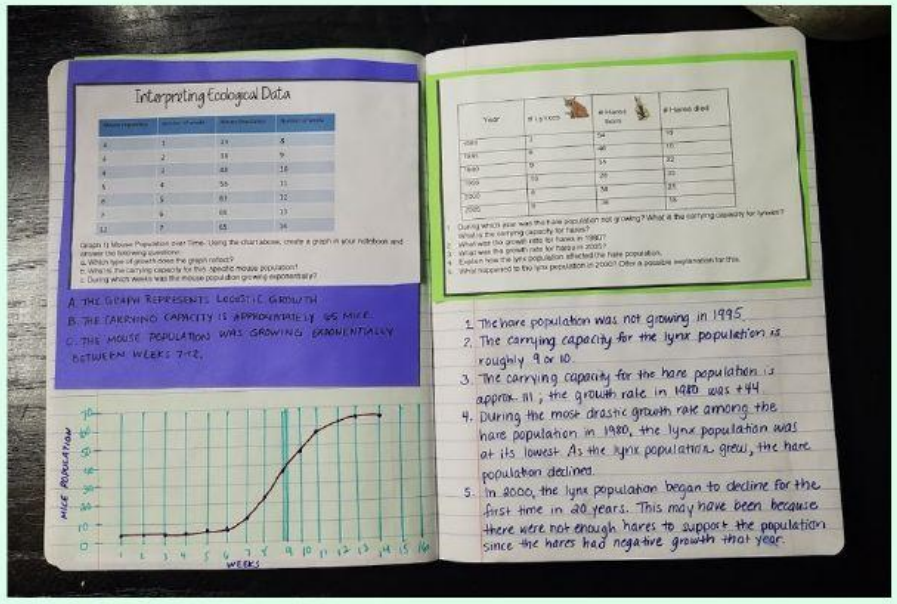
ECOLOGY GUIDED INQUIRY

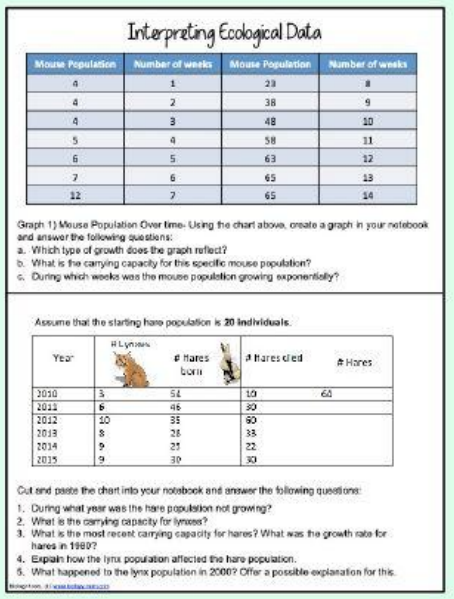
Explores ecological phenomena and models

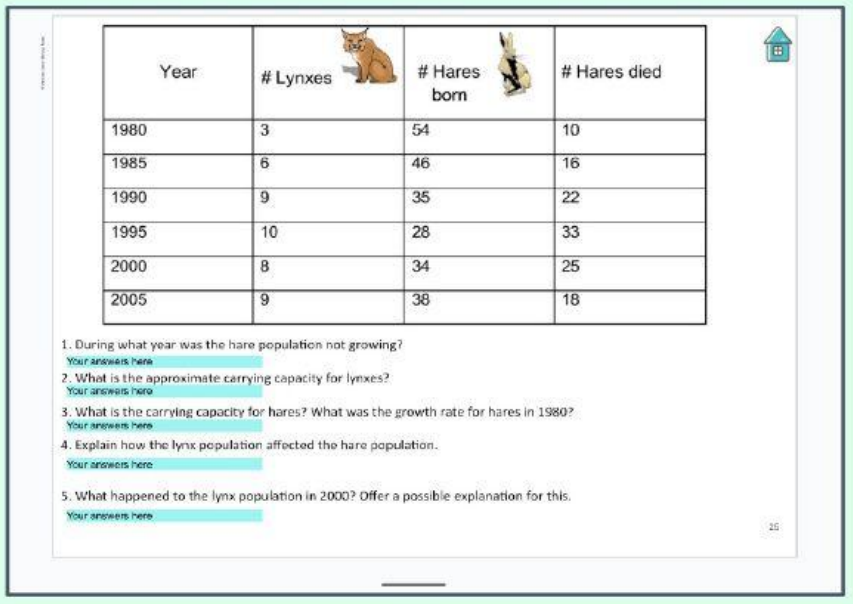


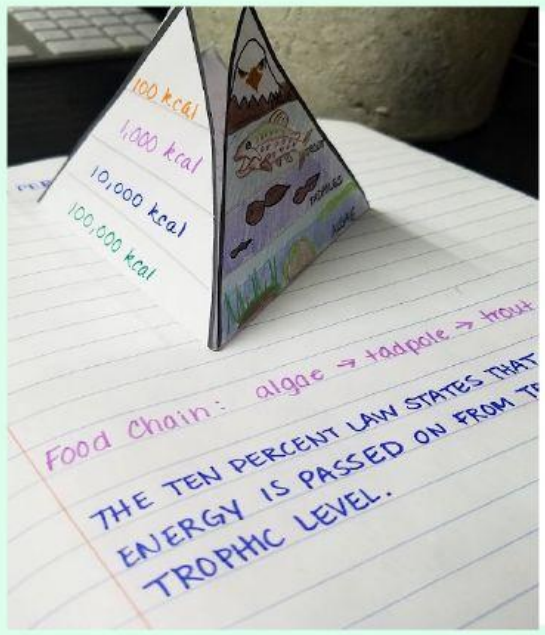


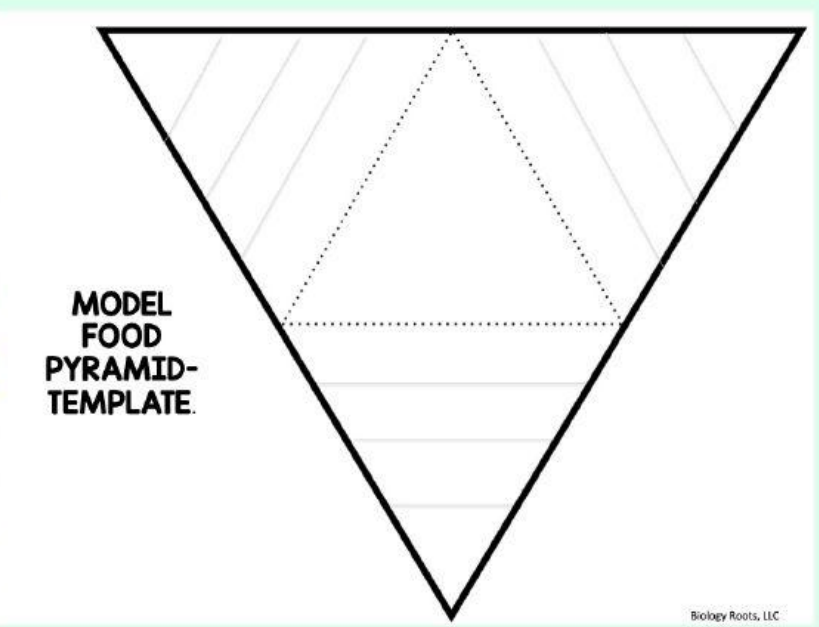
Interactive Notebook Activities included

