Home is where my habitat is.
Overview

This classroom manual is designed to provide ideas for how to use pages of the Home Is Where my Habitat Is e-book with students. It explains the concepts and suggests what to look for in students’ learning, while also supplying information about how they are practicing science and using crosscutting concepts.

Teachers who follow the guide while addressing the specific needs of their classroom will be able to:

- engage students in grade-level appropriate, three-dimensional learning;
- use the e-book as a tool in class-wide, small group, or independent explorations of its content;
- provide additional ideas and activities that utilize the e-book content but are not included in the e-book;
- explore how STEM content can be effectively integrated into literacy (English language arts);
- facilitate investigations that utilize the e-book content and connect it with students’ own classroom and community; and
- assess students on the second grade content standards to which this e-book is aligned and additional Common Core State Standards in English language arts and mathematics suggested throughout the e-book.

Book Description

This e-book is based on the phenomenon that many different plants and animals live in any given habitat, both on land and in the water. Building on this phenomenon is the definition of habitat as a place where animals are able to find water, food, shelter, and space for a population large enough to produce offspring. Similar resources must also be available for plants, with adequate sunlight and soil nutrients in place of food. An appropriate habitat for any species must therefore be able to meet an animal or plant’s specific needs. To explore this phenomenon over the course of the story, we follow a jumping spider named Kippy in her search for a new habitat. This spider belongs to the species Bagheera kiplingi, which lives in the tropical dry forest ecosystem of northwestern Costa Rica. Unlike most spiders, B. kiplingi feeds primarily on the nutritious leaf...
tips of acacia trees, making it the only known vegetarian spider. These leaf tips also serve as the food source for ants that defend the acacia trees in a mutualistic relationship. The ants and the spiders coexist within the same habitat of one small tree. Kippy’s story also helps demonstrate the great diversity of arthropods (spiders, insects, and other animals with exoskeletons) within any particular area.

Kippy needs to find a new home because her acacia tree has become overcrowded. There are many different locations to explore, each with its unique plants and animals. Though her original habitat is small, some of the animals that Kippy encounters require much larger habitats, including, in the case of the jaguar, dozens of square miles of undisturbed forest. Diversity in form and feeding habits also exists among the animals discovered, from legless amphibians to long-legged birds, and from fig-eating monkeys to worm-eating turtles. While the story progresses, students explore the habitat needs of various species, reinforcing the definition of habitat and inspiring children to think about habitats and how they may be appreciated and restored around the world, as well as close to home.

The Driving Question

A driving question is one that drives the teaching and learning for a given unit, or even an entire school year. It provides context for the purpose of student exploration and understanding of a phenomenon. This e-book is written around the driving question:

**How can a habitat be home for different plants and animals?**

Three-Dimensional Learning and *Home Is Where My Habitat Is* E-book

You will notice throughout the document that certain words and phrases are highlighted in different colors: blue, green, and orange. These colors correspond to the science and engineering practices (blue), crosscutting concepts (green), and disciplinary core ideas (orange). The book also incorporates engineering design (purple). This will help you quickly notice how each of the three dimensions and engineering design are used on a page. Refer back to this section for the full descriptions.

This e-book does not use all of the grade-level elements for the practices and crosscutting concepts, but that does not mean that you should not be aware of the other practices and concepts your students need to know. For a full list of all grade-level elements for the science and engineering practices and crosscutting concepts, refer to Appendix A.

For engaging in literacy ideas, refer to Appendix B.
4. Facts that do not have evidence or are incorrect go in the "What We Couldn't Prove" column. These unsupported facts uncovered through the content are explicitly identified by moving sticky notes from the first column to the third column or by writing the preconception on a new note and adding it to the third column. Add any new information from the text to the fourth column labeled, “New Information.”

5. Students add any questions that arise or remain unanswered throughout the reading to the final column labeled, “Wonderings.”

<table>
<thead>
<tr>
<th>What We Think We Know</th>
<th>Yes, We Are Right!</th>
<th>What We Couldn’t Prove</th>
<th>New Information</th>
<th>Wonderings</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
The story opens with a panoramic view of the tropical dry forest in Costa Rica. Many students have surely heard of the tropical rain forest and may be aware that it is currently disappearing due to human activity, but dry forests are considered “the most endangered major tropical ecosystem” (Janzen 1988). (The differences between rain forests and dry forests are discussed in Topic 3.) Ask students individually or in small groups to predict which animals they might find in different locations.

- What sorts of animals might live in the trees?
- How about on the ground?
- Are there patterns in the body structures that tree-dwellers or ground-dwellers share?
- What sorts of food might they eat?
- Do all of the trees look the same or might there be different types?
- What characteristics or structures tell you that there are different types of trees?

At first, students may not have all the answers to these questions or they may have just rudimentary responses. Ask these questions again as more organisms are introduced on later pages and you can compare their responses to gauge their learning.

