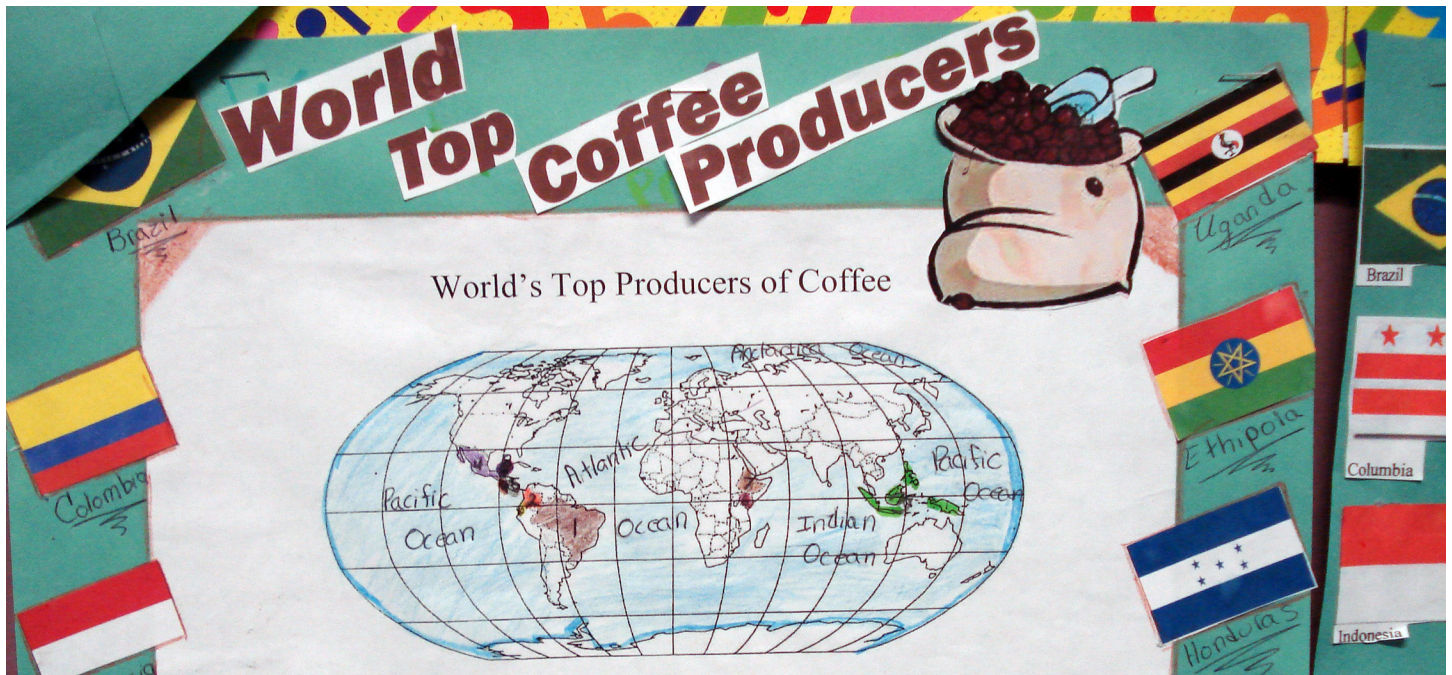


Sixth Grade



- **Why do Some Birds Have Two Homes When we Have One?**
- **Whose Breakfast isn't for the Birds?**
- **How Can my Breakfast Help the Birds?**

Lesson 1

6

Why do Some Birds Have Two Homes When we Have One?

El Imposible National Park, El Salvador

Concept

Many species of migratory birds have two homes: a temperate forest and a tropical rainforest. Their survival depends on the health of both forest systems. And the health of both forest systems depends on the survival of migrating birds.

Essential Question

Why do some birds need two homes, thousands of miles apart, when we only need one?

Introduction

Objectives

1. Students will research different physical and behavioral characteristics of birds and create theories about their migratory behavior.
2. Students will research the natural histories of different migratory birds and create diagrams describing the bird's annual cycles of behavior.
3. Students will carry out a variety of mathematical calculations to understand the phenomena of bird migration.

Informational Introduction for the Teacher

This lesson challenges students to explore the task of migration and understand how this important bird adaptation is related to temperate forest and tropical rainforest ecology. By observing birds and sorting pictures, students' theories about migrations surface. These hypotheses are then tested as students form new knowledge about forests and migrations. Students then explore the enormity of the task of migration by using mathematics. Last, students research a select bird and demonstrate their understanding of forest ecology and bird migration by designing a creative diagram of a year in the life of a migratory bird.

Informational Introduction for the Students

Consider the greatest distance you've ever walked in one day. Were you tired? Imagine if your life depended on you walking that far for every day for a week straight. Consider the coldest day of winter you've



ever experienced. Now imagine being outside in that weather every day for a week straight. These types of experiences are typical in the world of birds. Bird life depends on their ability to move, find food and shelter and eventually mate. All of these behaviors are ultimately linked to the forest in which they reside. In this lesson we'll discover how birds survive and how the forest helps them.

