THINKING ABOUT THE WORLD'S FORESTS

Have students read this section individually or as a class. Briefly discuss the benefits provided by forests and that forests vary in appearance depending on the climate zone in which they grow. Using Figure 6, have students identify their climate zone. Have students identify differences between the types of forest.

Ensure that students understand what is meant by the term "trends."

THINKING ABOUT SCIENCE

Have students read this section individually or as a class. The important message of this section is that all scientists, including the FAO scientists featured in this journal, must use data with the same unit of measurement if they are to meaningfully make sense of their data. Ensure that students understand units of measurement and why the unit of measurement must be the same for meaningful analysis. This section also describes how FAO collected forest-related data from all over the world. Note that scientists usually work in teams, and have students examine Figure 8. Ask students for any observations they have about the FAO team shown in Figure 8.

Emphasize to students that the information they will learn about the world's forests was collected by the large team of correspondents (in Figure 8) from countries all over the world.

INQUIRY 1: WHAT ARE THE WORLD'S FORESTS AND WHERE ARE THEY FOUND?

EARTH'S CLIMATES AND FORESTS

TIME NEEDED

One class period

MATERIALS

(for each student or group of students)

- World's Forests Third Edition
- Graphic Organizer for Inquiry 1: Earth's Climates and Forests
- Writing utensils

METHODS

In the first pages, students will learn about Earth's axis and its revolution around the Sun. They will learn about the Equator and lines of latitude. They will learn about sea level. Before leaving this section, make sure that students understand these terms and how the location on Earth affects an area's climate. Remind students that climate is the average weather in a location. Some climates are cool and other climates are warm. What kind of climate is found where your students live? Have students read about rainfall. Have students do research to discover the average yearly rainfall in their area. Students should read through Figure 11.

Observe the ecozones map and the photographs around it (Figure 12). Have students compare the ecozones figure with the climate figure (Figure 6 on page 13). Have students discuss why they think the maps compare as they do. Have students identify the climate zone and ecozone in which they live. Ask students to examine the forest photographs around the map. What do they notice about these forests?

Discuss the Reflection Section questions as a class or in small groups:

Observe Figures 9 and 10. Do you think that a location at sea level and at the same latitude north and south of the Equator would have a similar average air temperature? Why or why not? *Students will have individual answers to this question. You can test their conclusions by comparing the average air temperatures of seaside communities in Montevideo, Uruguay (24 °C), and Cape Town, South Africa (23 °C); and Jacksonville, Florida, United States of America (13 °C), and Hangzhou, China (15.6 °C). You may identify other seaside communities at similar latitudes to compare.*

Observe the photographs in Figure 12. What is one advantage of having a diversity of forest types across the planet? *Students will have individual answers to this question, and they may need your help. They should conclude, however, that a diversity of forest types worldwide is a good thing because a diversity of forests supports a diversity of animal and plant species and provides a wide range of products and services to people.*

Using information discussed during this section, have students complete the Graphic Organizer for Inquiry 1: Earth's Climates and Forests (on page 77).

INQUIRY 1: WHAT ARE THE WORLD'S FORESTS AND WHERE ARE THEY FOUND?

THE WORLD'S CHANGING FORESTS

TIME NEEDED

One class period

MATERIALS

(for each student or group of students)

- World's Forests Third Edition
- Blank paper
- Writing utensil
- Graphic Organizer for Inquiry 1: The World's Changing Forests

METHODS

Read through Table 1 on page 18. Ensure that students understand the difference between natural and planted forests. Use the photographs in Figures 14, 15A, and 15B to emphasize the difference.

Continue reading the text and have students examine Figure 16. Check students' understanding of the size of a hectare. Now read and examine Figure 17. Check students' ability to read tables and charts.

Throughout these lesson plans, students will be identifying their own continent's forest information on charts and graphs, and using that information to compare their continent's forests with other forests on other continents using graphic organizers. Where indicated in these lesson plans, students will follow a similar process to build this set of information.

For example, in Figure 17, students living in Africa will do the following:

Rank each continent from most to least amount of forest area according to data from 2015. The continent with the most will go at the top, and the continent with the least will go at the bottom. Then, write the name of the continents in order from most to least in the graphic organizer in the space provided for each figure.

Africa 624 = 4

Asia 593 = 5

Europe 1015 = 1

North and Central America 751 = 3

Oceania 174 = 6

South America 842 = 2

Then, students should circle their continent's name.

