

Ecosystems Inside Out

TEACHER'S GUIDE

Students across Canada are expected to understand and actively explore and analyze ecosystems around them and in other places on Earth. *Ecosystems Inside Out* supports this expectation by examining different aspects of ecosystems and how they work together in an interconnected ecosystem. This examination prompts readers to engage with a variety of different types of ecosystems and allows readers to explore the big picture of each amazing biome on Earth, along with the fascinating details of the organisms that live there.

The *Ecosystems Inside Out* Teacher's Guide is packed with inquiry-based lessons that develop the critical-thinking skills students need to understand how our planet relies upon a network of ecosystems for life to flourish. Students will learn how to be activists who consider how ecosystems work and affected by change, and what they can do to protect these fragile systems. They will also explore how the different parts of an ecosystem work together for a purpose, considering how the living parts of an ecosystem depend on the nonliving factors in the ecosystem to stay healthy, live, and reproduce. Activities also encourage students to critically consider what happens to the ecosystem as a whole if one part changes or fails.

Although each lesson plan in this guide can stand alone, the lessons follow a sequential order that works to scaffold understanding, and can be taught as such. Reproducible worksheets and assessment tools accompany each lesson plan. The titles in *Ecosystems Inside Out* include:

Deserts Inside Out
Forests Inside Out
Grasslands Inside Out
Islands Inside Out
Mountains Inside Out
Oceans Inside Out
Rain Forests Inside Out
Rivers and Lakes Inside Out
Tundras Inside Out
Wetlands Inside Out Oceans Inside Out

PACING CHART AND VOCABULARY

Lesson Plan Title	Pacing	Vocabulary
Survival on Earth	2 class periods*	biodiversity biome ecosystem habitat interrelationship
[A]biotic Factors, Producers, Decomposers, Consumers	2 class periods	abiotic factors biotic factors energy nutrients organism system
Food Chain Fun	2-3 class periods	consumers decomposers food chain food web interdependent producers
Eco Up Close—Challenges within an Ecosystem	3-4 class periods	biodiversity endangered invasive species migrated outcompetes population predators prey subspecies
Humans as Invasive Species	3-5 class periods	conservation degradation human Impacts urbanization waterways
Ecosystem Exploration	3-5 class periods	diorama In the final task, students should be using vocabulary learned throughout the unit.

* 1 class period = 40-60 minutes

ACCOMMODATION STRATEGIES

Accommodations provide equal access to learning and equal opportunity to demonstrate what is learned. Accommodations allow a student access to the subject or course without any changes to the knowledge and skills the student is expected to demonstrate.

Educators are encouraged to adapt the instructional approach, activities, and assessments included in this guide to best meet the diverse interests, needs, and abilities of their students. Possible accommodations may include:

Instructional Strategies

- Break tasks into parts with accompanying time lines
- Provide extra time for processing of oral information.
- Pair oral instructions with visual ones (writing or symbols)
- Pre-teach new vocabulary and regularly review previously taught vocabulary
- Provide model of completed work
- Frequently check with the student to get him/her started
- Provide oral and visual instructions and examples
- Provide a checklist of tasks for the student

Environmental Strategies

- Proximity to teacher
- Strategic seating
- Flexible or mixed-ability grouping
- Provide an alternative setting for learning that is free from visual and auditory distractions.

Assessment Strategies

- Build in extra time to allow student to process questions asked and answers given
- Provide written instructions and rubrics for assignments
- Offer a choice of assessment activities so that the student can choose one suited to their strengths
- Space out or extend assignments to prevent student feeling overwhelmed
- Reduce the number of tasks used to assess skill or concept
- Allow students to use assistive devices or technology

LESSON 1

Survival on Earth

Curriculum Correlations

Ontario Science and Technology

Grade 4: Understanding Life Systems—Habitats and Communities

3.1; 3.3; 3.4

Grade 6: Understanding Life Systems—Biodiversity

3.5

Next Generation Science Standards

5-LS2-1

C3 Framework

D2.Geo.2.3-5.

Materials

- Chart paper
- Markers, pens, or pencils
- *Ecosystems Inside Out Exit Card*
- *Maps Worksheet* – one sheet per pair
 - ▶ Features two different physical maps found on page 5 of every book. Indicates different biomes and landforms based on the book's content. Worksheets are copies of the maps with a blank key for students to complete, along a word bank.

Objectives

Students will:

- Define and give examples of habitats and ecosystems and their interacting organisms.
- Use physical maps to identify biomes found on different continents.

Setting the Stage

Facilitate class discussion about what students know about different habitats and ecosystems. Can read and review pages 4 and 5 from one book for context.

- Use prompts such as:
 - ▶ What is a habitat? What conditions would allow certain animals to live there?
 - ▶ Where can ecosystems be found on Earth? What is a system?
 - ▶ How can we differentiate between an animal's habitat, their ecosystem, and the biome in which they inhabit?
- Take-away concepts:
 - ▶ To be able to identify different biomes around the world
 - ▶ To learn about the different levels of ecosystems and understand the interrelationships between plants, animals, water, air soil and temperatures that encompass that system.

Use "Think, Pair, Share" method to have students come up with answers to the following questions:

- What is a habitat?
- What is an ecosystem?
- What is a biome?