Step 1: Connect (the concept to prior knowledge)

Challenge

Students observe birds in nature and examine pictures of birds, then compare their own theories to experts' theories on patterns of migration. Students consider

Lesson 1

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Why do Some Birds Have Two Homes When we Have One?

how migrating birds help sustain both temperate forests and tropical rainforests.

Materials

- photocopied pictures of overwintering and Neotropical migrant birds (one set per students)
 - overwintering birds
 - black-capped chickadee
 - American raven
 - white-breasted nuthatch
 - blue jay
 - pileated woodpecker
 - great horned owl
 - Neotropical migratory birds (the Neotropics include Mexico, Central America, South America and the Caribbean)
 - ruby-throated hummingbird
 - turkey vulture
 - American robin
 - red-eyed vireo
 - yellow warbler
 - wood thrush

Procedure

- Have the class observe birds at a feeder near the classroom or somewhere on the school grounds. Ask students to make observations about each bird in order to determine whether each bird migrates during winter months or spends winter in temperate forests.
- Have students work with a partner. Give each pair of students a set of bird pictures. Challenge students to use their prior knowledge and observations of the birds at the feeder to separate the pictures into two categories: (1) birds that live in their area year round and (2) birds that migrate somewhere else during part of the year.
- After sorting the bird pictures, have students discuss their ideas about the following questions. Ask them to share their theories for the entire class to discuss. Discussion questions:
 - What physical characteristics, if any, influenced your decision to sort the birds into their respective categories?
 - What behavioral characteristics, if any, influenced your decision to sort the birds into their respective categories?

- Why do you think some species like chickadees live in below-freezing temperatures when snow is up to our hips and other species like warblers fly 2,000 miles to live in a warm, rainy, luscious forest during the winter?
- Why would a bird living in a tropical rainforest, with plenty of shelter, refuge, food and resources, abandon its warm winter home at the onset of spring, and risk the trials and tribulations of flying 2,000 miles north in order to raise a family, only to fly back six months later?
- Do you think warblers (and the other migrants) really require two homes? Or are these just affluent birds indulging in more than they need? What do the warblers have that the chickadees don't?
- How do you think migrating birds can help sustain both temperate forests and tropical rainforests?

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

Students work with partners to research how experts answer the questions posed in Step 1. After sharing and discussing their findings, students are challenged to interpret a list of true or false statements.

Materials

- sorted bird pictures from Step 1
- research materials
- True/False statements

Procedure

- Ask students to work together to make any corrections to their initial sorting based on the discussion in Step 1.
- Students use field guides, birding books and Internet sources to research answers to the questions in Step 1. After finding answers, students make additional changes to their original sorting.
- Challenge students to take the True or False quiz. Tell them that the answers will be revealed afterwards, and the quiz is intended to offer experts' insights into bird migration.

Lesson 1

6

Why do Some Birds Have Two Homes When we Have One?

True or False?

- Most birds that live in the northeastern United States do not migrate. (*False. Approximately 520 of the 650 bird species that inhabit North America migrate*)
- There is much less food for birds to eat in temperate forests in winter. (*True. Due to the cold weather and snow, many food sources are inaccessible or have been eaten, forcing the birds to migrate*)
- Most non-migrating species depend on humans to survive the winters in the northeastern United States temperate forest. (*False. Most birds survive without the assistance of humans*)
- Birds leave the rainforest in spring and migrate north because it gets too hot for them there. (*False. Birds migrate north to establish breeding sites, mate and raise their young*)
- Migration is a movement from temperate forests to tropical forests. (*False. Some birds spend winter in temperate areas and migrate north to the Arctic Circle to take advantage of the abundance of life brought on by 24 hours of sunlight in the summer months*)
- Penguins migrate. (*False. Penguins move periodically throughout each day after breeding season, but they do not migrate*)
- Some birds migrate as far as 22,000 miles in one year! (*True. Arctic terns make the longest migration of any animal on Earth. Each year, they fly from the Arctic to the Antarctic and back*)
- Migrations is an adaptation birds have for survival. (*True*)
- Humans used to migrate like birds before modern heating systems. (*False. Human migration generally has a different meaning from bird migration. Humans have moved from place to place for many reasons, regardless of modern heating systems. Many humans inhabited the northern latitudes despite the cold without modern heating conveniences*)
- Birds help forests by scattering seeds and eating insects that may harm trees. (*True. Birds are important in maintaining a healthy food web in tropical rainforests*)
- Birds help forests by providing food for other animals that eat them and in turn help disperse seeds as well as nourish the forest soil with nutrients when they die. (*True. Birds are important in maintaining a healthy food web in tropical rainforests*)

4. After taking the quiz, engage students in a discussion about the statements. Encourage students to explore their disagreements to expose the reasoning behind each of the class opinions.
5. Reveal the correct answers and engage students in follow-up discussion about any confusing points.

Internet resources: "Do penguins migrate?" (www.adelie.pwp.blueyonder.co.uk/FAQs/migrate.htm)

Step 3A: Practice (math and learning centers)

Challenge

Students make calculations to fully appreciate the phenomena of bird migration.