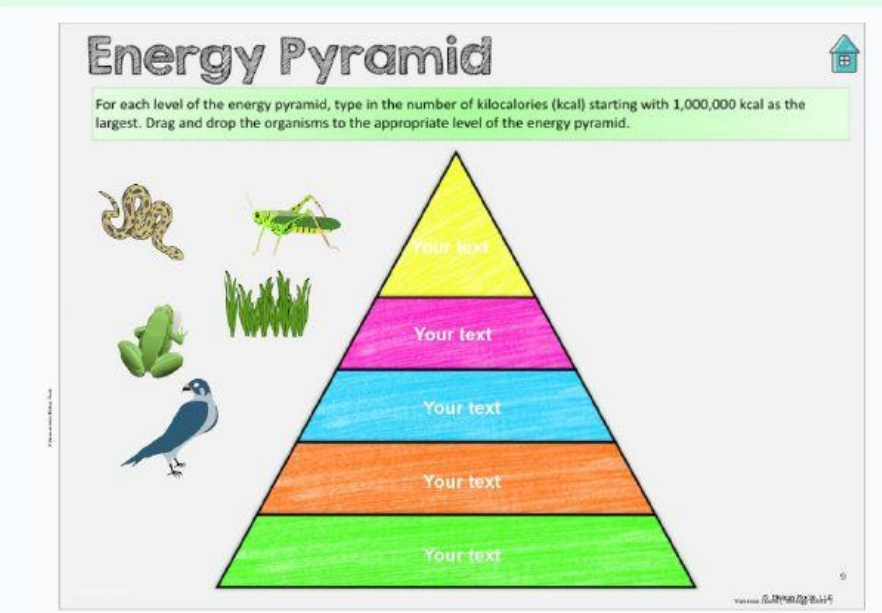


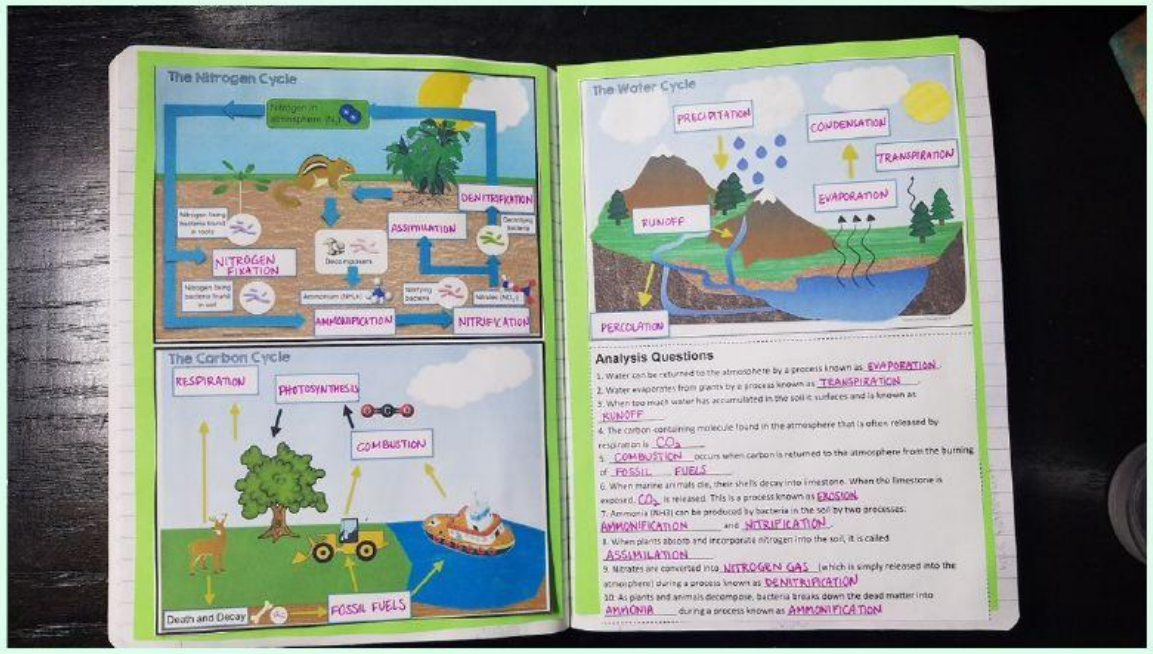


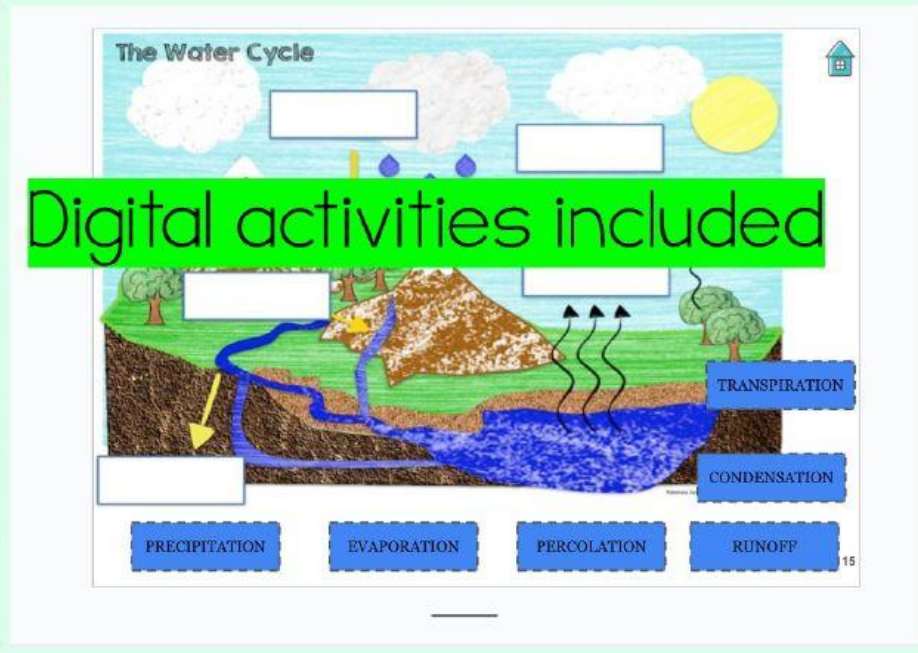




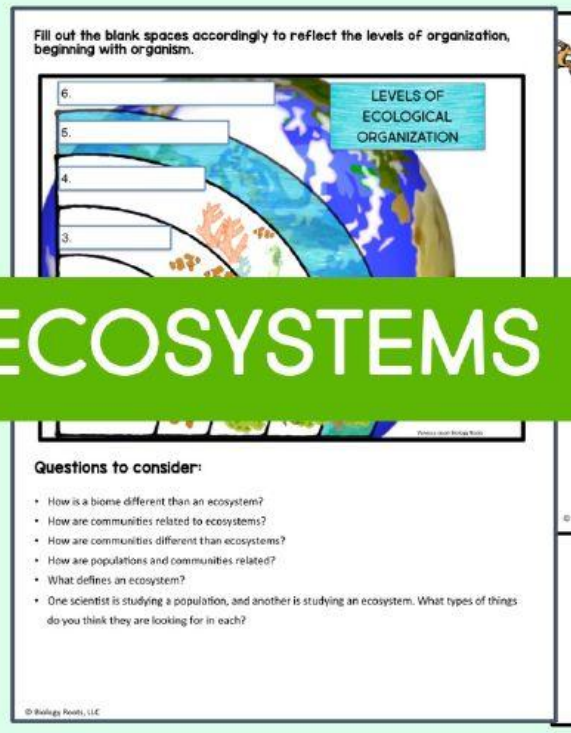


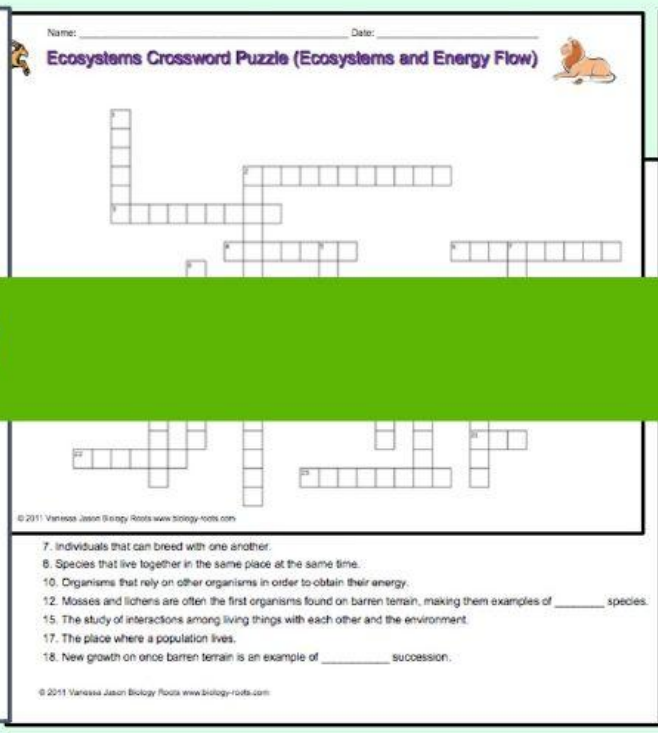


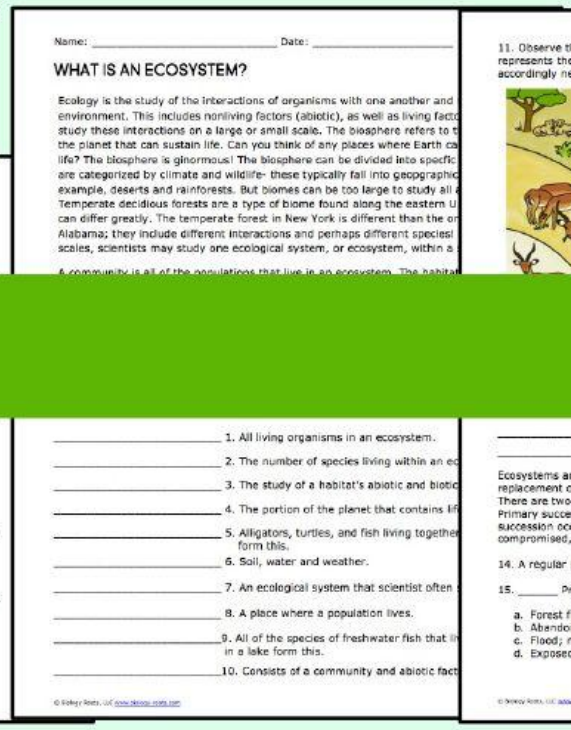


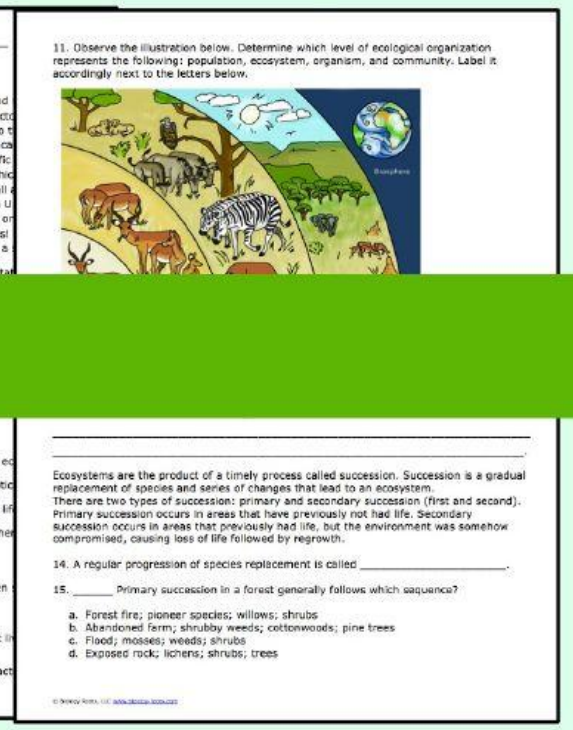


ECOSYSTEMS

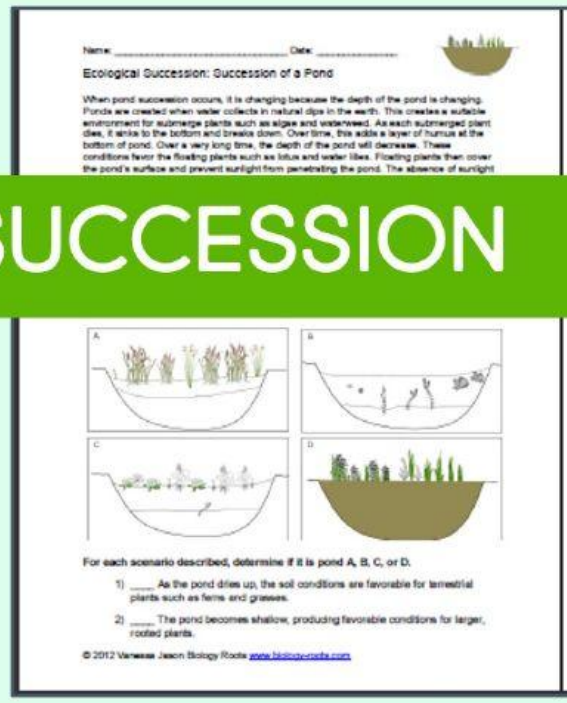


