Plant a Tree

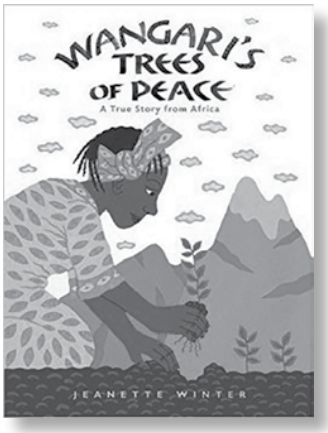
Description

Students hear the inspiring true story of Wangari Maathai, a Kenyan environmentalist and Nobel Peace Prize winner whose vision and determination led to the planting of 30 million trees in Africa. They learn about the many benefits we receive from trees and then plant a tree of their own.

Suggested Grade Levels: K–2

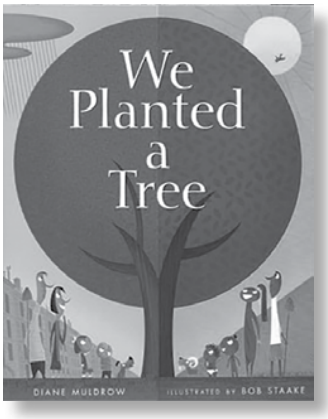
LESSON OBJECTIVES Connecting to the *Framework*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept
Asking Questions and Defining Problems Obtaining, Evaluating, and Communicating Information	**ESS3.C:** Human Impacts on Earth Systems **ETS1.A:** Defining and Delimiting Engineering Problems **ETS2.B:** Influence of Engineering, Technology, and Science on Society and the Natural World	Systems and System Models



Featured Picture Books

TITLE: ***Wangari's Trees of Peace: A True Story From Africa***
AUTHOR: **Jeanette Winter**
ILLUSTRATOR: **Jeanette Winter**
PUBLISHER: **Harcourt Children's Books**
YEAR: **2008**
GENRE: **Story**
SUMMARY: *This true story of Wangari Maathai, environmentalist and winner of the Nobel Peace Prize, shows how one woman's passion, vision, and determination can inspire great change.*



TITLE: ***We Planted a Tree***
AUTHOR: **Diane Muldrow**
ILLUSTRATOR: **Bob Staake**
PUBLISHER: **Golden Books**
YEAR: **2010**
GENRE: **Narrative Information**
SUMMARY: *Simple text and cartoon-style illustrations reveal the benefits of planting a single tree, both for those who see it grow and for the world as a whole.*

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Time Needed

This lesson will take several class periods. Suggested scheduling is as follows:

Day 1: **Engage** with *Wangari's Trees of Peace* Read-Aloud and Google Earth Field Trip to Mount Kenya

Day 2: **Explore** with Observe a Tree and **Explain** with *We Planted a Tree* Read-Aloud

Day 3: **Elaborate** with "Plant for the Planet" Video and Research a Planting Location and Type of Tree

Day 4: **Elaborate** with Plant a Tree

Day 5: **Evaluate** with We Planted a Tree

Materials

For Wangari's Trees of Peace *Read-Aloud*

- Globe or world map

For Google Earth Field Trip to Mount Kenya

- Google Earth app
- Projector or interactive whiteboard
- Internet connection

For Observe a Tree

- Clipboard (1 per student)
- Pencil (1 per student)
- Tape measure or string and yardstick to measure the circumference of the trunk

For Plant a Tree

- Tree to plant (Trees can be donated by a local nursery, home improvement store, the Arbor Day Foundation [10 free trees with membership], parents, or your school's Parent Teacher Organization. Consult with a local arborist to find a tree that is best suited for your school's plant hardiness zone and for the specific site your students select.)
- Tape measure or string and yardstick to measure the circumference of the trunk
- Ruler or meter stick
- Shovels
- Small hand shovels (optional)

For We Planted a Tree booklet

- Crayons or colored pencils
- Video-recording device (optional)

SAFETY

- Wear safety glasses or goggles when planting trees.
- Encourage students to wear sun-protective clothing.
- Have students wash their hands with soap and water after completing the activity.

Student Pages

- Observe a Tree
- We Planted a Tree booklet
- STEM at Home

Background for Teachers

Wangari Maathai was born in 1940 in a small village in Kenya. She was a brilliant student, and with her teacher's help, she won a Kennedy scholarship to study biology at Mount St. Scholastica College in Kansas. After that, she earned an MS at the University of Pittsburgh, and then pursued doctoral studies in Germany and at the University of Nairobi, where she earned her PhD and became a professor.