Materials

- mathematical problems
- world atlas

Procedure

Challenge students to work individually on the problems listed below:

- How much energy do you spend coming to school each day?
 - Calculate how many miles your school bus travels and multiply that number by the current rate of gasoline.
 - If you walk to school, calculate how far and multiply that by the calories spent walking certain distances (any calorie counter will offer this estimation. Estimate how many calories you burn in one week walking to school).
 - Find out how many miles one of the migratory birds flies in one year of travel. Calculate how many calories it would take for you to walk that distance.
 - Find out how many calories are in your favorite foods. If you walked the distance a bird travels, how much of that food would you have to eat in order to fuel your trip?
 - Find out your bird of choice's favorite food. Guess how many insects/other food your bird would have to consume in order to fly that distance.

Lesson 1

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Why do Some Birds Have Two Homes When we Have One?

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Students choose a neotropical migrant species of interest, research its patterns of movement throughout the year and design a graphic representation of how it spends one year.

Materials

- black tape for outline of continents
- colored tape
- index cards
- art supplies
- world atlas
- research materials (bird books, Internet)

Procedure

1. Students choose neotropical migratory birds which interest them and research the following aspects of the species' natural history: winter range, summer range, migration arrival/departure times (online at www.birdnature.com/timetable.html), migration distances and duration of migration, feather coloration throughout the seasons, bird calls and songs, food sources, description of habitats, how the forest provides food and shelter, etc.
2. Students create a draft drawing of their bird's year. Each drawing should include a map of the bird's migration patterns and symbols to represent different behaviors. For example, when birds are in mating season, the symbol may be a bird with bright plumage calling a female with hearts in the air to denote attraction of a mate. This draft will be translated onto the large diagram on the classroom floor.
3. Using a world map as a guide, students draw outlines (using chalk, black tape, etc.) of North America, Central America, and South America on the classroom floor.

4. Using colored tape and index cards, students translate their draft drawings onto the classroom floor. Each student's addition should highlight their bird's route to and from their temperate and tropical rainforest habitats. Encourage students to draw symbols on index cards and tape them alongside the route. The symbols should represent primary activities at each of the birds' habitats and intermediate destinations. Specific dates of migrations and a picture of their bird may also be helpful.

Step 4: Present (edit work/students orally present projects)

Challenge

Students present their projects to younger students. Students are challenged to explain what they know about bird migration by taking others on a full year migration of their selected species.

Materials

- migration chart on classroom floor
- students' draft drawing of their selected bird species

Procedure

1. Students take younger students on a simulated tour of their selected bird's year. Their description should include things like time of migration, reasons for migration, distance, how the forests supply what the birds need, how the migrants supply the forest with what the forest needs, and knowledge of where this bird might be at the present moment.
2. After the younger student completes the tour, ask him/her to take on the role of tour guide, and explain what he/she learned about bird migration and its relation to forests.

Lesson 1

Assessment Rubric

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student works well with partner to collect data. Student is able to work cooperatively to make decisions about which birds migrate.			
Student makes appropriate changes to sorted bird groups based on class discussion, researched information, and the opinions of others.			
Student accurately represents the bird's behavioral patterns using accurate information and clear and creative symbols.			
Student is able to explain clearly and accurately the key aspects of the bird's natural history and explain how it is related to temperate forests and tropical rainforests.			

Lesson 2

6

Whose Breakfast isn't for the Birds?

El Imposible National Park, El Salvador

Concept

Coffee plants are grown in the same habitats required by many birds. Rainforests, temperate forests and the landscapes that link them must be carefully managed in order to ensure the survival of migratory birds.

Essential Question

Whose breakfast isn't for the birds?

Introduction

Objectives

1. Students will create, administer and analyze a survey designed to ascertain respondents' understanding of where coffee comes from and their preferred types of coffee.
2. Students will research natural histories of different coffee types.
3. Students will compare migratory bird habitat with locations of coffee farming.
4. Students will write and send a letter to a coffee drinker illustrating the connection between their coffee, tropical forests and bird habitat.

Informational Introduction for the Teacher

In this lesson, students generate first-hand knowledge about the types of coffee preferred by members of their school community. They use survey data as a springboard for examining coffee production and its relation to birds. Students consider the amount of coffee consumed in the United States, where it is grown, range of rainforests in the tropics and locations of bird migration routes. Finally, students write letters to coffee correspondents illustrating the connection of their favorite coffee type with birds and rainforests.

Informational Introduction for the Students

The United States is the world's largest consumer of coffee. More than half of the United States population drinks coffee daily. Where does this coffee come from? Where is the nearest coffee farm? What does it have to do with birds? By surveying some coffee drinkers,

Our Coffee Survey

Where the coffee comes from?	
yes	17
no	9

My respondents were/were not Knowledge about where their coffee comes from.

Awareness of types of coffee?	
yes	16
no	10

It will change a lot of things such as have trees and birds.

Benefits of coffee are...

we will find out what people know about where their morning cup comes from and research how coffee is connected to rainforests and migratory bird populations. Finally, we will offer them expert information on their drink of choice so that they might become more aware of some of the impacts of drinking coffee, and know what they can do to preserve bird habitat.

Step 1: Connect (the concept to prior knowledge)

Challenge

Students develop, disseminate and analyze a survey on the particular types of coffee preferred by their teachers, school staff, and parents.