	Fig. 17 – Forest Area (millions ha)
Continent in Rank Order From Most to Least	Europe
	South America
	North & Central America
	Africa
	Asia
	Oceania

Students should do this exercise for Figures 17 to 20.

Have students read page 23 and examine Figure 23. Ask students what they notice about the percentage of forest area worldwide.

Now, have students examine Figure 22. What is similar about Africa and South America? (*Hint: Where on Earth are they located? Both are in the Southern Hemisphere at similar latitudes.*)

Students should read the paragraph on page 23 about decreases in forest area and observe Figure 24. Ask students to describe times when they observed forests being felled to construct buildings or roads, or for other uses such as agriculture.

Students will now read about trends in the amount of natural forests and planted forests.

For Figures 25 and 26, have students rank order the continents from most to least in hectares of both natural and planted forest in 2015 in the graphic organizer. Have students circle their continent's name in both columns. Note that for negative numbers, the highest negative number indicates the least value.

Now, have students read the paragraph that follows Figure 26 on page 24.

Ask students to summarize the trends in natural and planted forest land, based on the text and the information in Figures 25 and 26. Using 100 small stones, coins, or some other item, illustrate how much 7 percent is compared with 93 percent. Students should understand that even though planted forests are increasing in area, they are still a small percentage of total forest land worldwide.

Next, have students read about the amount of forested land per capita (page 24). Check to make sure that students understand what per capita means. Then, ask students to observe Figure 27. What is the general trend shown by this figure? Have students rank order the values for 2015 and write the continent names in the graphic organizer, from most to least amount of forested hectares per capita. Then have your students circle their continent's name.

Read the paragraph that follows Figure 27.

Have students read about urban forests on page 25 and observe the photographs of urban forests. If you have an urban forest nearby, hold a class discussion about the benefits the forest provides to your community. Using the Graphic Organizer for Inquiry 1: The World's Changing Forests (page 78), have students draw their idea of an urban forest and identify the benefits provided by the urban forest.

Have students read the sidebar about the world's urban population (page 25). Ask students to identify whether they live in an urban or a rural area. What are the characteristics of each?

Ensure that students have completed each column of the Graphic Organizer for Inquiry 1: The World's Changing Forests. Students should now summarize what they have learned about their continent's forests by comparing and contrasting the rank ordering they have completed so far. Students can write important ideas in the designated space.

Discuss the Reflection Section on page 25 as a class or in small groups:

Has an area of forest been felled in or near your community? If so, with what was this forest replaced? *Students will have individual answers to this question. One response, which has not yet been introduced in this journal, is that following harvest new trees may be planted. Other responses may include buildings, roads, parking lots, pastureland, and food crops.*

Describe in your own words the difference between a natural forest and a planted forest. *Students should realize that planted forests are created by planting, usually one species of tree, in straight rows, similar to food crops. Natural forests have a variety of native tree species and other vegetation, and the trees are different ages. The ecological processes of a natural forest are left to function normally.*

INQUIRY 2: WHAT BENEFITS DO THE WORLD'S FORESTS PROVIDE?

FORESTS ARE MORE THAN TREES

TIME NEEDED

One class period

MATERIALS

(for each student or group of students)

- World's Forests Third Edition
- Blank paper
- Writing utensil
- Graphic Organizer for Inquiry 2: Forests Are More Than Trees

METHODS

Individually or as a group, have students read the first paragraph and observe Figures 30 to 33. Have students think about the photographs, then have them identify a tree, mammal, bird, and insect found in the forests on their own continent. Have students write the name of this tree and these animals, as well as their continent, in the Graphic Organizer for Inquiry 2: Forests are More than Trees (page 81).

Ask students to read page 29-30. Have them examine Figure 34, which shows the water cycle and how trees transpire water.

Optional: Read the box on page 30 describing communication between trees by way of underground hyphae. Hold a class discussion about the advantages of using hyphae to transfer nutrients and information between trees.

If students need help, remind them that hyphae are found underground. Have students observe Figure 35 and discuss how hyphae can help move nutrients and chemical signals between underground fungi and tree roots.