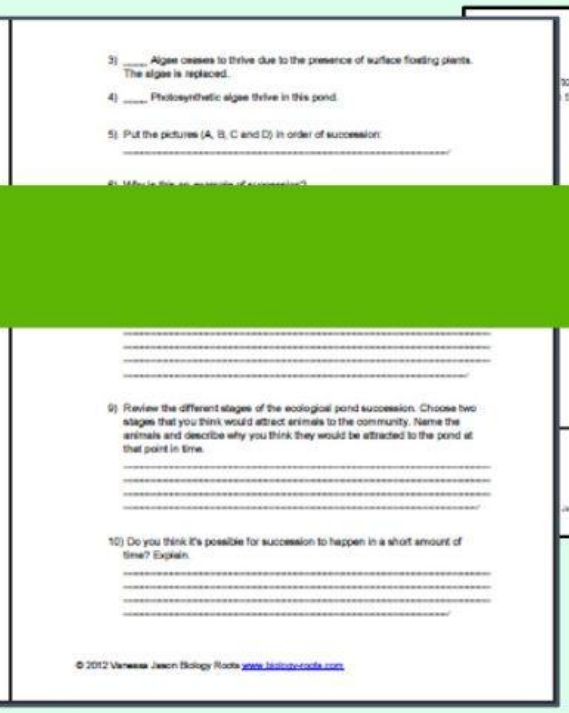


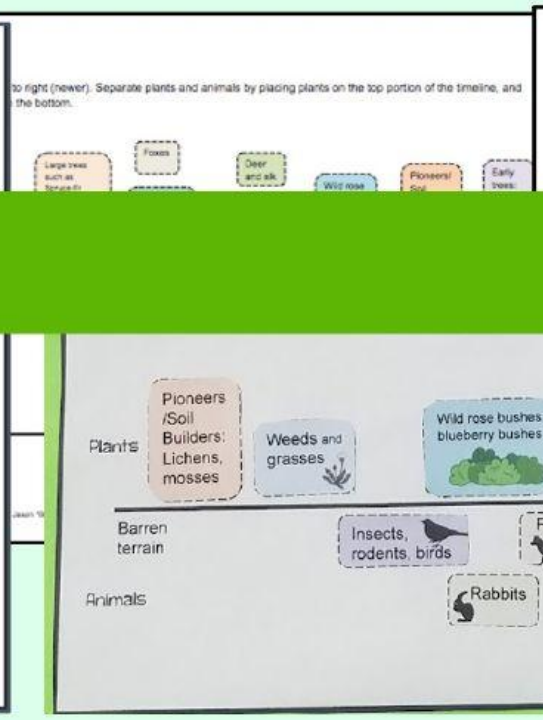




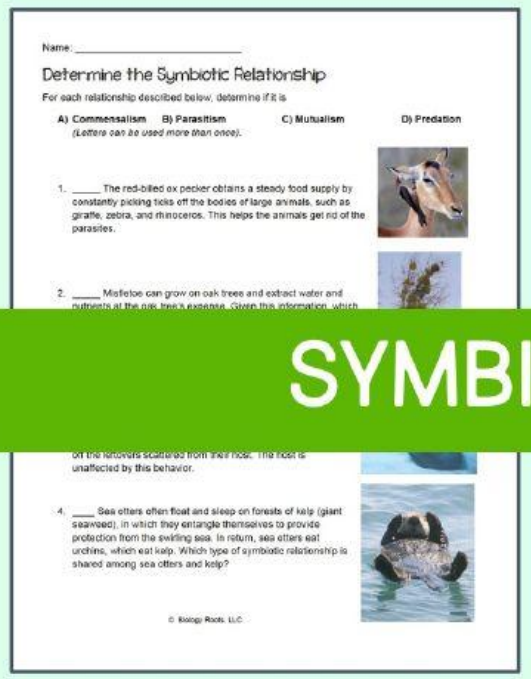
SUCCESSION

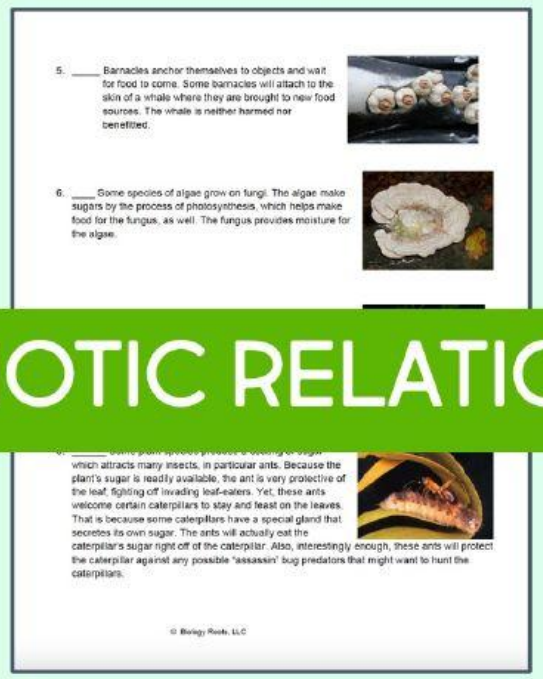






SYMBIOTIC RELATIONSHIPS







ENERGY FLOW

Aquatic Ecosystem Visual Vibes

Crabeater Seal · Killer whale · Elephant Seal · Adelie Penguin · Leopard Seal · Squid