Materials

- paper, writing utensils

Lesson 2

6

Whose Breakfast isn't for the Birds?

Procedure

1. Tell students they will be creating a survey for coffee drinkers to determine their knowledge of the drink and which types of coffee teachers, school staff and parents prefer.
2. Lead students in a discussion of the possible questions to investigate through the survey. Brainstorm possibilities. Some questions to pursue may include:
 - What are the most popular types of coffee?
 - Do coffee drinkers know where their coffee comes from?
 - Are coffee drinkers aware of the different types of coffee (sun coffee and shade-grown)?
 - Do coffee drinkers know the benefits of shade-grown coffee?
3. Offer students a variety of survey techniques. Some examples are listed below.
 - open-ended
 - What country does your coffee come from?
 - How does growing coffee affect the environment?
 - Where does most coffee come from?
 - Likert scale: 1 = well informed, 2 = somewhat informed, 3 = little knowledge, 4 = don't know at all
 - How knowledgeable are you about where your coffee comes from?
 - How knowledgeable are you about the different varieties of coffee?
 - How knowledgeable are you about shade-grown coffee?
 - fixed answers: check the space next to all of the words that describe the coffee you drink
 - Costa Rican
 - Colombian
 - Brazilian
 - Kenyan
 - Kona
 - Indonesian
 - Indian
 - shade-grown
 - sun coffee
 - flavored
 - organic
 - other (please specify: _____)
 - true/false
 - Coffee grows best in areas near the equator.
 - Shade-grown coffee techniques can help migratory birds.
4. Ask students which survey they think will be most effective in finding the information they desire.
5. Have students develop a list of questions to include in the survey.
6. Assist students in designing the survey.
7. After students survey teachers, staff and parents, compile the data.
8. Ask students to generate a list of most popular coffee types.
9. Engage students in a follow-up discussion about their survey. Ask questions:
 - How knowledgeable were the respondents about where their coffee comes from?
 - How might informing people about the origins of coffee and the effects on the environment change things?
 - Do you think it's important that people know where their coffee comes from?
 - Why or why not?

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

Students research the history of coffee grown in one of the Latin American coffees preferred by one of their survey respondents. They will use this information during Step 4 to write and send a letter to this person regarding the implications of their coffee preference on the lives of migratory birds.

Materials

- survey results from Step 1
- world atlas
- Rainforest Alliance supporting materials
- computers with Internet access

Procedure

1. Challenge students to use one of their survey respondent's answers and research the natural history of this type of coffee. Have students focus on the Latin American coffee types. For example, if the respondent checked "Costa Rican" and "Sun Coffee," challenge the student to research the Costa Rican rainforest areas, the specifics of coffee beans from Costa Rica (flavor, aroma, etc.), coffee

Lesson 2

6

Whose Breakfast isn't for the Birds?

farming in Costa Rica, and the possible environmental impacts of sun coffee farming.

2. Have students compile their data. Tell students they will be using their research later in the lesson when they will write a letter to survey respondents about their favorite coffee.

Internet resources: Rainforest Alliance Certified Marketplace (www.rainforest-alliance.org/find-certified), Northwest Shade Coffee Campaign (shadecoffee.org/shadecoffee), British Coffee Association (www.british-coffeeassociation.org)

Step 3A: Practice (math and learning centers)

Challenge

Through a series of guided calculations, students develop a sense of survey respondent knowledge of coffee, how much coffee is grown in rainforests, and the impact of coffee farming techniques on migratory birds.

Materials

- paper, writing utensils

Procedure

Challenge students to complete the calculations and answer the related questions:

- One acre of rainforest land can produce about 1,000 pounds of shade-grown coffee in a year. If the United States imports 2.5 million pounds of coffee in a year, how many acres of rainforest land is needed?
- The average American drinks 3.4 cups of coffee per day. If half of the United States population drinks this amount, how many cups does that equal? If half of the world's population drank the same amount, how many cups would that equal (US and world population available at www.census.gov/main/www/popclock.html)
- How many acres of rainforest would be needed to satisfy the world's coffee consumption if half of the people on earth drank 3.4 cups per day?
- Create a graph illustrating some aspect of the class survey data. Use one of the following formats: Pie chart of the most popular coffee types chosen, bar graph of the amount of knowledge people said they had about their coffee, chart depicting which countries are most preferred for their coffee beans.

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Students draw a map of North, Central and South America and illustrate the relationship between coffee production, coffee consumption and bird migration.

Materials

- world maps for each student, with countries outlined
- colored pencils
- world atlas for reference
- field guides of North American birds
- rainforest poster (available in the Resource Index)

Procedure

1. Hand out several world atlas references.
2. Challenge students to draw a large map of North, Central and South America, including outlines of countries
3. On their respective maps, challenge students to identify the following. Have them use color to illustrate rainforest range and countries.
 - countries containing rainforest
 - countries exporting coffee
 - major bird migration routes of a common North American migratory bird
4. Challenge students to discuss the meaning of their maps. Ask the following questions:
 - How does your map illustrate a connection between coffee production and migratory birds?
 - Who might find this information valuable?
 - Why?