Class discussion – Students might mention / Teacher should prompt:

- Habitat
 - ▶ What species or organisms might live in certain habitats?
 - ▶ What physical factors (soil, moisture, temperature, climate, etc.) and biotic factors (availability of food and presence or absence of predators) would allow for these species to live there?
- Ecosystem
 - ▶ Why are ecosystems different sizes? (As small as a puddle, as large as the Great Lakes)
 - ▶ What food chains would exist? (In the food chain, there are producers, consumers, and decomposers)
- Biome
 - ▶ Why would certain plants and animals have common characteristics for the environment in which they exist?
 - ▶ Where can biomes be found?

Share answers and create a class definition of a habitat, ecosystem and biome are to be sure students understand the difference. Write definitions on anchor chart for future reference. Example definitions:

- Ecosystem: is the neighborhood where animals live
- Habitat: is the animal's address in that neighborhood
- Biome: even bigger than an ecosystem, it is a large geographical area that contains distinct plant and animal groups, which are adapted to live in that environment

Activity

Divide the students into pairs and give each group one piece of chart paper and markers. Students should write “Biomes Around the World” across the top of the chart paper. Then, ask students to divide their chart paper with a vertical line down the center.

Hand students *Maps Worksheet* and prompt them to glue one map on each side of the chart paper. They should use the word bank to complete the blank key.

Teacher can consult with students as they are working through their vocabulary words to ensure understanding.

Once done, display the two different types of maps in the *Ecosystems Inside Out* series to consolidate learning and to allow students to make corrections to their keys to ensure understanding (p. 5).

Hang anchor charts of the different types of Biomes for reference.

Extensions

- ▶ Have students add to their anchor chart after class discussion. Students can be intentional to include certain physical factors, species, or food chains that they think would be included under each physical map.
- ▶ Invite students to conduct their own research to find specific examples of species that may live in a biome, ecosystem, or specific habitat.
- ▶ Provide small groups or pairs of students with source material and have them deconstruct the abiotic and biotic factors found within a certain ecosystem. Students can present their conclusion to the class and support it with evidence to justify their reasoning.

Wrap-Up

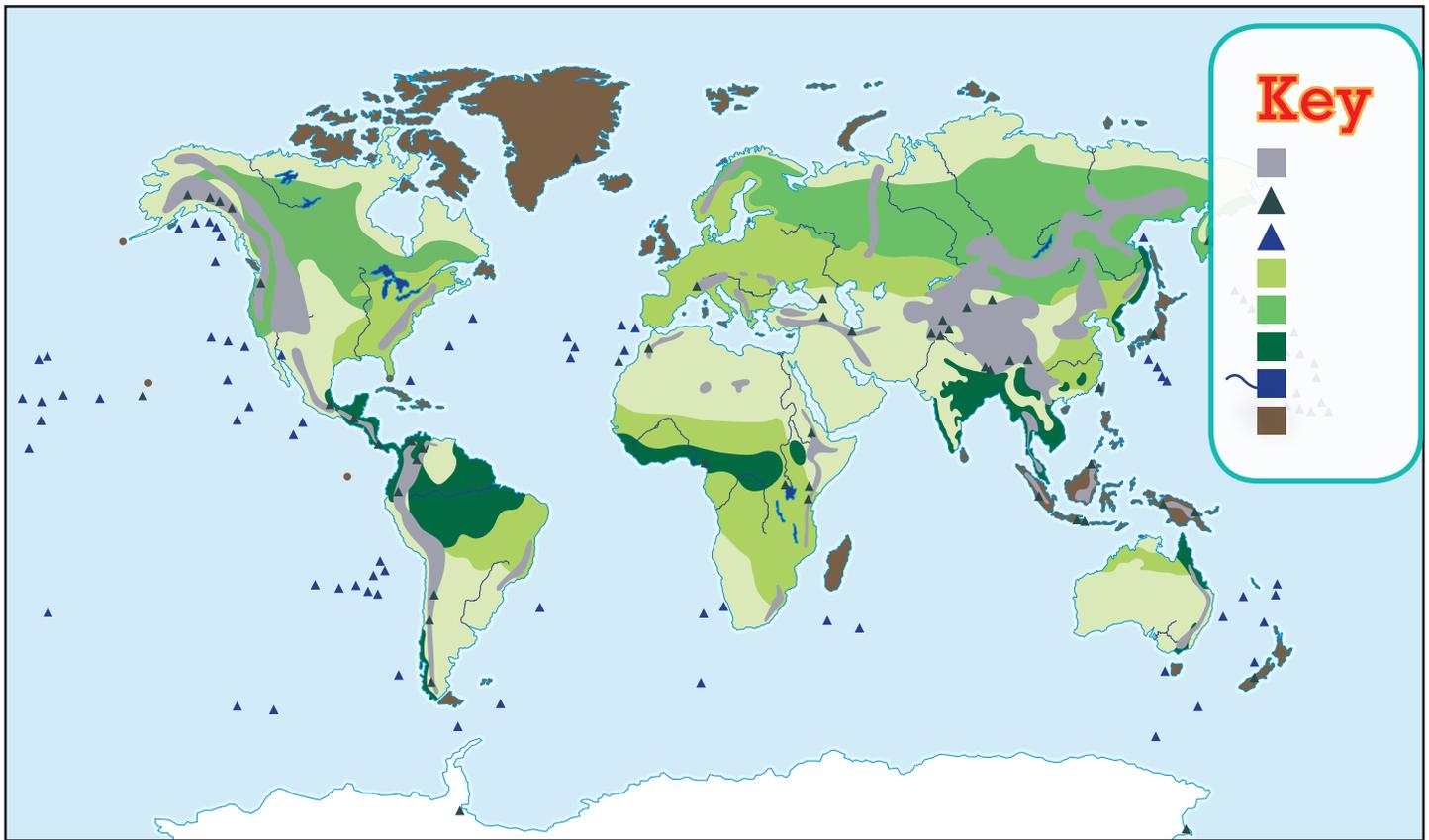
Correct maps as a class. Ask students to justify each identified biome by referring back to the definitions on anchor chart. Then, show the fully completed maps in the *Ecosystems Inside Out* books and reiterate why they are identified as such.