Read the text on page 31. Hold a class discussion about biodiversity. Examine Figure 36. Ask students if they think these two species of geese are related. Describe how a goose may become different from its ancestors after years of living in a new ecosystem. Geese, or any species, may adapt over time as they live in their new environment. Over time, small adaptations might be advantageous in the new environment. The individuals of that species with the advantageous adaptations will pass these traits on to successive generations.

Optional: Have students read the sidebar and compare and contrast what is shown in Figure 36 with how Persian walnuts have developed genetic diversity across 14 countries. Hawaiian geese adapted on their own. Persian walnuts were cultivated by people, and this cultivation, along with the new environments, enabled Persian walnut trees to diversify genetically.

GRAPHIC ORGANIZER FOR INQUIRY 1

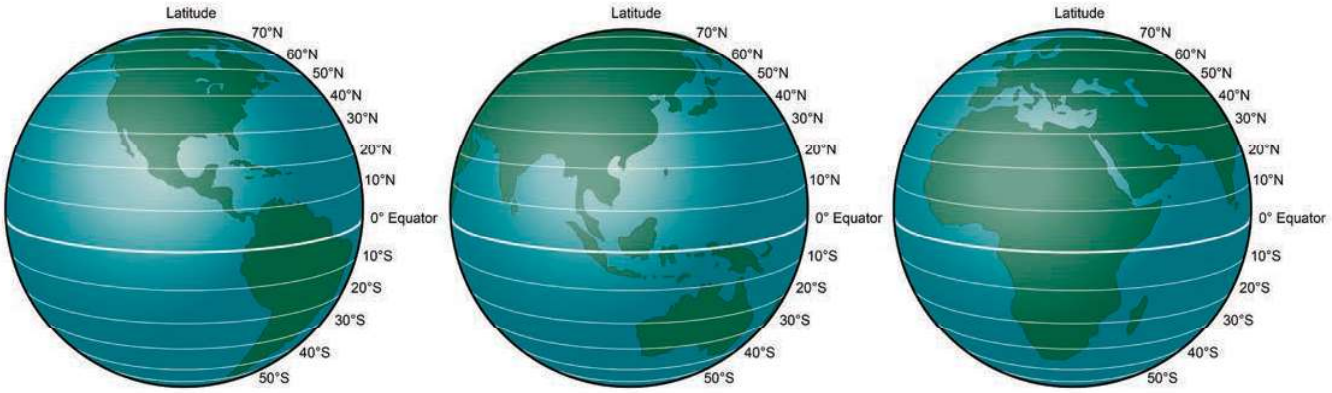
WHAT ARE THE WORLD'S FORESTS AND WHERE ARE THEY FOUND?

EARTH'S CLIMATE AND FORESTS

Write your location. Include your local community name, your country name, and your continent name:

Local community	Country	Continent

Identify your location's latitude using this image. If you have access to a media center or the Internet, identify your latitude to the closest whole degree. Note whether the latitude is north or south of the Equator. Identify a place on Earth at the same latitude but on the opposite side of the Equator.



Illustrations by Stephanie Pfeiffer.

My latitude is _____° _____ (North or South)

Using available resources, identify your location's elevation. Using Figure 9 as a guide, have students estimate their location above sea level and label the figure with that information. Using available resources, identify your location's average yearly rainfall amount and write it here:

_____

Using Figure 11, identify what kind of forests your location should have. Write the vegetation type here:

_____

Identify two similarities and two differences in the forests represented in Figure 12.

_____

_____

_____

_____

_____

_____

GRAPHIC ORGANIZER FOR INQUIRY 1

WHAT ARE THE WORLD'S FORESTS AND WHERE ARE THEY FOUND?

THE WORLD'S CHANGING FORESTS

Rank order your continent by writing the continents in order from most to least forest area. Circle your continent's name in each column.

	Fig. 17 – Forest Area (millions ha)	Fig. 19 – Natural Forest (% TFA)	Fig. 19 – Planted Forest (% TFA)	Fig. 20 – Net Annual Forest Change (millions ha)
Continents in Rank Order from Most to Least				

ha = hectare; TFA = total forest area.

	Fig. 25 – Natural Forest Change (thousand ha)	Fig. 26 – Planted Forest Change (thousand ha)	Fig. 27 – Per Capita Change (ha)
Continents in Rank Order from Most to Least			

ha = hectare; TFA = total forest area.

Draw a picture of an urban forest.

Write a paragraph on what you have learned about the world's changing forests.