Step 4: Present (edit work/students orally present projects)

Challenge

Each student selects one teacher, school staff member or parent to write and send a letter to highlighting the complex connection between coffee production, consumption, migratory birds and the health of temperate and tropical rainforests.

Lesson 2

6

Whose Breakfast isn't for the Birds?

Materials

- map from Step 3B
- calculations from step 3A

Procedure

1. Tell students that they will be writing a letter to their survey respondent in order to inform them about their choice of coffee and how it is related to migratory bird winter range, rainforests and temperate forests.
2. Challenge students to include the research discovered in Step 2, the calculations determined in Step 3A and the map created in Step 3B to explain the key connections for the coffee drinker receiving the letter.

Lesson 2

Assessment Rubric

6

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student is actively engaged in the process of brainstorming, designing and writing the survey. Student offers insights and respects others' opinions.			
Student uses resources effectively in compiling information about coffee types. Student asks relevant questions and follows through in the process of seeking answers.			
Student creates map in Step 3B that is accurate, to scale and effectively depicts the categories described. Student uses resources effectively to find necessary information.			
Student describes accurately and clearly the connection between coffee consumption, bird migration, and coffee farming in rainforest areas in letter to survey respondent. Letter is neat, professional and engaging.			

Lesson 3

6

How Can my Breakfast Help the Birds?

El Imposible National Park, El Salvador

Concept

Our food choices may have an impact on rainforests. Sun-grown coffee farming destroys essential bird habitat in rainforest areas.

Essential Question

How can my breakfast help the birds?

Introduction

Objectives

1. Students will rank several pictures of farms based on conservation of bird habitat.
2. Students will research sustainable coffee farming techniques with conservation of bird habitat in mind.
3. Students will design two farms with sustainability of bird habitats in mind.
4. Students will send their farm designs to the Rainforest Alliance and the local agricultural cooperative for comment.

Informational Introduction for the Teacher

This lesson guides students in an exploration of sustainable agriculture and its relation to bird habitat. First, students rank pictures of corn and coffee farms according to bird habitat conservation. Next, students research different coffee farming techniques and their relation to bird habitat. Students design and create maps of ideal farms to maximize both crop production and bird habitat conservation. Finally, students send farm designs to the Rainforest Alliance and the local agricultural cooperative for review.

Informational Introduction for the Students

Go to any diner for breakfast and the first thing you hear from the waiter or waitress is “Would you like coffee this morning?” Coffee is the second most traded commodity in the world. The beans are typically grown in areas of tropical rainforest. This form of agriculture can be damaging to migratory bird habitat. In this lesson, we will investigate the different types



of coffee farming and compare them to what we know about agriculture in the United States. Our investigation will include research of different farm types and designing the ideal coffee farm. Our designs will be sent to experts in the field for review.

Step 1: Connect (the concept to prior knowledge)

Challenge

Students work in small groups to rank pictures of 10 different coffee and corn farms according to what they think is in the best interest of a variety of birds.

Materials

- pictures of farms (one set for each group), available at www.rainforest-alliance.org/pictures/shade-coffee

Lesson 3

6

How Can my Breakfast Help the Birds?

Procedure

1. Divide class into groups of three or four.
2. Hand out a group of pictures to each group.
3. Challenge students to rank the pictures according to what they think is best for birds. For example, they might begin by finding the farm with the most trees or the farm they think could support the most diverse and abundant bird life.
4. When students have completed their ranking, ask them to explain why they chose to rank the farms the way they did.

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

Students read about shade-grown coffee and sustainable corn farming techniques and review a number of pictures depicting these farms. Students use this information to reevaluate the pictures they've ranked. They then interpret the advantages of a shade-grown coffee farm over sun coffee and conventional over sustainable farming techniques.

Materials

- ranked pictures of farms from Step 1
- computer with Internet access

Procedure

1. Tell students they will be investigating different types of coffee farms in order to reevaluate their ranking. Their goal is to compare their interpretations to the information at a number of Web-links about shade-grown coffee and other sustainable agriculture techniques.
2. Guide students to the Web sites listed below:
 - Bird-Friendly Farming: A Win-Win Conservation Solution (www.aaes.auburn.edu/comm/pubs/highlightsonline/fall98/birds.html)
 - EarthEasy: Shade-Grown Coffee (eartheasy.com/eat_shadegrown_coffee.htm)
 - Northwest Shade Coffee Campaign: Why Shade Coffee? (www.shadecoffee.org/shadecoffee)
3. After students research the different farm types, invite them to make any changes to their rankings.

4. When all changes have been made, ask groups to compare their rankings. If discrepancies arise, ask students to explain their ideas on which farm is better for birds.

Step 3A: Practice (math and learning centers)

Challenge

Students carry out a number of mathematical calculations designed to illustrate the impact of various agricultural practices on bird populations.

Materials

- paper, writing utensils

Procedure

Challenge students to complete the calculations and answer the related questions:

- Shade-grown coffee farms are typically home to 2/3rds of the normal bird life in a tropical rainforest. Sun coffee farms are typically home to 1/15th of the normal bird life in a tropical rainforest. If 225 bird species are typically found in an undisturbed rainforest, how many different types of birds would you expect to find in a shade-grown coffee farm?
- Using the same ratios from question 1, how many different types of birds would you expect to find in a sun coffee farm?
- How might this information be useful in conservation of bird habitat in tropical rainforests?
- How about temperate forests?

