



TEACHER'S GUIDE
Pioneer and Trailblazer
Vol. 19 No. 7

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Educational consultant **Stephanie Harvey** helped shape the instructional vision for this Teacher's Guide. Her goal is to ensure you have the tools you need to enhance student understanding and engagement with nonfiction text.

Lexile® Framework Levels

Pioneer

Introduction/What You Need to Know 470/510
 Balance for the Bogs 520
 Flying Flowers of Rwanda/Protecting the Marsh/
 Managing Mangroves..... 500/520/400

Trailblazer

Introduction/What You Need to Know650/660
 Balance for the Bogs 580
 Flying Flowers of Rwanda/Protecting the Marsh/
 Managing Mangroves..... 600/590/580

Standards Supported

- Common Core State Standards (CCSS)
- Next Generation Science Standards (NGSS)
- C3 Framework for Social Studies State Standards (C3)

See each lesson for standards covered.

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INTRODUCTION

BACKGROUND

Since 1888, the National Geographic Society has funded scientists and explorers and shared their findings with the world. To support educators who use our resources, we have created a Learning Framework, which lays out what we believe students should learn from their experiences with the Society.

PURPOSE

The Learning Framework was designed to convey the Society's core beliefs and values. It is built around a set of attitudes, skills, and knowledge that embody the explorer mindset.

To determine the learning outcomes within the Learning Framework, we dug deep into national standards in key subject areas. We also sought advice from subject matter and child development experts, along with the combined expertise of NG instructional designers, researchers, and content developers. To learn more, go to: <https://www.nationalgeographic.org/education/learningframework/>.

IMPLEMENTATION

Each article in this magazine has a knowledge-based link to the Learning Framework.

MINDSET OF AN EXPLORER: KEY FOCUS AREAS

Attitudes



CURIOSITY An explorer remains curious about how the world works throughout his or her life. An explorer is adventurous, seeking out new and challenging experiences.

RESPONSIBILITY An explorer has concern for the welfare of other people, cultural resources, and the natural world. An explorer is respectful, considers multiple perspectives, and honors others regardless of differences.

EMPOWERMENT An explorer acts on curiosity, respect, responsibility, and adventurousness and persists in the face of challenges.

Skills



OBSERVATION An explorer notices and documents the world around her or him and is able to make sense of those observations.

COMMUNICATION An explorer is a storyteller, communicating experiences and ideas effectively through language and media. An explorer has literacy skills, interpreting and creating new understanding from spoken language, writing, and a wide variety of visual and audio media.

COLLABORATION An explorer works effectively with others to achieve goals.

PROBLEM SOLVING An explorer is able to generate, evaluate, and implement solutions to problems. An explorer is a capable decision maker—able to identify alternatives and weigh trade-offs to make a well-reasoned decision.

Knowledge



THE HUMAN JOURNEY An explorer understands where we came from, how we live today, and where we may find ourselves tomorrow.

OUR CHANGING PLANET An explorer understands the amazing, intricate, and interconnected systems of the changing planet we live on.

WILDLIFE AND WILD PLACES An explorer reveals, celebrates, and helps to protect the amazing and diverse creatures we share our world with.

LANGUAGE ARTS Synthesizing Information for the Big Ideas

Second Grade Standard Supported

- **CCSS Reading Informational Text:** Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text. (2–2)

Third Grade Standard Supported

- **CCSS Reading Informational Text:** Determine the main idea of a text; recount the key details and explain how they support the main idea. (3–2)

What You'll Need

- Explorer Special Issue: Wetlands
- Think Sheet (Teacher's Guide, page 6)
- Clipboards
- Pencils

CONNECT & ENGAGE (5–10 minutes)

Kids are in a group in front of you. Hold up the cover of the magazine.

Say: *This is a special issue of Explorer magazine. Every article in this issue is about wetlands. I'm going to read aloud page 3. It was written by the magazine's managing editor, Brenna Maloney. Reading this may give us a sense of what big ideas will be covered in this issue.*

Read page 3 to students.