In the food web above, there are 8 food chains that include krill. Identify 4 of the possible 8 food chains:

1. Chain 1
2. Chain 2
3. Chain 3
4. Chain 4

Energy Flow in Ecosystems

Ecologists study how energy moves through an ecosystem by assigning organisms in that ecosystem to a specific level, called a **trophic level**, based on the organism's source of energy.

Energy moves from one trophic level to another. The path of energy through the trophic levels is called a **food chain**. The lowest trophic level is is occupied by the producers, which use energy from the sun to build carbohydrates.

At the second trophic level are **herbivores**, animals that eat plants and other types of producers. An herbivore must be able to break down a plant's molecules into usable compounds. Plants have a tough layer of cellulose, which only a few herbivores are capable of breaking down. Most herbivores rely on mircoorganisms, such as bacteria, in their gut to help them digest cellulose (humans do not have this in their system).

_____2. Organism here use energy from the sun to build energy-rich carbohydrates.
_____3. Tigers, wolves, and snakes would be found here.
_____4. Organisms here are capable of breaking down cellulose.
_____5. Secondary consumers are found here.
_____6. Plants, algae, and bacteria are found here.
_____7. Humans would be found at this level.
_____8. Organisms here break down a plants into usable compounds.

Eagle · Snake · Rat · Plants

POPULATION GROWTH

Predation or Starvation?

In 1970 the deer population on an island reserve of about 520 square kilometers in size and was about 2000 animals. Although the island had excellent vegetation for feeding, the food supply was limited. The forest management feared that overgrazing might lead to mass starvation. Since the area was too remote for hunters, the wildlife service decided to bring in natural predators to control the deer population. It was hoped that natural predation would keep the deer population from becoming too large and also increase the deer quality (or health), as predators often eliminate the weaker members of the herd. In 1971, ten wolves were flown into the island.

The results of this program are shown in the following table. The Population Change is the number of deer born minus the number of deer that died during that year. Fill out the last column for each year (the first has been calculated for you).

Population Growth and Ecological Data

Population Growth: Factors that Contribute to Population Growth

Every population has features that help determine its future. One of the most important features of a population is its size, which is the number of individuals within a population. The population size can affect the population's ability to survive. According to many studies, it appears as though very small populations are more likely to become extinct.

A second important feature to examine when studying populations is population density- that is, the number of individuals that live in a given area. Populations can be dense, meaning they live closer together, or far and few between. If the members of a population are spaced far apart, that means they may not encounter each other very often making reproduction rare, thus limiting the growth rate of the population.

A third feature ecologists consider is the way the individuals of the population are arranged. This feature is called dispersion. There are three possible patterns of dispersion that a population could have. Each of these patterns reflects the interactions between the

3. **Briefly describe each term in your own words in the table below:**

Term	Description
Population density	
Population dispersion	

4. What is one situation in which population density could have a negative impact on the production of offspring? _____

Human Population Web Quest

7 Billion And Counting

Part I) Visit http://www.census.gov/popclock/

What is the current US population? _____

What is the current world population? _____

Part II) Facing the Future – Fast Facts about Hunger: tinyurl.com/fastfacts

3) What happened to the obesity rate in _____?

4) In the US, what percentage of households suffers from hunger? _____

5) Why is there hunger if the world can produce enough food to feed everyone? _____

6) Name one other interesting fact listed on the page: _____

Part III) Facing the Future– 60 Second Tour: tinyurl.com/PopulationTour2

https://biology-roots.com/wp-content/uploads/2017/08/Population-Tour.pdf

1) From 1960-1999, what happened to the human population? (Include the numbers, too.) _____

2) Between 1900 and 1999, the human population _____.

3) We are currently growing by more than _____ people every _____.

4) How is human population growth negative for the Earth? _____

5) Name 5 things that resource scarcity can lead to: _____

6) Name 3 healthy ways to stabilize the human population: _____

Part IV) US Environmental Impacts: tinyurl.com/Environmentalimpacts

Madagascar? _____

Bangladesh? _____

How much of the world population does the US account for? _____

How much of the world's oil resources do we use? _____

How much of the world's coal do we use? _____

How much of the world's aluminum do we use? _____

How much of the world's paper do we use? _____

How much of the world's toxic waste does America generate? _____

How many of the world's automobiles belong to Americans? _____

Americans produce more _____ than any other country.

How much garbage does the average American create each year? _____

NAME: _____ Date: _____

Population Growth

Thomas Malthus (1766-1834) was an economist who is known for his theories about population and its increase or decrease in response to various factors.

Malthus thought that the population growth would slow progress towards a utopian society. He realized that the while food production would increase at a fairly steady rate, the population growth was faster and would exceed the rate of food production. Malthus: "The power of population is indefinitely greater than the power in the earth to produce subsistence for man".

Thomas Malthus was the first recorded person to acknowledge that in all history of mankind, in every age and state that mankind has existed, the population increase is limited by survival. He also noted that the higher the survival rate, the higher the population growth rate. He noted that the population constantly increases as the means of survival (nourishment, shelter, etc.) goes up, but only to a certain point. Malthus concluded that the population was kept at a number equal to the means of sustenance (and as Malthus wrote, done so "by means of misery and vice.")

Malthus became hugely influential, and controversial, in economic, political, social and scientific thought. Some notable evolutionary biologists studied his work, including Charles Darwin and Alfred Russell Wallace. Malthus' work may have served as one small path for Darwin's theory towards natural selection (survival of the fittest).

What triggered Malthus' ideas? The Victorian

sustenance". Today, what do we call this "number"? _____

3. Which scientists did Malthus influence with his theories? _____

4. What type of growth was seen during Queen Victoria's reign? _____

5. Describe the conditions of Victorian England among the middle class: _____

Recall that ecologists are biologists who specialize in the study of how species interact within a population. On this worksheet you will look at some of the things ecologists might study when it comes to

pulation growth in Victorian England would

the growth of a population?

this graph is **Logistic Growth.** Logistics refers to transport materials. So this logistic model of a that is limited by carrying capacity.

1. _____food, shelter, mates
2. _____ populations grow exponentially
3. _____ weather, climate/natural disaster
4. _____populations that consistently keep the population size at its carrying capacity.

HUMAN POPULATION WEB QUEST

PRACTICE SHEETS- BIOGEOCHEMICAL CYCLES

Name: _____

Drawing Biogeochemical Cycles

A biogeochemical cycle is a pathway formed when a substance enters a living organism for a period of time and then returns to the nonliving environment. There are three biogeochemical cycles: water, carbon and nitrogen.

The Water Cycle:

In the space below draw a representation of the water cycle. Make sure to include these terms in your drawing: *precipitation, evaporation, transpiration, and water vapor.*

Name: _____ Date: _____

The Cycling of Materials in Ecosystems

HOW ARE BIOGEOCHEMICAL CYCLES RELATED TO YOU?

THE WATER CYCLE

In the nonliving portion of the water cycle, bodies of water such as rivers and lak
evaporate. The amount of evaporation depends on the temperature: the hotter t
temperature, the higher the evaporation rate. Evaporation is the process in whic

In the living portion of the water cycle, plants use ground water found in the soil.
can evaporate from plants via transpiration, which is also a process driven by the
The sun heats the Earth's atmosphere, creating wind currents that can draw moi
from the tiny openings in the plants' leaves.