Pass out *Ecosystems Inside Out Exit Card*.

Assessment

Assess student understanding during lesson using observational notes. Assess *Ecosystems Inside Out Exit Card* for understanding of the difference between an ecosystem and a habitat. Review definitions to clarify misunderstandings as needed.

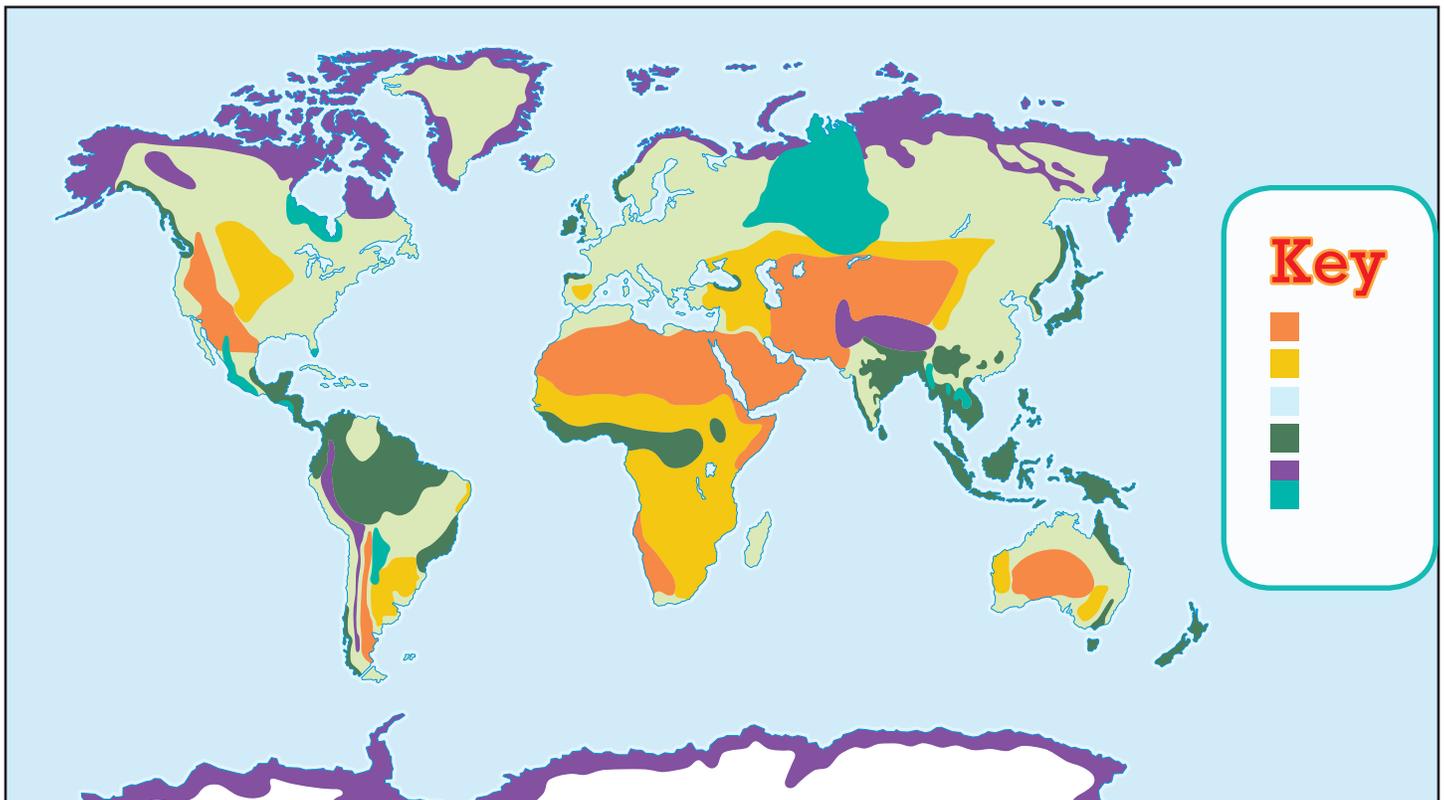
MAP 1 – This map shows where forests and other biomes are found around the world.



Word Bank

Deserts • Grasslands • Oceans • Rain forests • Tundras • Wetlands • Mountains – ranges • Mountains – land peaks • Mountains – sea peaks • Forests – temperate • Forests – taiga • Forests – tropical • Rivers and Lakes • Islands

MAP 2 – This map shows where deserts and other biomes are found around the world.



Name: _____ Date: _____

Ecosystems Inside Out Exit Card

In your own words, give a definition of habitat, ecosystem and biome.

Habitat: _____

Ecosystem: _____

Biome: _____

Based on the mapping activity, identify two biomes (one from each map) below and name the biome using the word bank.