Say: *This message from the managing editor starts to give us some ideas about the importance of wetlands, but we will find out more as we continue reading. However, we've already started to learn a few details about wetlands, which will help us determine the big ideas in this issue.*

Say: *It's our job as readers to think about and synthesize the variety of facts and details to arrive at the big ideas. Turn and talk about some of the details you learned about wetlands from the managing editor's message on page 3.*

Kids turn and talk.

At this point, you may also want to spend some time reading through and discussing with students "What You Need to Know" on pages 4–5 to build more background about wetlands before reading the other articles in the magazine.

MODEL (10 minutes)

Kids sit in a group with you in front of them. You will be modeling using pages 14–15 of the article "Flying Flowers of Rwanda."

Say: *Nonfiction articles like the ones we are reading are packed with information. When we encounter lots of information in our reading, we need to slow down, read closely, and pay attention to the details. These are the bits and pieces that can help us synthesize and discover the big idea.*

Say: *Titles can often tell us what an article is about. If a title doesn't tell us exactly, it can at least give us clues. We can use other information like photos and illustrations to help, too. Let's look at this title—"Flying Flowers of Rwanda." Let's also look at the photo and the text on page 14. Under the title on page 14, the text says "Can dragonflies help save Rugezi Marsh? I'm already getting lots of clues from the title and also the photo. I'm intrigued by the title. From the question under the title, I am going to guess that the dragonflies are what the author is calling "flying flowers." That's pretty cool, and that small illustration of the dragonfly does look a little like a flower. I have a question though. I wonder how dragonflies can save the marsh.*

Say: *I'm going to keep reading now to look for details that might help me understand how dragonflies can help save the marsh. I'll read aloud page 15, and then I'll go back to the text and write down the details that I learned.*

Read the text on page 15 and write the details on sticky notes or on the board. Be sure to "think aloud" so students can understand how you are sorting through and processing the information. The details are a little different in Pioneer and Trailblazer. You can write down the details exactly as they are written in the article or paraphrase them a bit, as shown below.

- Rwanda is in Africa. The author, Erasme Uyizeye, grew up there.

LANGUAGE ARTS Synthesizing Information for the Big Ideas

- Erasme’s village was close to a wetland.
- Erasme and his friends called the dragonflies they saw while swimming, “flying flowers of the river.”
- Over time, there were fewer and fewer dragonflies. Erasme wondered why.
- Erasme now does a lot of his work in this wetland, which includes the Rugezi Marsh.
- The marsh is a source of water and power.

Say: *Next, I’ll look again at the details and think about how they fit together. I’m also not forgetting that we said the title can often tell or be a clue to the big idea, so I’m going to keep that in mind, too.*

Say: *Well, I’ve got quite a few details listed, and they all tie together with Erasme and his work in the marsh in Rwanda. I know the dragonflies are part of the big idea, but I don’t exactly know in what way yet. I’m guessing they are important for the marsh and that I’ll find out more as I read on. I’m going to be on the lookout for more details that will help me understand what the big idea is.*

Say: *Now, turn and talk about what you noticed me doing as I was reading and thinking about the details and the big idea.*

Let students turn and talk and then share out.

GUIDE (10 minutes)

Hand out Think Sheets and have kids attach them to their clipboards. Kids remain in a group in front of you.

Say: *Let’s keep reading. I’ll read some more text aloud, and you can read along, too. Don’t forget to look at the photos and the map, too. Write down the details you hear on the Think Sheet squares.*

Read aloud page 16. Kids should note on their Think Sheet squares a few more details.

Pioneer Details

- Years ago, this area faced a crisis. There was little rainfall, and there was too much building and farming.
- This was harming the ecosystem—water levels in the marsh dropped, and there was less power.
- They are working to bring back the marsh, and dragonflies can help.
- Dragonflies spend most of their life cycle in the water, but the water must be clean for them to live.
- Erasme and his team track dragonflies. When they can’t find them, they know that part of the marsh needs help.

Trailblazer Details

- Years ago, Rwanda faced an energy shortage. Too much human activity and too little rainfall harmed the ecosystem.
- Rwanda’s people depend on farming, and they converted the wetlands into farmland.
- In the last two decades, people have tried to restore the marsh, and some of their efforts are working.
- Dragonflies are part of the solution!
- Dragonflies are a sign of the health of the wetland. They spend most of their life cycle there, but for the dragonflies to thrive, the water has to be clean. They also need healthy plants nearby to hide from predators.
- Erasme and his team use the dragonflies to help them identify areas that need protecting.
- As the marsh continues to recover, they should see more and more dragonflies.