1. What occurs in the nonliving portion of the water cycle?
2. What occurs in the living portion of the water cycle?
3. The rate of evaporation depends on the _____.
4. What are some possible paths that precipitation could take?
5. Water retained underneath the Earth's surface is called _____.
6. What is transpiration? _____

The water you drink today is the same water that the dinosaurs drank! It has been cycling for a very long time. The water you use while showering may go down the drain but it's never gone for good.



THE CARBON CYCLE

Animal cells such as ours produce carbon dioxide as a waste. We get rid of the carbon

any remaining water out of the dead organisms. As they are buried deeper and deeper into the Earth, the heat from the Earth's center helps to create coal. Over the years thousands of people have died digging for coal because the mines were very deep under the surface of the Earth, making for dangerous conditions.

The same process can happen from oceanic plants and animals, forming oil and natural gas, which is why you often hear of oil companies drilling for oil in the ocean. Recall that living things are carbon-based organisms. As coal, oil, and gas are burned, carbon is returned to the atmosphere and forms with oxygen to make CO_2. Typically, the burning of fossil fuels is a complicated process, and in doing so can create many harmful pollutants.

7. Describe the relationship between respiration and photosynthesis.
8. Why are natural resources such as coal and oil called fossil fuels?
9. Besides decayed living things, come up with 3-4 things necessary for the formation of coal: _____.
10. How do fossil fuels contribute to the carbon cycle?

Across

5. The nitrogen cycle relies heavily on plants and _____.
7. Nitrogen in the _____ is not usable by most organisms.
9. Cellular respiration and photosynthesis are components of the _____
12. Ammonification and assimilation are components of the _____ cycle.
14. Evaporation of water from plants.
15. Nitrogen _____ is a crucial part of the nitrogen cycle in which bacte
nitrogen from the atmosphere into ammonia.

Down

1. _____
2. Proce
3. Water
known a
4. Precip
6. As ter
8. Most o
9. The Su

Name: _____ Date: _____

BIOGEOCHEMICAL CYCLE CROS

Name: _____ Date: _____

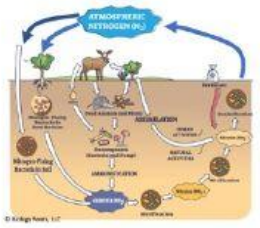
Biogeochemical Bellringer!



Label the water cycle at left with the following terms: precipitation; evaporation; transpiration.

Think About It: How could fewer trees lead to less rainfall?

The diagram at left represents the carbon



The diagram at left represents the _____ cycle.

What is assimilation?

Think About It: Nitrogen is added to fertilizers to help plants grow. How does human impact affect the nitrogen cycle?

HUMAN IMPACT

PowerPoint, Digital Lessons, Project Rubric

In today's modern world, Human activity can directly impact the **environment**, and lead to an affect on ecosystems and **biodiversity**.

Examples include:

- **Deforestation**
- **Pollution/ use of fossil fuels**





Name: _____ Date: _____

INVASIVE SPECIES

An invasive species is a population that is not native to a particular area, but has been brought there due to human trafficking. Invasive species tend to thrive in these areas if they have no predators. They can multiply rapidly and, if condition
established ecosystems.

1. Come up with your own definition of an invasive s

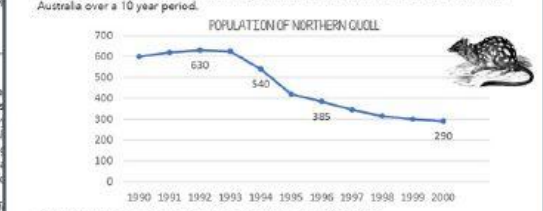
Case Study: Cane Toads

Cane toads are native to South and Central America
Texas. Cane toads live in sand dunes or coastal mars
insects, snakes, other toads, and small animals. The
variety diet, and were purposely brought to Queens
sugar cane beetle: a beetle that was devastating su
cane beetle tends to live at the top of sugar canes,
making sugar cane beetles an unlikely food source f

The cane toads were found in a new land with very f
reproduction. 102 cane toads were brought to Quee
over 2 million invasive cane toads in Australia.

Population Chart: Cane Toads and the Northern Quoll

The chart below represents an estimated population of northern quoll in an area of 1km² in Australia over a 10 year period.



2. What was the estimated population of northern quolls in 1993? _____
3. Use your graph to estimate what year cane toads began to invade the northern quoll's territory: _____

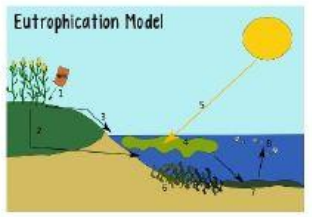
Name: _____ Date: _____

Human Impact: Agriculture

Nitrogen is an essential nutrient for plants because they need it to make chlorophyll; therefore nitrogen is found in most fertilizers. Farmers often add fertilizers to their crops. Fertilizers runoff into streams, rivers, and lakes can affect the balance of nitrogen found in water. This could lead to an overgrowth of algae.

Read the steps of eutrophication below:

1. Excess nutrients are applied to the soil.
2. Some nutrients are leached into the soil and may drain into the water body;
3. Some nutrients runoff the ground into the water body directly.
4. The excess nutrients causes an algal bloom.
5. The algal bloom blocks the light for plants below the surface.
6. Natural plant life at the bottom of the water body dies due to lack of sunlight.
7. The algal bloom and other affected plant life eventually dies and sinks to the bottom of the water body; bacteria begin to compose the
excess remains, using up
8. The depletion in oxygen c
to die as well, which further



Name: _____ Date: _____



CHECK YOUR UNDERSTANDING: How does deforestation play a role in the flood/drought cycle?

Name a solution to help break the flood/drought cycle:

x

The big picture is water underground (or ground water). What is "healthy soil "like?

x

The ground water has two possible routes: it can be taken up and stored by _x_____; and some of it _x_____ deep down into aquifers (ground water). This ground water wells up and feeds _x_____ and _x_____, *allowing more life to thrive.*

If we eliminate trees and plants, how can that change the soil and lead to floods?

x

How does removing trees lead to drought?

x

Invasive Species Project Rubric

You may choose **one** of the following mediums to display your project: A storybook, a mobile, a diorama, a brochure, or a large-size poster. Use the rubric below to plan your project.

Element of project	Points available	Points earned
Name of species (common name and scientific name)	5	
Where the invasive species is native to (specific country.)	5	
A clear picture of a map that reflects the species' native habitat.	5	
Description of the species' natural habitat, including climate, natural predators, and organisms it competes with.	15	
The general diet of the species in its natural ecosystem.	5	
Describe how the specie to its non-native its	10	
Describe at least 3 ways problems it is causing in	15	
Offer a solution to at le one of the problems described.	10	
Include at **least 3 images** of the species in your project.	10	
Graph or chart depicting the estimated population size (growth) of the invasive species in its non-native habitat over a 10 year time period.	10	
Total Points	90	___/90

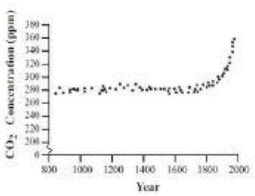
preview



4. _____

7. Which natural process removes carbon from the atmosphere? _____

Human activity	How it can disrupt the carbon cycle
Burning of fossil fuels	8.
Deforestation	9.