Word Bank

Deserts • Grasslands • Oceans • Rain forests • Tundras • Wetlands • Mountains – ranges • Mountains – land peaks •
Mountains – sea peaks • Forests – temperate • Forests – taiga • Forests – tropical • Rivers and Lakes • Islands

Criteria	Met	Somewhat Met	Not Met
I can explain the concept of an ecosystem and use some terminology of its components			
I can differentiate between a habitat, ecosystem and biome			
I can identify, using a map, where biomes are found around the world			

LESSON 2

[A]biotic Factors, Producers, Decomposers, Consumers

Curriculum Correlations

Ontario Science and Technology

Grade 4: Understanding Life Systems—Habitats and Communities

3.4

Grade 6: Understanding Life Systems—Biodiversity

2.1, 2.2, 3.5

Next Generation Science Standards

5-LS2-1

Materials

- Chart paper and markers
- Whiteboard with chalk or markers
- *Abiotic and Biotic Factors Nature Walk Worksheet*
- *Two Nutrients and One Fungus (Ecosystem Version of Two Stars and a Wish) Worksheet*

Setting the Stage

Review definitions and examples of habitat, ecosystem and biome. Use this discussion to transition into the learning for this lesson.

Class discussion:

- What are some examples of living and non-living things?
 - ▶ Start to prompt for examples of abiotic and biotic factors in ecosystems

Introduce the concept of abiotic and biotic factors using the following video:

<https://bit.ly/2K3u75y>

After watching the video, prompt students with the following questions to deepen their understanding of the information:

- What types of elements do animals and plants need to survive?
- What might a species need in order to survive in their ecosystem?
- How can analyzing a system help us make connections to the different parts that work together for a purpose in a system?

Objectives

Students will:

- Differentiate between abiotic and biotic factors in a variety of ecosystems.
- Characterize between consumers, decomposers, producers found within different ecosystems.

Activity

Hand out the Abiotic and Biotic Factors Nature Walk Worksheet. Explain expectations when on the nature walk. You can visit the schoolyard, or if possible, take students to a nearby park or pond.

Instructions: Take a walk around your school & write down as many biotic & abiotic factors that you see! You must have at least 5 abiotic factors and 5 biotic factors.

Extensions

- ▶ Have students bring a device on the nature walk with them in order to take photos of the abiotic and biotic factors they have included on their list. Have them include these photos in a media presentation, describing why each of the components included in the presentation were important to that ecosystem.
- ▶ Students can identify abiotic and biotic factors found within 4 different types of ecosystems (desert, rain forest, ocean, mountain) and critically think about what similarities and differences there are between the different types of factors. Why are certain factors found within certain ecosystems? Would certain abiotic/biotic factors found within one ecosystem allow for another type of ecosystem to flourish? Would the flow of energy change?

Wrap-Up

Consolidate video and walk about by writing down these ideas on a chart paper to create a visual for students. Make reference to the video for some examples, but also have students provide other examples of abiotic and biotic factors in different ecosystems as well.

- Take away concepts:
 - ▶ Abiotic factors are nonliving parts of an ecosystem, such as water and soil.
 - ▶ Biotic factors are living parts of an ecosystem, such as plants and animals.
- Animals need food, water, shelter, and space to survive; making connections between the interrelationships of the components of an ecosystem and the fact that the terms and processes are universal and apply to all different types of ecosystems.

Hand out the *Two Nutrients and One Fungus (Ecosystem Version of Two Stars and a Wish)* Worksheet to help guide instruction for the next lesson.

Assessment

Assess *Abiotic and Biotic Factors Nature Walk Worksheet* by identifying the correct answers out of 10. Students should have at least 5 examples for each of the factors (abiotic and biotic) found on the nature walk.

Name: _____ Date: _____

Abiotic and Biotic Factors Nature Walk Worksheet

Abiotic Factors	Drawing	Biotic Factors	Drawing

Name: _____ Date: _____

**Two Nutrients and One Fungus
(Ecosystem Version of Two Stars and a Wish)**

What are two concepts you feel comfortable explaining? Remember to use proper vocabulary to prove your understanding.

1. _____

2. _____

What is one concept you feel is challenging? Describe where your misunderstanding is.

3. _____

LESSON 3

Food Chain Fun

Curriculum Correlations

Ontario Science and Technology

Grade 4: Understanding Life Systems—Habitats and Communities
2.6, 3.1, 3.2

Grade 6: Understanding Life Systems—Biodiversity
2.2, 2.5, 3.5

Common Core State Standards – Writing, Grade 4
CCSS.ELA-LITERACY.W.4.2

Common Core State Standards – Reading, Grade 4
CCSS.ELA-LITERACY.RI.4.9

Common Core State Standards – Reading, Grade 5
CCSS.ELA-LITERACY.RI.5.9

Next Generation Science Standards
5-LS2-1

Materials

- Chart Paper and markers
- Printed images from p. 7 of each of books from the *Ecosystems Inside Out* series
- *Ecosystems – Factors and Food Chains Exit Card*
- *Food Chains Assessment Checklist*
- Books from the series *Ecosystems Inside Out* (p. 6 and p. 7)

Objectives

Students will:

- Differentiate between producers, consumers, and decomposers within a food chain.
- Communicate understanding of habitats as areas that provide plants and animals with the necessities of life.
- Make connections between plants and animals and how they are interdependent and are adapted to meet their needs from the resources available in their habitats.
- Identify and construct food chains in ecosystems, correctly demonstrating the flow of energy.

Setting the Stage

From the previous lesson, students will have a better understanding of living and non-living things in an ecosystem, which will allow the class discussion to segue:

- What types of energy are spread through an ecosystem?

As a class, read page 6 of one of the books in the series. This page introduces food chains and producers, consumers, and decomposers.

Then, divide the class into 6 groups. Give each group a slip of paper with either producer, consumer, and decomposer on it. Each group has to define the type of organism they have been assigned and give a few examples.