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Students design two farms with sustainability of bird habitats in mind. One farm is a corn farm in the eastern United States and the other is a coffee farm in El Salvador.

Materials

- construction paper
- art supplies
- world atlas
- pictures of farms

Procedure

1. Challenge students to design two farms with

Lesson 3

6

How Can my Breakfast Help the Birds?

sustainability of bird habitat in mind. One is a corn farm in the eastern United States and the other is a coffee farm in El Salvador. The goal of each ideal farm is to be able to grow crops and protect birds. Tell students they will draw maps of their farms and send them to organizations for comment.

2. Suggest to students they begin by creating a list of goals and practices designed to meet these goals. For example: Goal: Produce two varieties of coffee (Robusta and Arabica) while preserving bird food sources (i.e., insects). Practice: Grow Robusta plants in most shaded areas (it requires less specific conditions), Arabica in full sun and eliminate pesticide use. Have students write these goals in a chart form to be included on the map of their farm.
3. After students have completed their goals, hand out two large (11" x 14") pieces of paper and art supplies. Challenge students to create the ideal farm that will meet the goals they've created.

Materials

- farm designs from step 3B

Procedure

1. Tell students they will be sending their farm designs to the Rainforest Alliance (an organization that works with farmers in Latin America to help them grow crops sustainably) and to the local agricultural cooperative for comment on their sustainability practices.
2. Challenge students to compose a short letter of explanation to the Rainforest Alliance and agricultural cooperative describing their farm designs. The letter should include a description of the assignment, specific areas that the student would like comment on and any questions about agriculture, coffee and birds that they would like answered.

Step 4: Present (edit work/students orally present projects)

Challenge

Students send their farm designs to the Rainforest Alliance and/or the local agricultural cooperative for comment on their sustainability practices.

Lesson 3

Assessment Rubric

6

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

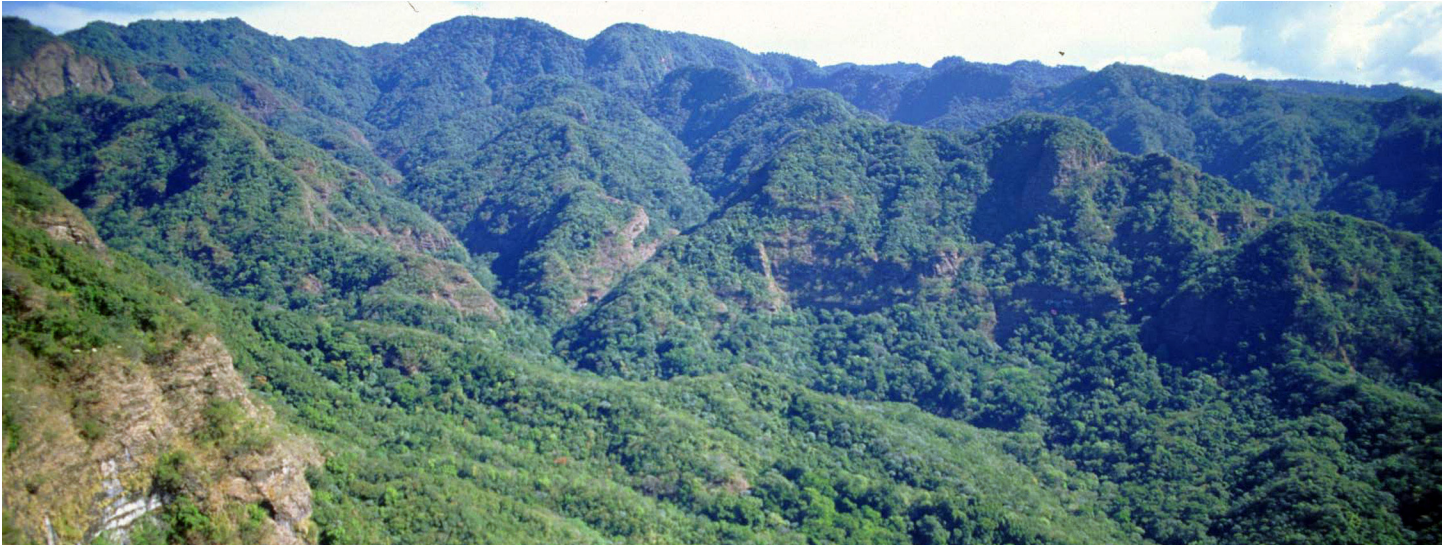
Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
While ranking farm photos, student shows enthusiasm, works well with the group, respects others' opinions, asks good questions, uses prior knowledge when considering pictures and offers insights when appropriate.			
Student uses resources provided to rework the ranking of pictures. Student identifies connections between farm technique and its effects on bird habitats.			
Student's goals and corresponding practices are logical and supported by the research performed in previous steps. Student's goals and practices demonstrate knowledge of different farming techniques and their connection to bird habitat.			
Maps of ideal farms are creative, visually engaging and include a chart listing goals and corresponding procedure. Farm designs clearly illustrate knowledge of sustainable farming techniques and the relationship to bird habitat.			