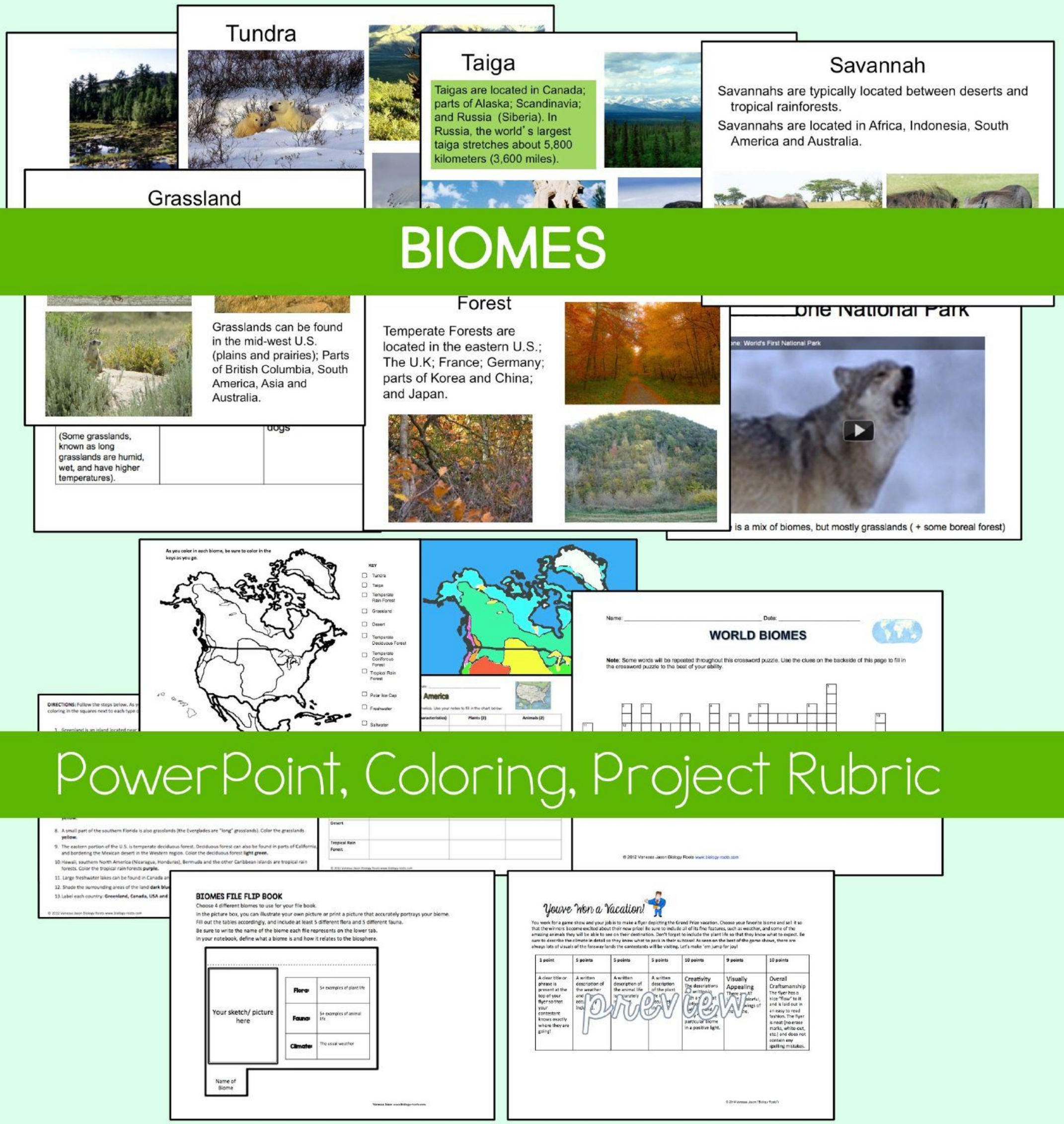


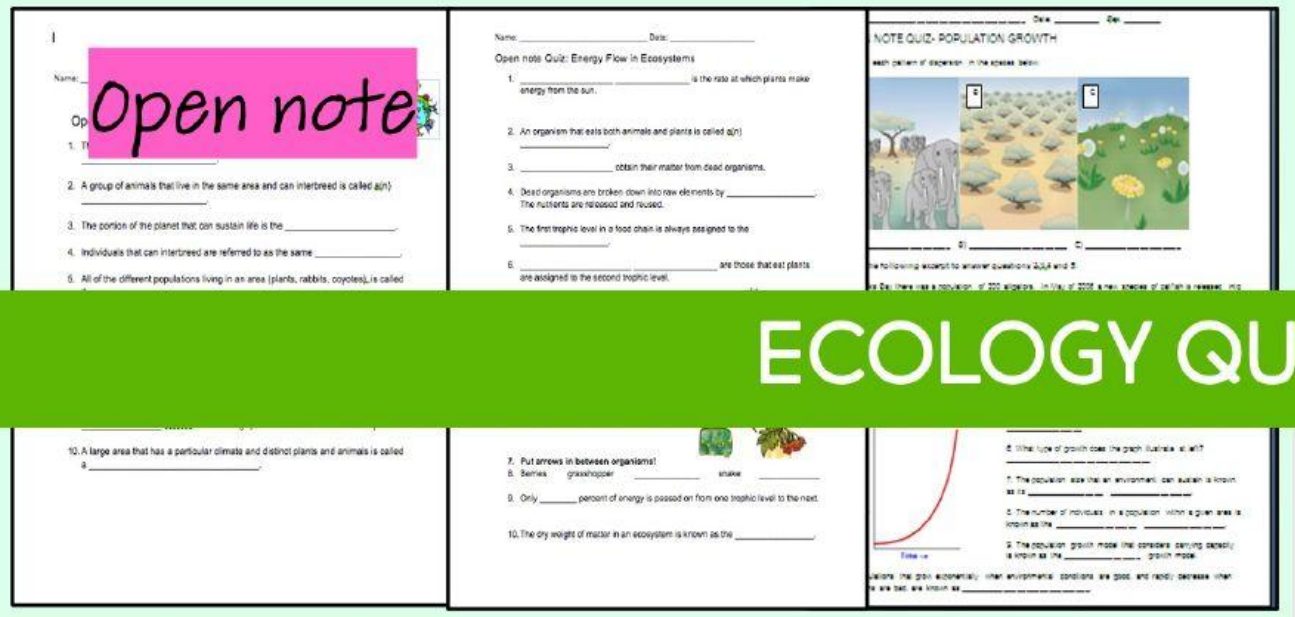
10. Global warming occurs when greenhouse gases, such as carbon dioxide and other gases like nitrous oxide and methane, are released into the atmosphere and trap radiation and heat. The graph at left represents change in atmospheric CO_2 over time. Offer an explanation for the trend you see in the graph:

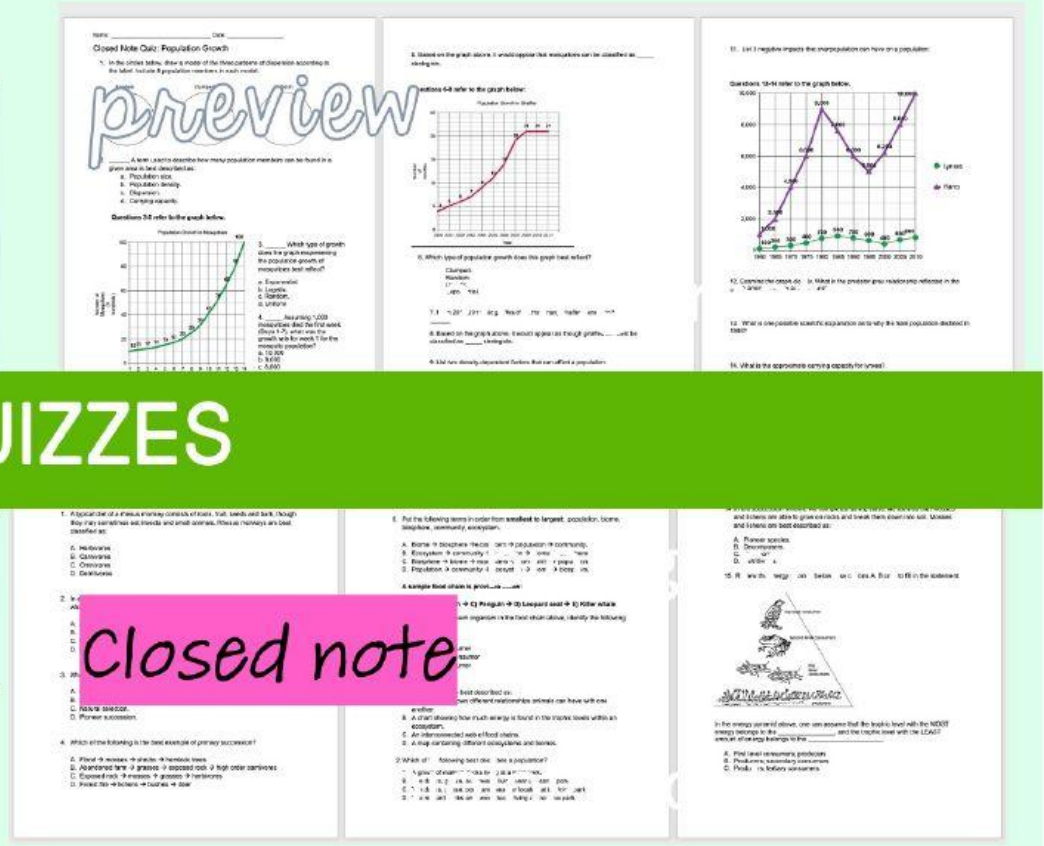
11. Offer a solution to decrease global warming: _____