Say: *Okay, what details did we have on this page? Do you have a better idea now about what the big idea might be? How could we state the big idea, based on the details we’ve seen so far? Turn and talk about that, and then you can share out.*

Encourage kids to think about how to synthesize the details and come up with a few different ways of stating the big idea. Some suggestions kids might have include the following:

- Dragonflies are a sign of a clean and healthy wetland.
- Erasme and his team track dragonflies to monitor the health of Rugezi Marsh.

Let kids know that there are many ways to state the big idea. Have kids share and discuss their different ways of thinking about and stating the big idea.

LANGUAGE ARTS Synthesizing Information for the Big Ideas

COLLABORATE (25 minutes)

Say: *Now it's your turn. Find a partner and choose one of the other articles in the magazine to read together. We know that all of the articles in this issue are about wetlands, but each article has a different focus, with different details and different big ideas.*

Say: *Write down the details on your Think Sheet squares. Keep talking about how they fit with the other details in the article. As you read and learn more details, you might have some different thoughts about what the big idea is. Continue to synthesize these details and refine your thinking about the big idea.*

Say: *While you are working together, I'm going to walk around the room to see if you need any help or have any questions.*

Kids read, write down details, and talk about them and the big idea. Move around the room, conferring with partners.

SHARE THE LEARNING (10 minutes)

You might want to have kids do one or both of the following to share their learning.

- Have partner groups who read the same article share and compare the information about the details they wrote down and their thoughts about the big idea. Remind students that there are different ways to state a big idea.
- Have partner groups who read a different article share the big idea of the articles they read and discuss the details that helped them synthesize the big idea.

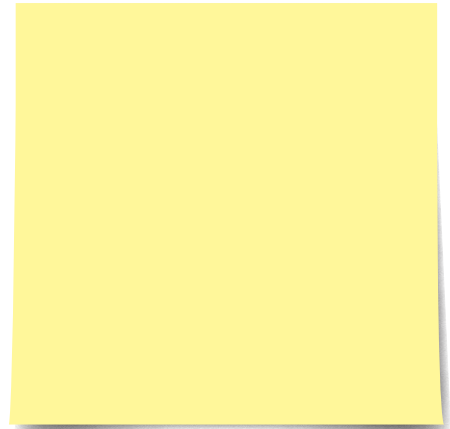
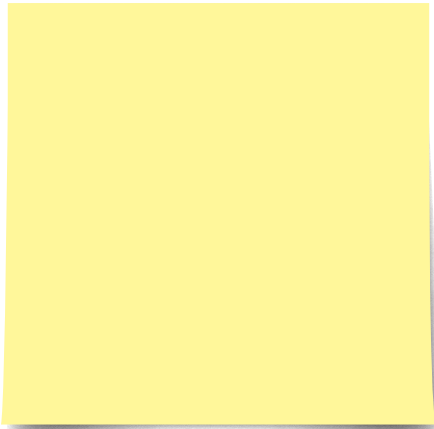
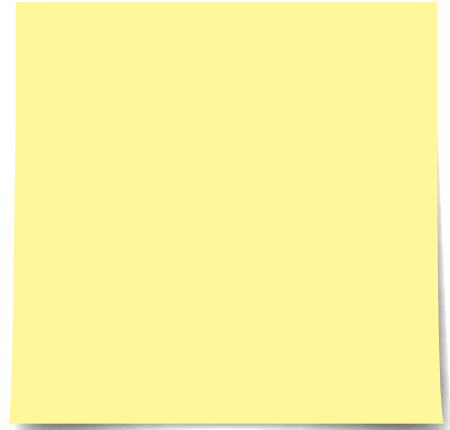
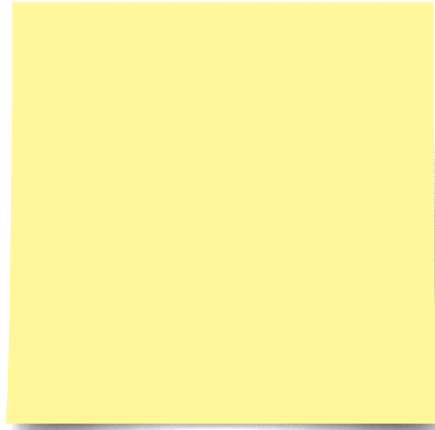
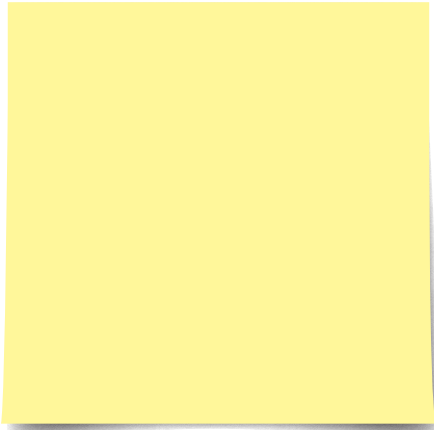
Say: *Synthesizing the details to see how they all relate to one another to come up with the big idea takes some clever thinking. Great work today, everyone!*