Direct students to conduct an investigation to gather more information on the animal species that they see on page 1, or make comparisons between the species that they see on the page and wildlife that might be found in habitats closer to home. Do they see any patterns between animals in the Costa Rican dry forest and a natural area near their school?
TOPIC 1: Are All Habitats The Same?

Be sure to ask for specifics when mentioning different categories of animals during discussions of natural areas. If a student says that she can find a bird in the woods near her home, ask what types of birds she has seen. Note that assessment does not extend to knowing the names of the different organisms, but understanding the differences between species within the same type of organism is appropriate, such as comparing crows and sparrows. If a student mentions that there are frogs or turtles in a wetland, challenge him to be more specific, or conduct class research on local frog and turtle species. Do they look different? Do they behave different? These investigations will help inform students about the diversity of life in all habitats, which is an important component of any ecosystem.

Make comparisons between animals living in different parts of the tropical dry forest and a local ecosystem by recording data on a table like the one below.

<table>
<thead>
<tr>
<th>Location</th>
<th>In the Trees</th>
<th>On the Ground</th>
<th>In or Near the Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical dry forest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near me</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What might students observe in this picture? Invite them to describe what they see. Students might notice the ants almost immediately; ask questions to further their observations.

- What are the ants standing on?
- Can you guess what the ants are doing?
- What structure on the plant are they visiting?
- Are all of these ants the same type?
- What sorts of features do they all have in common?
- How about the creature that is lowest on the spine—what sort of animal is it?

Most importantly, students should understand that this is a small-scale scene. The spine is less than 2 inches in length, and any of these animals could easily fit on a fingernail.

This page introduces students to the main character, a jumping spider named Kippy. She is young—recently emerged from a nest that her mother has been guarding—and now she must start taking care of herself. This page also features a special group of ants that are commonly called acacia ants, which have a special relationship with acacia trees. This will be discussed more on page 3.

On page 2, students also have their first opportunity to use a “Check Your Thinking” button. Students should use this button and answer the associated questions before they proceed to the next page so that they may assess their own understanding of the material.

A “Learn More” button also appears for the first time on this page. These buttons allow students to delve more deeply into a subject.
If a teacher orders living organisms from a supplier for the purpose of maintaining them in a classroom habitat, these creatures should NEVER be released into the wild. This is particularly true with tadpoles and butterflies. A better alternative is to collect from a local area, although teachers must be aware of local regulations governing the collection of native species. Activities that don’t require collection are also possible: birds may be attracted to shelters, particular plants, birdbaths, and feeders, while salamanders might thrive under rocks and wet leaves. Pollinator gardens with native plants will work well for butterflies, bees, and other insects. Reptiles and amphibians can often be found near schools (Eastburn et al. 2017), although they will survive best in a location that mimics wild conditions. For example, frogs and toads may visit small, artificial ponds (information available at http://www.savethefrogs.com/d/ponds/index.html), while salamanders, snakes, lizards, and land-dwelling turtles may be attracted by brush piles (information available at https://boxturtle.uncg.edu/wp-content/uploads/2016/01/Brush-pile-fact-sheet.pdf). On the outside walls of school buildings in warm weather, jumping spiders and ants are also common sights. Students can (and should) record the different kinds of animals and plants that they find within any given area, along with descriptive and quantitative information.

These types of activities can help students explore habitats more deeply, as well as explain what a habitat means to different species of interest. Of course, these habitats are far simpler than those one might find in a less urbanized or wild setting, so challenge students to think of the inputs (food, water, leaves) that are necessary to make these habitats function properly. How might these inputs—along with outputs like animal waste—be handled in a fully functioning habitat? Plants can utilize animal waste after fungi and bacteria have broken it down, and trees produce the leaves that became these animals’ food. For a functioning habitat to exist—even a simple one—more than one species is required to make the habitat suitable. This is another reason for the diversity of plants and animals that one may find in different habitats.

Upon completion, students may elaborate on their experiences to develop or restore habitat for other species in the classroom or on school grounds and evaluate their effectiveness.
TOPIC 3: What Changes Can Occur in a Tropical Dry Forest?

Differentiated Instruction

For those students who may not be familiar with bar graphs—or may be struggling to make sense of them—the teacher may demonstrate how to lay a paper horizontally along the graph and line up the paper’s edge with the line for the zero value. How many bars do students see above the paper’s edge? The teacher may then show students how to move up to the halfway point between zero and two, which represents the number 1. How many bars do students see above the paper’s edge? This process may continue until students reach the line for 14 inches, which is the maximum value.

Students who need further practice with measurements may also place a ruler vertically on a piece of paper and mark the actual value of rainfall each month as indicated by the graph. For example, for April, students would mark one inch, which represents the total amount of rain that usually falls during that entire month. For October, students would mark twelve inches (or one foot), etc.