- Some possible examples for the different types of organisms: Apple tree, hawk, mushroom, carrot, dragonfly, bamboo, cougar, bacteria, daffodil, pigeon, snake, catfish.

Consolidate this idea by dividing the chalkboard into three sections: Producers, Consumers, and Decomposers. Have students come up to the board and write their group's definition along with the few examples. Rework definitions as a class to ensure it encompasses each type of organism, and have students add additional examples to each section.

Activity

Referring back to pages 6 and 7 of any book in the series, discuss the importance of the flow of energy found in the ecosystem.

Once some ideas have been brainstormed, invite students to watch the following video on Food Chains: <https://bit.ly/2lp55mz>

This video from KET's **Think Garden** collection illustrates why all living things need food and explains how organisms provide energy, in the form of food, to each other. Colorful graphics show the difference between a food chain and a food web, and an animation and poem make food chains easy to understand.

Ask students to use "Think, Pair, Share" method to review any questions they may have after watching the video.

As a class, discuss main ideas in video. As students gain more knowledge, their responses should be more in depth and specific to different types of ecosystems.

Write responses to all class discussion questions on whiteboard. Based on responses, create class "Ecosystem List" to identify different parts of the system, using specific vocabulary to reinforce learning.

Extensions

- ▶ Show students more food chains from different types of ecosystems, and ask them to analyze the food web using guidelines. Students can complete this individually, in small groups, or as a class.
- ▶ Ask students to research to find additional information about an ecosystem (fungi, bacteria, nutrients) that is not readily available. Have them develop these ideas with photosynthesis in mind.

Hand out *Ecosystems – Factors and Food Chains Exit Card*

Wrap-Up

Class Discussion

- Invite students to share questions they still have about the food chain to further develop lessons from here.
- Take away concepts:
 - ▶ Organisms cannot live without energy
 - ▶ Energy comes from the sun and is spread across the ecosystem through food
 - ▶ Organisms need one another for energy

Analyze a few other types of ecosystems and create a "Similarities and Differences" anchor chart to show the variances between the energy found in a variety of ecosystems. Students should notice that, depending on the ecosystem, the flow of energy will be slightly different because of the different types of species and organisms found within each ecosystem.

Assessment

Use checklist at bottom of exit card to assess students' answers on exit cards based on their understanding of concepts. Students should develop their answers about the information of different types of ecosystems, and the abiotic and biotic factors that accompany that ecosystem, which permit the survival of the identified species. They should also connect their knowledge of the food chain to be able to properly identify producers, consumers and decomposers within the food chain.

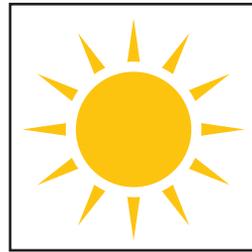
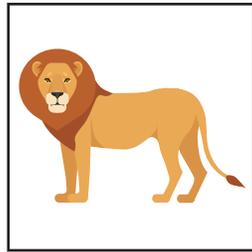
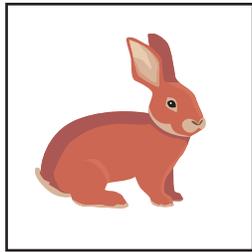
Name: _____ Date: _____

Ecosystems – Factors and Food Chains Exit Card

Choose an ecosystem that we focused on in our lesson. Identify three types of species or organisms that might live there. Name 3 abiotic and 3 biotic factors that would allow those species to inhabit that ecosystem.

Ecosystem:	Abiotic Factors	Biotic Factors
1.		
2.		
3.		

Cut and paste the images found below to create a proper food chain. Then, in the space provided, identify the producers, consumers, and decomposers for each of the animals that you have cut and pasted into the squares



Identify in what type of ecosystem you might find a food chain like the one constructed above. Write a descriptive text to demonstrate and justify your understanding of energy flow through a food chain.

Name: _____

Date: _____

Food Chains Assessment Checklist

CRITERIA	LEVEL 1 Limited understanding displayed.	LEVEL 2 Adequate understanding displayed.	LEVEL 3 Thorough understanding displayed	LEVEL 4 Exceptional understanding displayed.
Student classifies abiotic and biotic factors in an ecosystem.				
Student properly identifies producers, consumers and decomposers found within an ecosystem				
Student constructs a food chain demonstrating the flow of energy.				
Student identifies in what type of ecosystem certain food chains might be found.				
Student writes a descriptive text to demonstrate understanding of energy flow through a food chain.				

LESSON 4

Eco Up Close—Challenges within an Ecosystem

Curriculum Correlations

Grade 4: Understanding Life Systems—Habitats and Communities

3.3, 3.7, 3.9

Grade 6: Understanding Life Systems—Biodiversity

2.2, 2.5, 3.4, 3.7

Common Core State Standards – Writing, Grade 4

CCSS.ELA-LITERACY.W.4.2

Common Core State Standards – Reading, Grade 4/5

CCSS.ELA-LITERACY.RI.4.9

CCSS.ELA-LITERACY.RI.5.9

Next Generation Science Standards

5-LS2-1

Materials

- *Ecosystems Inside Out Series* – Choose a number of books that would allow you to divide your class into groups of four students. Be sure to choose a variety of types of ecosystems
- *Researching an Ecosystem Worksheet*
- *WANTED Poster Success Criteria and Template*
- Devices with Internet access

Objectives

Students will:

- Explain why changes in the environment have a greater impact on specialized species than on generalized species.
- Understand the idea that every animal and plant species has a native habitat, or environment where it naturally and normally lives and grows.
- Investigate, characterize, and understand the environmental and ecological impacts invasive species have on different ecosystems.