Sixth Grade



Supplementary Materials

- **Teacher Summary**
- **Resources**
- **National Standards**



El Salvador has the highest population density (260 people per square kilometer) and the lowest percentage of intact primary forest (about two percent) in all of Latin America. Much of the country is intensely farmed, even the steepest slopes, making them susceptible to landslides and flooding. El Salvador, like much of Central America, was ravaged by civil conflict for most of the 70s and 80s. These conflicts stemmed in part from an intense need for land among the many landless peasants. Most recently, the already hard-hit communities of northern El Salvador were struck by major earthquakes, destroying much of the little infrastructure the area had.

Of the few remaining natural areas in El Salvador, El Imposible (The Impossible) National Park has the greatest diversity of species of plants and animals in the country. At least 400 species of plants and many spectacular animal species, such as the ocelot, great curassow, black-hawk eagle and crested guan are making their last stand in El Imposible.

Traders from Guatemala used to travel through the mountainous forests of El Salvador to reach the local markets, carefully leading their mules through the steep Impossible Pass, from which the park takes its name. The park is one of the few existing examples of the typical Mesoamerican Pacific coastal rainforests. It is a major source of air purification for the northwestern part of the country and the source of eight major rivers, which supply drinking water to the entire region and feed important coastal mangroves. Additionally, the park is part of the Mesoamerican Biologic Corridor, a major conservation initiative to create a connected series of protected areas between the U.S. and Colombia, running the length

of Central America. El Imposible represents the only viable forests within El Salvador, and thus is a crucial component of the Corridor.

El Imposible is characterized by middle elevation tropical montane forest. At its highest elevations, El Imposible has small remnants of cloudforest—the misty forests that are home to sloths, ocelots, orchids and bromeliads, among others. The park stretches down into the valleys, encompassing many spectacular waterfalls and rivers, where the forest changes over to lush rainforests replete with toucans, macaws, anteaters, capuchin monkeys, snakes and dozens of other birds species. Gone are the large mammals that could once be found in El Salvador's forests—jaguars, tapirs, pumas—which could no longer take the continued reduction of habitat. El Salvador's forests are crucial habitat for the millions of migratory songbirds that travel south from the U.S. and Canada each winter in search of warmer temperatures and fresh food supplies. Many of “our” birds in the Northeast travel to the coffee forests of Central America each year—more than 3,000 miles each way!

El Imposible National park, created by government decree on March 16, 1989, includes a core protected area of 8,818 acres. The core of the park is restricted to scientific research and recreational uses, in much the same way that our national parks are used. When the park was created, it was drawn on top of existing private lands. The government has pledged to help the families who live inside the park to relocate by buying their land at a fair price. However, in the 12 years since the park was established, none of the families have received compensation. Surrounding the core is a buffer zone of 5,449 acres that



are intended to be used for limited farming, while prohibiting deforestation, hunting, fishing and any new building in the area. Families living within the buffer zone have been a key part of SalvaNatura's plan for managing El Imposible. Many of the more than 100,000 residents of the area are living at or below the poverty level, desperate for an opportunity to provide a better life for their children and themselves. SalvaNatura has long recognized that they must work with these families to help them meet their economic needs while respecting the aims of the national park.

All of the land within the buffer zone is privately owned. SalvaNatura has been fundraising over the years to buy available land to help families relocate. Thus far, with support from international donors (including the Rainforest Alliance), SalvaNatura has purchased more than 1,200 acres. All of SalvaNatura's lands are adjacent to the park and within the buffer zone previously described. These lands are managed under the same restrictions as the rest of the park. Wildlife habitat is growing and natural regeneration is taking place in degraded areas. SalvaNatura is able to enforce park regulations that foster natural regeneration of wildlife habitat on its property and on lands that belong to the Salvadoran government. However, it is a constant struggle to enforce regulations on private properties in the buffer zone.

The hillsides of El Imposible are well-suited to low-impact agricultural practices and have been farmed in some fashion for hundreds of years. SalvaNatura (SN) and the Rainforest Alliance (RA) have been working with these small farmers to develop guidelines for growing environmentally-sustainable coffee in the hills of El Im-

posible. Coffee is a major cash crop throughout Central America. But due to price fluctuations and the high costs of agrochemicals, many small farmers are unable to provide for their families on their small parcel of land. SN and RA help farmers to improve their quality, production and income, while decreasing their impact on the fragile wildlife of El Imposible. As part of their effort to promote sustainable livelihoods among the communities of El Imposible, SN promotes wise soil management, planting fruit trees (great habitats for birds and a good source of nutrition for children), using living trees as fences and fire wood nurseries (most residents still use wood to cook and heat, taking wood from the forest), and organizes community projects including school nurseries and latrines.

In addition to their efforts to increase the size of the park, SalvaNatura has concentrated much of its efforts in promoting eco-tourism in the buffer zone. Hiking, bird watching and archaeological trips are organized by a group of trained guides from the community. These guides, many of them former hunters or loggers, are now able to make a living without destroying the forest. To help others in the communities around the park, SN has provided small loans to help start up a family-owned inn, local restaurant, natural medicine stall, handicraft gift shop and three country stores. These businesses improve the experiences of visitors to the park, by providing the comforts one expects when traveling, while providing a livelihood to local families.