Name _____

Date _____

THINK SHEET

Write the details you learned in the note squares. Write the big idea on the lines at the bottom.



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LESSON FRAME Synthesizing Information for the Big Ideas

What You'll Need

- Nonfiction text
- Think Sheet template
- Clipboards and pencils

This frame is a kind of template of the lesson we just worked on. It has the instructional moves and language of the lesson, but the specific content has been removed. This way you can use the Lesson Frame for the other articles in the issue or for any nonfiction text you might be teaching.

CONNECT & ENGAGE (5–10 minutes)

Kids are in a group in front of you. Hold up page(s) _____.

Say: *Titles can often tell us what an article is about. If a title doesn't tell us exactly, it can at least give us clues. We can use other information like photos and illustrations to help, too. Let's look at this title _____. Let's also look at the pictures and the text on these pages. Turn and talk about what you think this article might be about.*

Read the title of the article and the text on page(s) _____. Give kids time to turn and talk and then share out with the class.

Say: *A title can help us begin to figure out what the big idea of an article is. You can think about it this way: Many writers try to synthesize, or combine, a lot of information to create a title that gives readers a clue to what they will be reading. And they have to do this in just a few words. That's not an easy task, is it?*

Say: *It's our job as readers to use the title as a clue, and then as we read, synthesize the variety of facts and details to arrive at the big idea.*

MODEL (10 minutes)

Kids sit in a group with you in front of them.

Say: *Nonfiction articles like the one we are reading are packed with information. When we encounter lots of information in our reading, we need to slow down, read closely, and pay attention to the details. These are the bits and pieces that can help us synthesize and discover the big idea.*

Say: *Watch and listen as I show you how I do this. I'm going to write down the details. Next, I'll look again at all of the details and think about how they fit together. I'm also not forgetting that we said the title can often tell or be a clue to the big idea, so I'm going to keep that in mind, too.*

Read aloud page(s) _____. Then write down on sticky notes or on the board what the details are. Be sure to "think aloud" so students can understand how you are sorting through and processing the information. You can write down the details exactly as they are written in the article or paraphrase them a bit.

Say: *Wow! There are a lot more details than I realized. I want to think about these details and the title again. The title is _____. Now I know for sure that _____. The details on these pages helped me figure that out. From these details I also _____. I'm going to keep this in mind as we continue to read and synthesize the details to come up with the big idea of this article.*

Say: *Turn and talk about what you noticed me doing as I was reading and thinking about the details and the big idea.*

Let students turn and talk and then share out.

LESSON FRAME Synthesizing Information for the Big Ideas

GUIDE (10 minutes)

Hand out Think Sheets and have kids attach them to their clipboards. Kids remain in a group in front of you.

Say: *Let's keep reading. I'll read some more text aloud, and you can read along, too. Don't forget to look at the photos. Write down the details you hear on the Think Sheet squares.*

Read aloud page(s) _____. Kids should note on their Think Sheet squares a few more details.