BIOMES

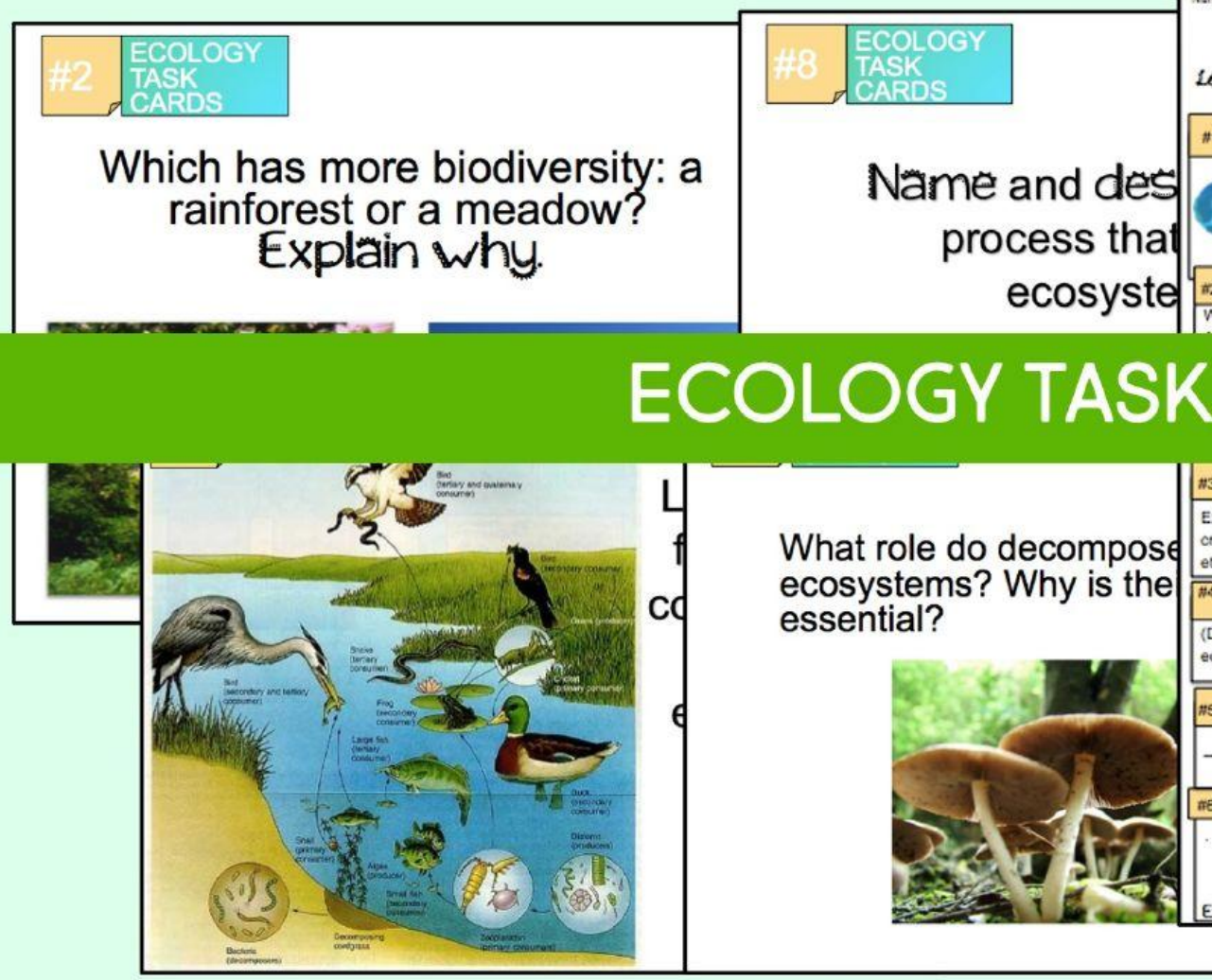
PowerPoint, Coloring, Project Rubric

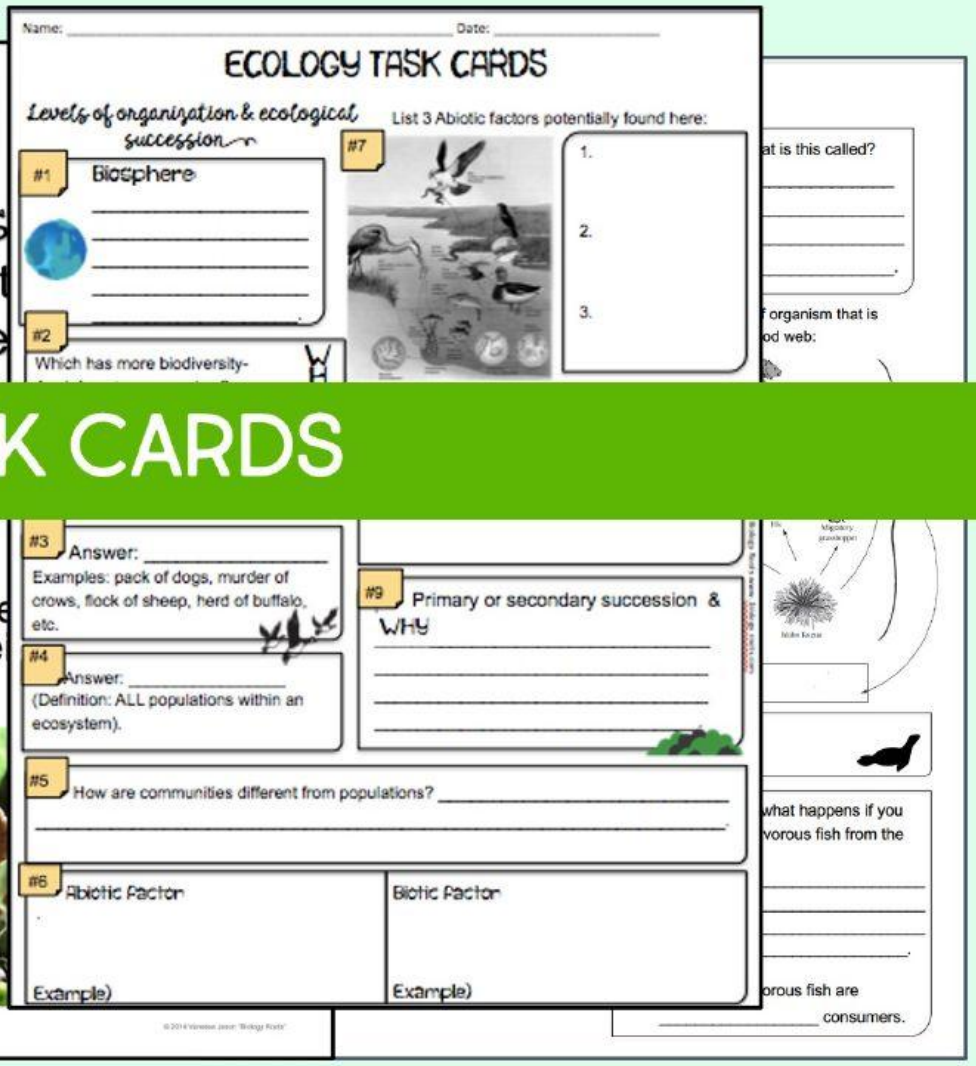






ECOLOGY QUIZZES





ECOLOGY TASK CARDS

ECOSYSTEMS	ENERGY FLOW	POPULATION GROWTH	BIOGEO-CHEMICAL CYCLES	COMMUNITIES
1pt	1pt	1pt	1pt	1pt
3 pt	3 pt	3 pt	3 pt	3 pt
4 pt	4 pt	4 pt	4 pt	4 pt
5 pt	5 pt	5 pt	5 pt	5 pt

REVIEW GAME AND STUDY GUIDE

Name: _____ Date: _____

Ecology Study Guide

Ecosystems and Energy Flow

Use the word bank to complete each statement below.

abiotic factors | biotic factors | primary succession | secondary succession | succession | pioneer species | ecology | ecosystem | biodiversity | habitat | community | biome | biosphere

1. A regular progression of species replacement is known as _____.
2. Nonliving factors, such as weather, that can affect ecosystems is known as _____.
3. The study of living things and their interaction with each other and the environment is known as _____.
4. Plants or masses that first grow in a newly formed ecosystem are called _____ _____.