Setting the Stage

Write the word “biodiversity” on the whiteboard. For five minutes, brainstorm definitions, words, and examples that come to mind when students see that word. Write down student responses on board.

- Take away concepts:
 - ▶ Because all living things (including humans) are connected, maintaining biodiversity is critical to the health of the planet, including diversity among individuals, species, and ecosystems.
- Define biodiversity:
 - ▶ **The variety of plant and animal life in an ecosystem or other area on Earth.**

Class discussion—interdependence and interrelationships

- Relying on each other for survival
- The relationships between many different organisms and their environment
- Introduce and define invasive species: **Animals or plants that have been introduced into an ecosystem where they did not originally live.**
- Prevention and early detection are extremely important to stop invasive species from threatening our ecosystems and resources

Activity #1

Group kids based on interests for differentiated instruction. Hand out or allow students to choose a copy of one *Ecosystems Inside Out* book and instruct them to open to and read page 20. Use the books and the devices for outside research to answer the questions found on the *Researching an Ecosystem Worksheet*.

Using the jigsaw technique, have one member from each group come together and present the information they have found within their small groups. They will be experts on their topic, but will also be able to learn about other ecosystems from their peers.

Jigsaw technique is a method of organizing classroom activity that makes students dependent on each other to succeed. It breaks classes into groups and breaks assignments into pieces that the group assembles to complete. Students are then split into groups with one member assigned to each topic.

Extensions

- ▶ Using other resources, such as the school library or the Internet, have students deepen their understanding of their topic by exploring other invasive species within the ecosystem

Activity #2

Create a WANTED poster to inform others on the invasive species you have researched for your specific ecosystem or one that you have found in your area. Use the following websites to help guide your research on an invasive species in an ecosystem of your choosing or within your community.

- In your community: <https://bit.ly/2M0fZ1Z>
- Ontario students: <http://www.invasivespeciescentre.ca/>
- United States students: <https://www.usda.gov/our-agency/initiatives/usda-kids>

Wrap-Up

If desired, teacher can invite students to share their WANTED posters with the class within each type of ecosystem. Presentations will help student's understanding of the different intricacies of a variety of ecosystems.

Assessment

Teacher will collect *Researching an Ecosystem Worksheet* and assess for understanding. Teacher will also collect WANTED posters to assess students' understanding of invasive species within an ecosystem.

Name: _____ Date: _____

Researching an Ecosystem Worksheet

Type of ecosystem: _____

What kinds of animals live in this type of ecosystem?

1) _____ 2. _____

3) _____ 4. _____

What are the necessities to be able to live in this ecosystem?

• _____ • _____ • _____

• _____ • _____ • _____

What climate allows for survival in this ecosystem?

How do the animals survive in these habitats? (Think about food, shelter, prey, predators, climate, animal's characteristics, etc.)

What challenges does this ecosystem face?

1) _____

2) _____

3) _____

Name: _____ Date: _____

Researching an Ecosystem Worksheet

What types of invasive species are found within this ecosystem?

1) _____

2) _____

3) _____

What would happen if other species invaded these ecosystems?

How could you help prevent the introduction of invasive species?

What organizations in our community allow us to be informed and help our community's ecosystems?

1) _____

2) _____

Name: _____ Date: _____

WANTED Poster Success Criteria

After researching your ecosystem, choose one of the invasive species you have research and create a WANTED poster. Continue with more specific research on the invasive species you have chose, and be sure to include the following criteria.

Be sure to include (TOTAL = 38)

- 1) Draw a detailed picture of the species (5)**
 - a.) Write a description of the organism that could be used to identify it (5)
- 2) Draw a background that depicts the ecosystem in which it is found (4)**
 - a.) Write a description of the environment where the organism lives (CAN BE FOUND) (4)
- 3) Write three interesting facts about the species (3)**
- 4) Write why the species is WANTED (Crimes Committed) (3)**
 - a.) Explain how the invasive specie impacts or affects the environment (5)
- 5) Write a reward for someone finding/removing the invasive species from that ecosystem (Rewards)**
 - a.) Reward must refer to the benefits of capturing or removing this species from the ecosystem (4)
 - b.) Your contact information if found – name and email address (2)
- 6) Createa bibliography using NoodleTools or EasyBib including at least three sources you have used to complete your research (3)**

Name: _____

Date: _____

WANTED

DESCRIPTION

CAN BE FOUND

FACTS

1) _____

2) _____

3) _____

CRIMES COMMITTED

REWARD

LESSON 5

Humans as Invasive Species

Curriculum Correlations

Grade 4: Understanding Life Systems—Habitats and Communities

2.3

Grade 6: Understanding Life Systems—Biodiversity

2.2, 2.5, 3.4

Common Core State Standards – Reading, Grade 4

CCSS.ELA-LITERACY.RI.4.9

CCSS.ELA-LITERACY.SL.4.1.A

CCSS.ELA-LITERACY.SL.4.1.B

Common Core State Standards – Reading, Grade 5

CCSS.ELA-LITERACY.RI.5.9

Next Generation Science Standards

5-LS2-1

Materials

- Chart paper and markers
- Devices with Internet access
- *Researching Human Impacts on an Ecosystem Worksheet*
- *Urbanization versus Conservation Role-Play Script – Requirement Checklist*
- *Comparing Perspectives Exit Cards*
- *Role Play Checklist*

Objectives

Students will:

- Understand the impact humans have on ecosystems and describe ways in which humans are dependent on natural habitats and communities.
- Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished.
- Explain why changes in the environment have a greater impact on specialized species than on generalized species.