Say: *Okay, what details did we have here? Do you have a better idea now about what the big idea might be? How could we state the big idea, based on the details we've seen so far? Turn and talk about that, and then you can share out.*

Encourage kids to think about how to synthesize the details and come up with a few different ways of stating the big idea.

Say: *Let kids know that there are many ways to state the big idea. Have kids share and discuss their different ways of thinking about and stating the big idea.*

COLLABORATE (25 Minutes)

Say: *Now it's your turn. Find a partner and continue reading together.*

Say: *Write down the details on your Think Sheet squares. Keep talking about how they fit with the other details in the article. As you read and learn more details, you might have some different thoughts about what the big idea is. Continue to synthesize these details and refine your thinking about the big idea.*

Say: *While you are working together, I'm going to walk around the room to see if you need any help or have any questions.*

Kids read, write down details, and talk about them and the big idea. Move around the room, conferring with partners.

SHARE THE LEARNING (10 minutes)

Kids join a sharing circle with you.

Say: *Let's take some time to have a few of you share the big idea of the article you read and the details that helped you determine the big idea. Remember to share using respectful language. After you share, ask if anyone has any comments or questions. Then you can invite someone else to share.*

Kids share out and invite others to share, always using respectful sharing language. There should be time for about 3 or 4 kids to share out with the whole group.

Say: *Synthesizing the details to see how they all relate to one another to come up with the big idea takes some clever thinking. Great work today, everyone!*

Introduction/What You Need to Know

SCIENCE

Standards Supported

- **NGSS ESS2.A: Earth Materials and Systems:** Wind and water can change the shape of land. [2-ESS2-1]
- **NGSS Science and Engineering Practices: Obtaining, Evaluating, and Communicating Information:** Obtain and combine information from books and other reliable media to explain phenomena. [3-ESS2-2]

Resources

- Projectable PDF or interactive digital magazine
- Wetlands of the World posters: Bog, Mangrove, Swamp, Marsh (Teacher's edition)
- Content Assessment Master (page 11)
- Article Test (page 16)

Science Background

A wetland is an area where water covers the soil for at least part of the year. From swamps and marshes to bogs and mangroves, there are many kinds of wetlands. The type of wetland that forms in an area depends on factors such as the type of soil, topography, climate, and vegetation.

Wetlands are important ecosystems. They help prevent flooding, clean and filter water, and provide homes for many different plant and animal species.

The soil in a wetland is soft and spongy, making it difficult to build on the land. So for most of history, people saw wetlands as wastelands. They drained wetlands and put the land to other uses. In the early 1970, governments started to see the value in wetlands and began preserving these ecosystems. In many parts of the world, it is now illegal to alter or destroy wetlands.

ENGAGE

Encourage students to review the **Introduction** and the article and turn and talk with a partner to discuss what they see. Invite students to ask questions or share what they already know about wetlands.

EXPLORE

Display the **Introduction** with the projectable PDF or the interactive digital magazine. Instruct students to read the text and examine the photos. As a class, search for clues that explain what a wetland is. Then have students read the **"What You Need to Know" feature** on the following spread.

EXPLAIN

After reading, remind students that a wetland is land that is covered by water for at least part of the year.

Ask: *What are four reasons wetlands are important ecosystems?* (They are like giant sponges and help stop flooding. They clean and filter water. They are homes for plants and animals. They are important to people who use them in different ways) *What threats do wetlands face?* (building/development, farming/agriculture, unwanted living things/invasive species, and climate change) Have students discuss these issues in small groups. Guide the class to recognize that people caused many of the problems wetlands face. But people can work together to find solutions. Challenge students to identify things people can do to help keep wetlands healthy.

ELABORATE

Display and review the four **"Wetlands of the World" posters**. Instruct students to compare and contrast the four types of wetlands they see. Invite volunteers who have visited any of these types of wetlands to describe the plants, animals, and landscape they found there. As a class, compare and contrast the four wetlands so students understand how each one is unique.

EVALUATE

Have students complete the **Content Assessment** for this lesson. Then have them take the **Article Test**. Encourage them to share and compare their results in small groups.

Name _____

Date _____

CONTENT ASSESSMENT: Introduction/What You Need to Know

Conduct research to find an interesting bog, mangrove, swamp, and marsh. Write its name and location in the box.