Another important project being carried out by SalvaNatura is environmental education for local children. Local schoolchildren are benefiting from the creation of

“Los Habitantes del Imposible,” (the Residents of El Imposible) a program held in 40 local schools to promote pride among the residents. The materials teach children about what a special place they live in, and encourage careful stewardship of the land. SalvaNatura supports 132 literary circles in neighboring communities and has published numerous stories and guides, including a col-

lection of national postage stamps. All of these projects are part of SalvaNatura's efforts to provide the communities of El Imposible with viable economic alternatives, raising them out of desperate poverty, so that they will be able to contribute to the preservation of El Salvador's very *possible* national park.



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Resource Index

Check out this page for additional supplemental materials that complement these dynamic units and to access many of the resources listed below.

www.rainforest-alliance.org/curricula/resources

Slideshow (1)

The Curriculum site provides a slideshow and script about El Salvador that includes background information about the animals, people and landscape of this region. The slideshow can be download for viewing in the classroom, printed out and read as a story, or viewed online with the students.

www.rainforest-alliance.org/pictures/el-salvador-kids

Unit-Specific Story (2)

The Rainforest Alliance has developed two original stories for use with this unit, available in English, Spanish and Portuguese. The stories are available to download and print or can be viewed onscreen.

- *Alex Goes Exploring in El Imposible*
www.rainforest-alliance.org/pictures/alex-explores-el-imposible
- *Life in San Miguelito*
www.rainforest-alliance.org/pictures/life-in-san-miguelito

Species Profiles (3)

The species profiles include photos, habitat, foraging behavior, group relationships, threats and many more facts.

- ocelot
- great curassow
- king vulture
- blue-crowned motmot

www.rainforest-alliance.org/species

Rainforest Products

Check out a summary of products found in our homes and supermarkets that either originated in tropical forests or are currently produced there.

www.rainforest-alliance.org/articles/tropical-forests-in-our-daily-lives

www.rainforest-alliance.org/articles/7-everyday-foods-from-the-rainforest

Park Profiles

A basic introduction to El Imposible National Park.

www.rainforest-alliance.org/adopt-a-rainforest/el-salvador

Rainforest Poster

Download and print out this colorful two-page poster, which is available for you to use in explaining the layers of the rainforest, its products and the environmental threats facing many rainforests around the world.

Inside the Canopy – structure and species of the rainforest

www.rainforest-alliance.org/publications/inside-the-rainforest-canopy

Conservation Coffee Summary

Access an eight-page introduction to the issue, including a glossary of terms. These are appropriate for students to read independently.

www.rainforest-alliance.org/sites/default/files/uploads/pdfs/curricula/conservation-coffee.pdf

Venn Diagram Template

Download a photocopy-ready Venn diagram designed to complement this unit.

www.rainforest-alliance.org/sites/default/files/uploads/pdfs/curricula/venn-brazil.pdf

Certificate of Accomplishment

Print out colorful rainforest certificates for your students to commemorate their completion of these units.

www.rainforest-alliance.org/curricula/certificate-of-participation

Visual Arts

Standard 2

Level 3: Grade 5–8

- Knows how to use structures (e.g., sensory qualities, organizational principles, expressive features) and functions of art
- Knows how the qualities of structures and functions of art are used to improve communication of one's ideas

Geography

Standard 2

Level 3: Grade 5–8

- Knows the location of places, geographic features and patterns of the environment
- Knows the relative location of, size of and distance between places (e.g., major urban centers in the United States)

Standard 3

Level 3: Grade 5–8

- Understands the characteristics and uses of spatial organization of Earth's surface
- Understands how places are connected and how these connections demonstrate interdependence and accessibility (e.g., the role of changing transportation and communications technology, regions and countries Americans depend on for imported resources and manufactured goods)

Life Sciences

Standard 6

Level 3: Grade 5–8

- Understands relationships among organisms and their physical environment
- Knows factors that affect the number and types of organisms an ecosystem can support (e.g., available resources; abiotic factors such as quantity of light and water, range of temperatures and soil composition; disease; competition from other organisms within the ecosystem; predation).

Mathematics

Standard 6

Level 3: Grade 5–8

- Understands and applies basic and advanced concepts of statistics and data analysis
- Reads and interprets data in charts, tables, plots (e.g., stem-and-leaf, box-and-whiskers, scatter) and graphs (e.g., bar, circle, line)
- Organizes and displays data using tables, graphs (e.g., line, circle, bar), frequency distributions and plots (e.g., stem-and-leaf, box-and-whiskers, scatter)

Thinking and Reasoning

Standard 6

Level 3: Grade 5–8

- Applies decision-making techniques
- Makes decisions based on the data obtained and the criteria identified
- Secures factual information needed to evaluate alternatives

Environment and Society

Standard 14

Level 3: Grade 5–8

- Understands how human actions modify the physical environment
- Understands the environmental consequences of people changing the physical environment (e.g., the effects of ozone depletion, climate change, deforestation, land degradation, soil salinization and acidification, ocean pollution, groundwater quality decline, using natural wetlands for recreational and housing development)