Setting the Stage

Class discussion:

- What types of challenges do ecosystems face?
- How do humans contribute to these challenges?
- What happens to ecosystems when humans invade?
- What can we do to prevent negative occurrences to our ecosystems?

Activity

Class discussion:

- Why is it important to preserve natural areas?
- How can you educate yourself on what you can do in your community to help sustain natural habitats?
 - ▶ Joining projects that could kick-start your ecology career at: **www.kidsecologycorps.org**
 - ▶ Learning more about ecology and how you can help care for the planet at: **www.ecology.com/ecology-kids**
- Take-away concepts:
 - ▶ Studying different perspectives (human development side versus the ecosystem protection side) allows students to understand that there are human impacts on biodiversity.
 - The goal of this lesson is to role-play a community meeting about human's impact on a local ecosystem
 - ▶ Understanding that, although some species adapt to new stresses, food sources, predators and threats in certain environments (urban and suburban), there could be severe consequences to certain species that are unable to adapt (extinction).
 - ▶ Implementing action as a new generation to help our ecosystems continue to flourish to avoid species extinctions.

Hand out *Researching Human Impacts on an Ecosystem Worksheet* and *Urbanization versus Conservation Role-Play Script – Requirement Checklist* to help guide students in their role-play activity.

Each pair of students will choose a topic and work together to research urbanization (human development) as well as conservation efforts to help soften environmental impacts (ecosystem protection). They will write a script where the two parties (human development versus ecosystem protection) have a discussion about the pros and cons of each standpoint.

Some of the topics students could research and role-play include:

- Overfishing and hunting
- Destruction of habitats through agriculture and urban sprawl
- Use of pesticides and herbicides
- Release of other toxic compounds into the environment
- Business parks
- Housing
- Roads and waterways
- Tunnels and bridges

Extensions

- ▶ If students are unfamiliar with how to write a script after they have done their research, model this concept with them about a topic with which they are familiar to help build confidence and understanding of script writing.
- ▶ Sentence starters:
 - Urbanization: My name is _____ and I am from _____ company here to talk to you about _____ (topic).
 - Conservation: My name is _____ and I am from _____ company here to talk to you about _____ (topic).
 - Urbanization: In our municipality, _____ has been a dream of ours to help our community flourish.
 - Conservation: That is definitely a great idea, but because we are a company that would prefer to conserve our ecosystems, we feel as though different steps should be taken to protect the local ecosystem.
 - Urbanization: Supporting statement 1
 - Conservation: Supporting statement 1
 - . . . continue to help students develop their ideas in a dialogue fashion
- ▶ For more information on the conversation of ecosystems, refer to *Ecosystems Research Journal Series*

Wrap-Up

Hand out *Comparing Perspectives Exit Cards* and have students complete them to hand in.

Assessment

Assess *Comparing Perspectives Exit Card* for understanding of core concepts. Use *Role Play Checklist* to assess role-play activity.

Name: _____ Date: _____

Researching Human Impacts on an Ecosystem Worksheet

Human Development	Ecosystem Protection	Citing my Source

Name: _____ Date: _____

Urbanization versus Conservation Role-Play Script Requirement Checklist

During a town meeting, you have the chance to voice your opinion on your topic, from your point of view.

Follow the requirements below to ensure you are successful in your role-play activity.

Will urbanization triumph, or will conservation win by a landslide?

Topic: _____

Time Frame: 1 – 2 minutes

Are you FOR urbanization?

Are you FOR conservation?

Argument:

Did you identify your topic and point of view?

Is your argument clearly stated?

Do you provide several convincing statements that support your argument?

Do supporting facts from your research help support your argument?

Are you using persuasive language to encourage your point of view?

Formatting:

Is your role-play a conversation between you and your partner?

Do each of you effectively represent your perspective and allow the conversation to flow nicely?

Do you each have at least three supporting arguments that allow you to uphold your perspective?

Does your role-play conclusion allow partners to finish with their strongest argument?

Name: _____

Date: _____

Role Play Checklist

Success Criteria	Indicators of student performance		
	High	Medium	Low
Capacity to argue a convincing point of view relevant to a specified role	Responds to opposing point of view with an answer entirely relevant to the role that is being played.	Responds to opposing point of view with an answer that is partly relevant to the role that is being played.	Responds to opposing point of view with an answer that is not relevant to the role that is being played.
	Provides several convincing statements and evidence that support their argument, both in answers to the opposing point of view and in the personal statement.	Provides some statements and evidence that support their argument both in answer to the opposing point of view and in the personal statement.	Provides few or no statements or evidence that support their argument either in answer to the opposing point of view or in the personal statement.
	Demonstrates active listening by making effective and relevant reference to opposing points of view.	Demonstrates active listening by making reference to opposing points of view.	Makes little or no reference to opposing points of view.
	High	Medium	Low
Capacity to show understanding of the urbanization/ conservation of a specified ecosystem	Shows thorough understanding by using appropriate vocabulary during role-play activity.	Shows understanding by using appropriate vocabulary during role-play activity.	Shows limited understanding by using only some vocabulary during role-play.
	Exhibits in-depth understanding that, although some species adapt to new situations, there could be severe consequences to other species.	Exhibits understanding that, although some species adapt to new situations, there could be consequences to other species.	Exhibits some understanding that, although some species adapt to new situations, there could be consequences to other species.
	Develops detailed actions that can be implemented as a new generation to help our ecosystems continue to flourish to avoid species extinctions.	Develops actions that can be implemented as a new generation to help our ecosystems continue to flourish to avoid species extinctions.	Develops actions with some effectiveness that may be implemented with modifications as a new generation to help our ecosystems continue to flourish to avoid species extinctions.
	Identifies, using detailed examples, how human actions impact the ecosystems in our world.	Identifies how human actions impact the ecosystems in our world.	Identifies, with some clarity, how human actions impact the ecosystems in our world.