Pointing out that the official language in Costa Rica is Spanish and showing Spanish-language words as they relate to what is being studied can help develop a multicultural educational experience. Discussing conservation efforts in this area of the world will also support engagement in different cultures and in citizen science.

Teacher's Note: Conserving the dry forest

Tropical dry forests are among the world’s most endangered ecosystems, but the seasonal forests in Costa Rica appear to be recovering, thanks to efforts by the national government and conservation scientists like Dan Janzen. To learn more about how to help protect the tropical dry forests in Costa Rica, you may visit the Guanacaste Dry Forest Conservation Fund at http://www.gdfcf.org/ or the Organization for Tropical Studies at http://www.ots.ac.cr/.
How is this graph different from the last one? Students should be given the opportunity to interpret the graph for themselves. They should be able to draw the conclusion that the weather phenomenon signaling seasonal change in northwestern Costa Rica is rainfall alone—there is very little difference in temperatures throughout the year. Students should understand that in the tropical dry forest, none of the months are cold and that the characteristics of a tropical dry climate are warm temperatures year round, plus distinct rainy and dry seasons. The “Check Your Thinking” buttons at the bottom of the page will confirm each of these answers.
The silhouettes on this page can serve as guides for students to predict what they will see. (Note: The vocabulary word nocturnal is not assessed in this grade but can be used in context and then defined at the teacher’s discretion.) Guide discussion with questions such as these:

- What time of day is it?
- What has changed?
- Do you know any nighttime animals that live in tropical forests?
- Do any nighttime animals live near us?
- What do you know about them?

Ask students to compare characteristics of the animals on this page with animals they have learned about earlier in the e-book. For example, like the sloths discussed on page 12, the tamandua (a type of anteater) has long, curved claws that work well for climbing and also work well for defense. The kinkajou is another climbing animal with flexible fingers and a prehensile tail like the monkeys on page 16. This animal and a related species, the olingo (also pictured), are fruit eaters, while the tamandua is an insect eater (primarily termites and ants) and the margay (a small, spotted cat) will eat small mammals, insects, birds, and frogs. Ask questions to guide students’ thinking:

- How do the animals’ habitats overlap?
- How are they different?
- Why would certain animals that eat figs come out in the nighttime instead of during the day like other fig eaters?

Part of the reason that different animals can occupy the same habitat is the ability to lower the risk of competition by eating at different times of day and night. Because of their different feeding schedules, monkeys and kinkajous rarely encounter each other so there is no need to fight over resources—even if they might eat the same thing in the same place.
Students may be aware of nocturnal animals that live near them—foxes, opossums, raccoons, and even coyotes are increasingly common in many areas. What do students know about these nighttime animals? Many insects are active during the nighttime, as are bats, and this is also the time when frogs often make their calls. Since many bats and frogs eat insects students can use lines of logic like this as evidence for an argument about when animals might be active in their local habitats. (This phenomenon is true in Central America as much as it is in the United States: a chorus of frog calls fill the darkness, at least in those locations where frogs have not been affected by chytrid fungus).

**Thinking Beyond**

Students can observe different body structures to explore the features that help different animals survive in different habitats. Data can be entered into a table like the one below.

**Example table for data collection:**

<table>
<thead>
<tr>
<th>Animal</th>
<th>Type of Foot</th>
<th>Type of Tail</th>
<th>Where does it live?</th>
</tr>
</thead>
<tbody>
<tr>
<td>howler monkey</td>
<td>flexible toes</td>
<td>long</td>
<td>trees</td>
</tr>
<tr>
<td>tamandua</td>
<td>curved claws</td>
<td>long</td>
<td>trees</td>
</tr>
<tr>
<td>hairy porcupine</td>
<td>curved claws</td>
<td>long</td>
<td>trees</td>
</tr>
<tr>
<td>sloth</td>
<td>curved claws</td>
<td>none</td>
<td>trees</td>
</tr>
<tr>
<td>peccary</td>
<td>hooves</td>
<td>short</td>
<td>ground</td>
</tr>
<tr>
<td>jaguar</td>
<td>short claws</td>
<td>long</td>
<td>ground</td>
</tr>
<tr>
<td>kinkajou</td>
<td>flexible toes</td>
<td>long</td>
<td>trees</td>
</tr>
</tbody>
</table>

**Differentiated Instruction**

Many of these animals are familiar to residents of Central America, where Spanish is the predominant language. Students may enjoy the multicultural opportunity to learn the Spanish names of these animals. Spanish-speaking students with family in Latin America may gather information from their parents about animals that their relatives or ancestors may have encountered. Many of the animals on these and other pages have Spanish names that vary between regions—the jaguar may either be called a *jaguar* or *tigre*, the peccary can be called a *saíno* or *javelina*, and a monkey could be a *mono* or *mico*. Discussing vocabulary provides a wonderful opportunity for students to learn more about the countries where tropical dry forests can be found.