Then draw and write to show and tell about each one.

	Draw	Write
Bog		
Marsh		
Swamp		
Mangrove		

Balance for the Bogs

SCIENCE

Standards Supported

- **NGSS ESS1.C: The History of Planet Earth:** Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)
- **NGSS ESS3.B: Natural Hazards:** A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)

Resources

- Projectable PDF or interactive digital magazine
- Content Assessment Master (page 13)
- Article Test (page 17)

Science Background

A bog is a type of freshwater wetland most often found in cold or even Arctic areas. Bogs often form in shallow lakes when plant debris slowly builds up and fills the lake. It can take hundreds or even thousands of years for a bog to form.

While grasses and sedges eventually cover a bog's surface, at its bottom is a thick, spongy mat of material called peat. Peat is a valuable fossil fuel, and some people cut it into squares, dry it out, and burn it for heating and cooking.

Few plants can grow in a bog's soggy soil. In addition to being highly acidic, the soil has low levels of oxygen and nutrients. Plants that do live here have adapted to survive. Some are carnivorous and get their nutrients from the insects they catch and digest.

Bogs are known as carbon sinks. They store huge amounts of carbon in peat. This helps keep global temperatures from rising.

ENGAGE

Encourage students to flip through the article and turn and talk with a partner to discuss what they see. Invite students to ask questions or share what they already know about bogs.

EXPLORE

Display the "**Balance for the Bogs**" article with the projectable PDF or the interactive digital magazine. As a class, discuss what a bog is. Then brainstorm ideas about what might means for a bog to be in balance.

EXPLAIN

After reading, remind students that a bog is a type of wetland that accumulates peat. Peat is a deposit of dead plant material. As a class, review how a bog forms. (These details can be found in the "**How Raised Bogs Form**" sidebar.) Brainstorm ideas about why it might take thousands of years for a bog to form. **Ask:** *How do bogs help keep Earth's temperature from rising?* (They absorb and store carbon dioxide. Carbon dioxide traps heat. If there's too much of it in the air, it can cause Earth to heat up.) Have students reading the TRAILBLAZER edition review the "**Carbon Sources vs. Carbon Sinks**" feature for more details on this process. Then point out that some people use peat for fuel. **Ask:** *Why does this worry some people?* (Burning peat releases carbon dioxide into the air, which can cause temperatures to rise.) In small groups, have students discuss what lawmakers in Ireland are doing to preserve bogs and why this is important.

ELABORATE

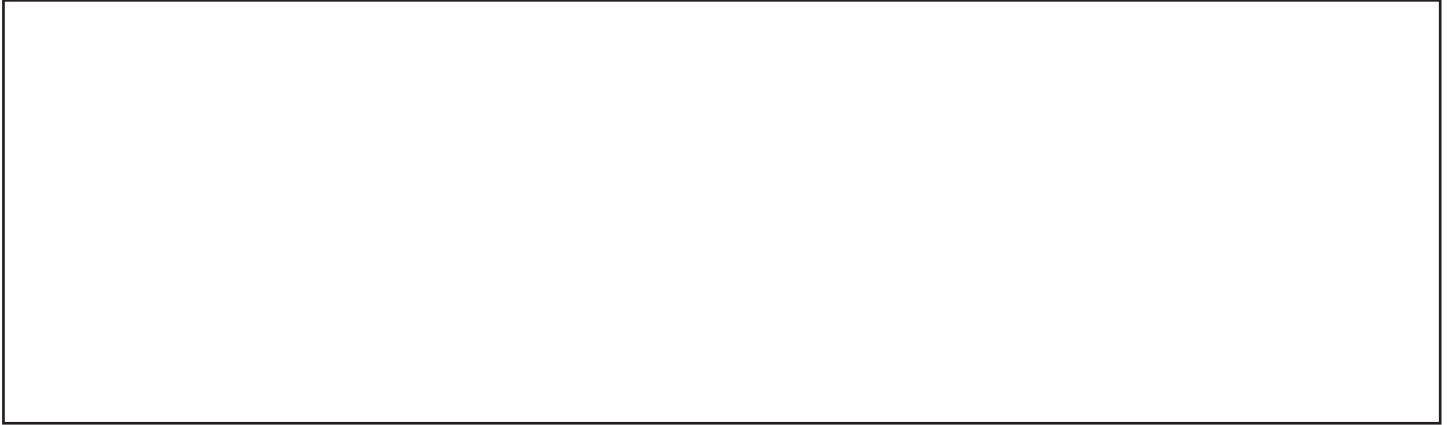
Remind students that burning peat releases carbon dioxide into the atmosphere. This causes Earth's temperature to rise. As a class, discuss reasons why people still want to burn peat for fuel. Brainstorm ideas about what could be done to stop this practice and convince people to change.