10. Living factors that are part of the ecosystem are called _____ _____.
11. Succession that occurs where no soil has existed (no previous growth) is known as _____ _____.
12. A _____ is part of the biosphere that has a specific climate and community.

13. Give one example of PRIMARY succession:

14. Give one example of SECONDARY succession:

15. Why are producers an essential component of an ecosystem? _____
16. Why are decomposers an essential component of an ecosystem? _____
17. In a marine food web, the total biomass of algae far outweighs the total biomass of all the killer whales. Why? _____

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animals.
dead bodies.
fungi.
e energy.
ted by a block of space
that trophic level.

consumer, secondary

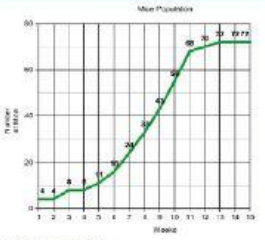
consumer, etc. Write this terms under each organism above.

33. Assign each organism in your food chain above to each of the trophic levels below:

Fourth trophic level

10,000 kcal

Population Growth and Communities



Use mice population graph to answer the following:

52. Which type of growth does the graph reflect? _____
53. What is the carrying capacity for this specific mouse population? _____
54. During which weeks was the mouse population growing exponentially? _____
56. During week 12, what was the growth rate of the mice population? _____
57. If 10 mice died between weeks 11 and 12, how many were born? _____

58. Define symbiosis: _____

For each scenario below, determine if it is predation, parasitism, mutualism, or commensalism. The term may be used more than once.

Type of symbiosis	Description
59. _____	For centuries, dogs and humans have lived together. Dogs provide protection and companionship, and humans provide food and shelter.
60. _____	Tapeworms live inside the gut of other organisms. Though tapeworms do not cause pain, they eat the food that their host ingests and may deprive them of nutrients.
61. _____	Squirrels live in oak trees and eat their seeds (acorns). The tree is not negatively or positively affected by this.
62. _____	Leopard seals consume adelie penguins for nutrients, killing them in the process.
63. _____	Monarch butterflies consume nectar from the milkweed plant and lay their eggs on its leaves. As they collect nectar from plant to plant, they help pollinate the milkweed.

64. What is coevolution?

Provide an example:

65. What is a niche? _____

66. Distinguish between fundamental niche and realized niche:

Fundamental niche → Realized niche

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the space provided:

his process.
plants.
combine nitrogen with hydrogen to form
ce enters a living organism for a time then
ronment.
rom the leaves of plants.
ade of decayed plants and animals- used for fuel.
based compounds into nitrogen gas.
uds during this process.
ne; returns CO_2 to the water.
it into the atmosphere.

through _____ and _____

81. What role does combustion play in global warming? _____

82. Fill in the table below with the affects that deforestation has on each one of the factors listed:

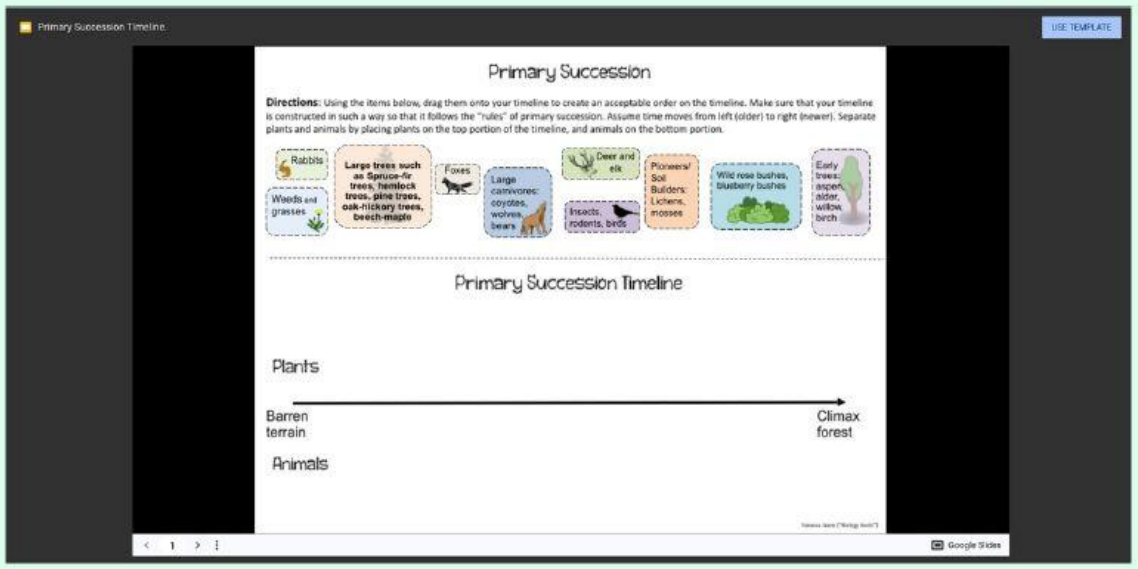
Floods	Droughts	Climate Change

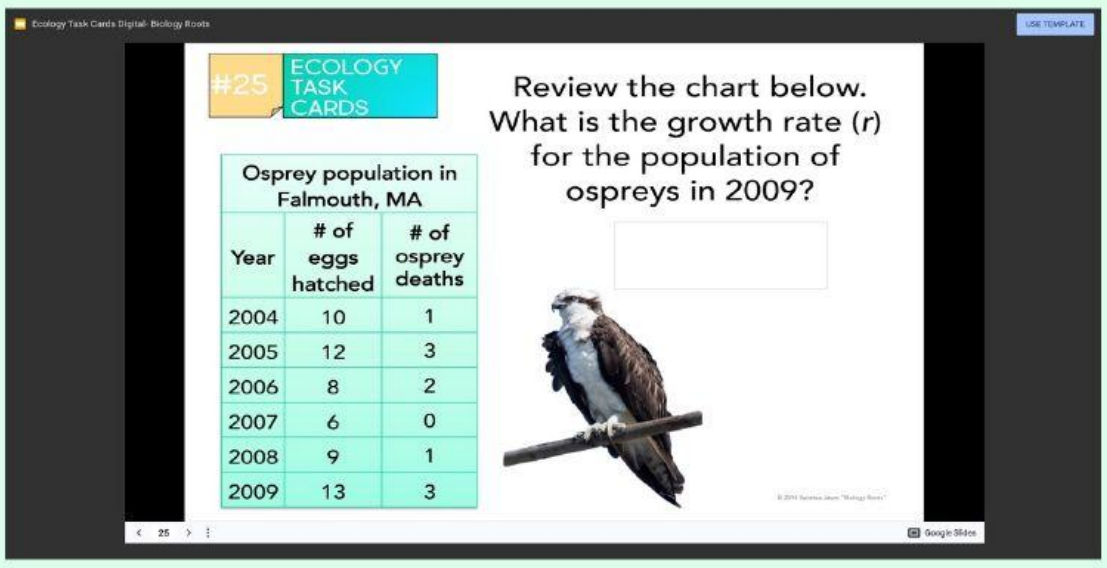
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UNIT TEST

Editable, answer key included

Digital options available





*Most items are available on Google Slides



Still not sure if you need this resource?

This unit is for any teacher who is looking for a fully prepared ecology unit from start to finish, OR a BIG bank of ecology activities to have at a bundled discount (save $30)!
This includes fresh activities to keep your students engaged! The ecology unit is COMPLETE and can be used as is —or if you already have an existing unit, this can absolutely be used to supplement, support, or freshen up. Every piece has been thoughtfully curated and mapped out. Questions? Reach out to me at vanessa@biology-roots.com

-Vanessa

★★★★★

I use this resource almost every single semester. My students enjoy it, and it is certainly one of my favorite purchases on TPT. Wonderful resource.

Craft & Class Co. (TPT Seller)
9 reviews
Grades taught: 9th

★★★★★

What a great resource! Great resource, easy to use, kids were engaged throughout the lesson. I have recommended this lesson to fellow teachers and they love it as well.

Barbara W.
146 reviews
Grades taught: 9th