Name: _____ Date: _____

Comparing Perspectives Exit Cards

CRITERIA... Did I	Always	Sometimes	Rarely	Never
Help co-plan my role-play by effectively researching my perspective?				
Co-create the conversation and work equally on the role-play with my partner?				
I participated in my group by: _____ _____ _____ _____				

LESSON 6

Ecosystem Exploration

Curriculum Correlations

Grade 4: Understanding Life Systems—Habitats and Communities

2.4, 3.1

Grade 6: Understanding Life Systems—Biodiversity

2.4, 3.5

Next Generation Science Standards

5-LS2-1

English Language Arts Standards » Speaking & Listening » Grade 4/5

CCSS.ELA-LITERACY.SL.4.1

CCSS.ELA-LITERACY.SL.5.1

English Language Arts Standards » Writing » Grade 4

CCSS.ELA-LITERACY.W.4.7

Materials

- *Ecosystem Diorama Project Criteria Sheet with Rubric*
- A range of craft materials for students to use for their diorama. Some examples are:
 - Shoebox
 - Construction paper and tissue paper
 - Glue and tape
 - Markers
 - Non-living things and models of living things found in the ecosystem
 - Modelling clay (variety of colors)
 - Popsicle sticks

Setting the Stage

Hook students by showing them examples of different dioramas to get them excited about their final product.

Students will create a diorama of an ecosystem and present it to the class.

Objectives

Students will:

- Plan and build their own ecosystem in order to demonstrate an understanding of habitats, ecosystems, and biomes around the world
- Present their ecosystem to the class and describe what they learned about the figure or event.

Activity

Hand each student copy of *Ecosystem Diorama Project Criteria Sheet with Rubric*. Review criteria for the diorama as a class. Or, as a class, create success criteria.

Have students contribute ideas on what they feel will make the project and presentation effective. Guidelines may include the following:

- During the presentation, student introduces topic clearly and summarizes each of the requirements of their ecosystem
- During the presentation, student identifies at least three new pieces of information they learned about their ecosystem
- Student explains how the ecosystem works as a whole (interdependence between the sun, energy, food chains, plants, animals, etc.)

Although most of the information needed would be included in the book series, students will need to do some research on the ecosystem they are representing. Have them refer back to some of the websites used throughout the unit, or any of the websites found here:

<http://kids.nceas.ucsb.edu/biomes/>

<http://www.kidsgeo.com/geography-for-kids/0164-ecosystems.php>

<http://www.kidcyber.com.au/topics/biomes.htm>

Review research techniques and skills with students, such as:

- Set time limits and stay focused.
- Use teacher-vetted websites only.
- Keep track of the sources that you take information from.

Extensions

- ▶ Have students display and present their models in the hallway or gymnasium to other classes in the school. This will strengthen their presentation skills and deepen their knowledge of their ecosystem, as they will answer question from the audience.

Continue to encourage students to refer to their success criteria throughout the building of their diorama. Give students two or three class periods to complete their project.

Wrap-Up

Have students present their projects. Use one or two class periods for presentations.

Assessment

Students will hand in their projects. Teacher will use the rubric to assess project and presentation.

Name: _____ Date: _____

Ecosystem Diorama Project Criteria with Rubric

Directions: As part of our Ecosystem unit, each student must create a diorama of an ecosystem of their choosing from the 10 books in the series Ecosystems Inside Out. To create the diorama, you may use an empty shoebox or another small box can also be used.

Dioramas include:

- 3 or more different types of animals native to the ecosystem
- 2 or more different types of plants native to the ecosystem
 You may use clay, paper-mache, or other products to create
- An accurate representation of the ecosystem
 Include both abiotic and biotic factors
- Label all items in your ecosystem
- A creative use of materials
 Use materials you find outside or you may purchase materials

Rubric				
CRITERIA	Level 1	Level 2	Level 3	Level 4
Design	The project is distractingly messy or very poorly designed. It does not include texture and/or 3D elements	The project is acceptably attractive though it may be a bit messy. It includes little texture and/or 3D elements.	The project is attractive in terms of design, layout, and neatness. It includes texture and/or 3D elements.	The project is exceptional in terms of design, layout, and neatness. It includes a good use of texture and/or 3D elements
Accuracy	Little or none of the features displayed in the diorama are accurate to the selected ecosystem.	Few of the features displayed in the diorama are accurate to the selected ecosystem.	Most of the features displayed in the diorama are accurate to the selected ecosystem.	All of the features displayed in the diorama are accurate to the selected ecosystem.
Plants, animals and other elements	Little or no plants, animals, or other factors are displayed in the diorama.	Few plants, animals, and other elements are displayed in the diorama.	Plants, animals, and other elements are displayed in the diorama.	Both 3D plants, animals, and other elements are displayed in the diorama.
Presentation	Student did a poor job of presenting and was not prepared for questions by the teacher and other students.	Student presented information in an unorganized way and may have not been clear on some points.	Student presented information adequately, but may not have been clear on some points.	Student presented information in a clear, concise manner and was an expert on the biome.