EVALUATE

Have students complete the **Content Assessment** for this lesson. Then have them take the **Article Test**. Encourage them to share and compare their results in small groups.

CONTENT ASSESSMENT: Balance for the Bogs

Draw a picture of a raised bog. Then answer the questions.



How does a raised bog form?	How do bogs help protect Earth?
Why do some people burn peat?	Why are some people against burning peat?

Do you think people should burn peat? Why or why not?

Flying Flowers of Rwanda

SCIENCE

Standards Supported

- **NGSS ETS1.A: Defining and Delimiting Engineering Problems:** Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- **NGSS LS4.D: Biodiversity and Humans:** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

Resources

- Projectable PDF or interactive digital magazine
- Content Assessment Master (page 15)
- Article Test (page 18)

Science Background

The Rugezi Marsh is a large wetland located in northern Rwanda. It is a diverse ecosystem for plants and animals. It is also an important resource for people, who rely on its waters to feed the two area hydroelectric plants that bring power to their homes.

Years ago, lack of rainfall and the growing demands of human activities caused water levels in the marsh to plummet, putting this valuable resource at risk. Ever since, people have been working hard to restore the wetland.

National Geographic Explorer Erasme Uyizeye is one of those people. And in his quest to restore the wetlands, he discovered a surprising helper: dragonflies. Dragonflies spend most of their lives in the water. They thrive where water is clean and healthy plants abound. By monitoring dragonfly numbers, Uyizeye is helping to identify areas of the marsh that need protecting.

ENGAGE

Encourage students to flip through the article and turn and talk with a partner to discuss what they see. Invite students to ask questions or share what they already know about marshes.

EXPLORE

Display the "**Flying Flowers of Rwanda**" article with the projectable PDF or the interactive digital magazine. As a class, discuss reasons why the author and his friends might have called dragonflies "flying flowers" and how they can help save a marsh.

EXPLAIN

After reading, remind students that Explorer Erasme Uyizeye loved watching dragonflies in the Rugezi Marsh when he was a child. **Ask:** *What did he notice about dragonflies over time?* (There were fewer of them.) Point out that during that same time, the Rugezi Marsh was changing. Have students turn and talk to discuss what happened. (Lack of rainfall and too much farming and building caused water levels to drop.) **Ask:** *How did this affect the people who lived there?* (They had less power.) *Why?* There wasn't enough water to feed the power stations that produced their electricity.) Remind students that Uyizeye is now an ecologist who is working to restore the marsh. **Ask:** *How does his childhood interest in dragonflies now help him with his work?* (He tracks dragonflies in the marsh. Finding them shows him where water is clean and where it needs to be protected.) Have students discuss how Uyizeye can use this knowledge to save the Rugezi Marsh.

ELABORATE

Have students read the "**Protecting the Marsh**" and "**Managing Mangrove**" articles. Discuss each article. Then challenge students to explain how careful observation, like Uyizeye's tracking of dragonflies, has or could help people better protect wetlands in other places, too.

EVALUATE

Have students complete the **Content Assessment** for this lesson. Then have them take the **Article Test**. Encourage them to share and compare their results in small groups.

CONTENT ASSESSMENT: Flying Flowers of Rwanda

Answer each question about the article.

<p>Why is the Rugezi Marsh an important ecosystem?</p>	
<p>What problem did the marsh face?</p>	
<p>How has Erasme Uyizeye used his observations to find a solution?</p>	
<p>What can other researchers learn from his experience?</p>	

ARTICLE TEST: Introduction/What You Need to Know

Read each question. Fill in the circle next to the correct answer and then write your response on the lines.

1. When is a wetland covered by water?
Ⓐ rarely
Ⓑ every other year
Ⓒ at least part of the year

2. What can wetlands clean and filter out of the water?
Ⓐ rain
Ⓑ chemicals
Ⓒ plants

3. How do wetlands help stop flooding from happening?
Ⓐ They collect and hold water.
Ⓑ They bury pollutants.
Ⓒ They are made into land for farming.

4. Which sentence about wetlands is true?
Ⓐ It is good to bring plants and animals from other areas to a wetland.
Ⓑ Many plants and animals live in wetlands.
Ⓒ People help wetlands when they drain them to build houses and roads.

5. How can climate change harm wetlands?

ARTICLE TEST: Balance for the Bogs

Read each question. Fill in the circle next to the correct answer and then write your response on the lines.

1. What can you find in a bog?
Ⓐ salt-loving trees
Ⓑ woody plants and trees
Ⓒ peat

2. What are bogs made of?
Ⓐ rocks and sand
Ⓑ ice and snow
Ⓒ water and plants

3. What do bogs absorb?
Ⓐ carbon dioxide
Ⓑ oxygen
Ⓒ helium

4. Why are bogs important?
Ⓐ They are a good place to grow many crops.
Ⓑ They can keep Earth's temperature from rising as much.
Ⓒ They are the only fuel source in Ireland.

5. What happens when people burn peat? Why is that bad for Earth?

ARTICLE TEST: Flying Flowers of Rwanda

Read each question. Fill in the circle next to the correct answer and then write your response on the lines.

1. Where is the Rugezi Marsh?
Ⓐ Russia
Ⓑ Rwanda
Ⓒ Romania

2. What does the Rugezi Marsh provide?
Ⓐ salt and water
Ⓑ farming and building
Ⓒ water and power

3. What helps Erasme Uyizeye study the Rugezi Marsh?
Ⓐ flowers
Ⓑ water levels
Ⓒ dragonflies

4. What does Uyizeye know when he sees many dragonflies in the marsh?
Ⓐ The water there is clean.
Ⓑ The water there is dirty.
Ⓒ That part of the marsh is flooded.

5. What does Uyizeye know when he can't find any dragonflies in a part of the marsh?

Pioneer and Trailblazer

ANSWER KEY

Introduction/What You Need to Know

Assess Content, page 11

Answers will vary depending on which examples students use. However, students should select one bog, mangrove, swamp, and marsh, identify the name and location of each, draw a picture of each, and write to tell what each one is like.

Article Test, page 16

1. C; 2. B; 3. A; 4. B; 5. Climate change raises sea levels. This makes wetlands flood.

Balance for the Bogs

Assess Content, page 13

Students should draw a picture of a raised bog, as depicted in the article.

1. (Possible response) Long ago, glaciers scraped hollows in the land. They filled with water and became small lakes. Plants grew on the edges of each lake. They died, filled the lake, and created a spongy mat. As the mat grew over time, it trapped water in the lake. Mosses grew on top, creating a raised bog.
2. Bogs store carbon dioxide. Carbon dioxide traps heat. When bogs trap the gas, Earth's temperature doesn't rise as much.
3. Peat is a cheap fuel source. Many people like peat fires.
4. Burning peat releases carbon dioxide into the air. That can make Earth's temperature rise.
5. Answers will vary.

Article Test, page 17

1. C; 2. C; 3. A; 4. B; 5. When people burn peat, it releases carbon dioxide into the air. That is bad because it can cause Earth's temperature to rise.

Flying Flowers of Rwanda

Assess Content, page 15

1. The marsh is a source of both water and power. This wetland controls the water that flows into two big rivers. It also feeds a power station, which produces electricity.
2. Years ago, there was little rainfall. There was too much building and farming. It was harming the ecosystem. Water levels in the marsh dropped and the people had less power.
3. He observed that water must be clean for dragonflies to live. So, he and his team track dragonflies to find parts of the marsh that need help.
4. Answers will vary.

Article Test, page 18

1. B; 2. C; 3. C; 4. A; 5. He knows that part of the marsh needs help.