When Maathai returned to Kenya from the United States, she was devastated by the deforestation of her homeland and the changes in daily life it brought, especially for women living in rural areas. She started the Green Belt Movement in Kenya in 1977 by planting nine seedlings in her backyard. She began working with local women to plant trees and would pay them if the trees they planted were still living after three months. For most of these women, Maathai's planting project provided them with their first earnings ever. Soon, women all over Kenya were planting seedlings.

Map of Kenya

Maathai was met with opposition from the Kenyan government and businesses that were cutting down trees for timber and clearing land for coffee plantations. She was even arrested and jailed. News of her arrest spread in Kenya and other countries, and people from around the world began to unite and demand her release. After Maathai was released from jail, she began traveling the world telling her story, speaking out for the environment and for women's rights.

By 2004, 30 million trees had been planted as part of Maathai's Green Belt Movement. Consequently, the incomes of 80 thousand people had increased. As a result of her efforts, Wangari was awarded the Nobel Peace Prize that year. In its citation, the Norwegian Nobel Committee noted Maathai's contribution to "sustainable development, democracy and peace." Maathai died in 2011 at age 71, but her trees and her message of hope live on.

Maathai's story is an engaging, real-world context in which students can learn about human impacts on Earth systems. In a version of her story written specifically for young children, students learn that cutting down trees in Maathai's village to make room for buildings and crops negatively affected the people and the environment. Students then learn about the benefits of trees during another read-aloud and apply their knowledge by planting a tree in an area the class researches and selects together. These activities provide students an experience with the scientific practice of obtaining, evaluating, and communicating information as they use grade-appropriate texts (picture books) and media (videos and websites) to obtain information about the natural world.

Deforestation, the removal of trees transforming a forest into cleared land, is a global problem. Forests cover about 30% of the Earth's surface and provide homes for about 70% of Earth's land animals. A study published in *Science* in 2013 revealed that the Earth is losing the equivalent of 50 soccer fields of

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forest every day (Hansen et al. 2013)! The biggest cause of deforestation is farming. Forests are cleared to grow crops and create grazing areas for livestock. In addition, loggers cut down forests for create wood and paper products. Forests are also cut down to make space for buildings such as homes and shopping centers. Deforestation is a complicated problem because the reason behind it usually comes down to people's need to make money and provide for their families. Trees are one of Earth's most important natural resources. They play an important role in *ecosystems*, communities of living and nonliving components of an environment interacting as a system. We depend on trees for providing food and wood products, conserving water and soil, removing carbon dioxide from the air, and adding oxygen to the air. Animals and other plants depend on trees as well. Students must understand the importance of trees to humans and all life on Earth and realize their actions have an impact on trees. Nurturing a sense of wonder about trees will encourage students to do more to protect and conserve this vital resource.

engage

Wangari's Trees of Peace Read-Aloud

Connecting to the Common Core
Reading: Literature
Key Ideas and Details: K.1, 1.1, 2.1

Questioning

Show students the cover of *Wangari's Trees of Peace: A True Story From Africa*. Introduce the author and illustrator, Jeanette Winter. *Ask*

? From looking at the cover, what do you think this book might be about? (Answers will vary.)

? Where is Africa? (Answers will vary.)

After students respond, show them Africa on a globe or world map. Then, read through page 21, where Wangari says, "We need a park more than we need an office tower." *Ask*

? Why do you think Wangari says that? Why would a park be more needed than an office tower? (Answers will vary, but many students will realize that a park benefits people as a place to play and enjoy nature and is also a home for many animals.)

Before reading page 22, where Wangari is hit by the "government men," you will need to consider the maturity of your students and then decide whether to show the illustration of Wangari with blood on her face.

Visualizing

Continue reading, but stop before reading pages 30–31, which begin, "And if you were to climb to the very top of Mount Kenya today, you would see …" Here, have students close their eyes and visualize what the millions of trees Wangari planted would look like from the top of Mount Kenya. Discuss what the students are visualizing in their minds, then reveal the illustrations. *Ask*

? How did your mental picture compare with the illustrator's interpretation of the scene? (Answers will vary.)

After reading, *ask*

? How do you think Wangari felt when she came home to Kenya to find the trees gone? (She was sad.) What makes you think so? (She was crying, and she looks sad in the illustration.)

? Why were people cutting the trees down? (to make room for buildings)

The book says that the trees were cut down to make room for buildings, but it is important to explain the two other major reasons people cut down trees: to create fields for crops and livestock

and to use the trees for wood and paper products. *Ask*

? What did Wangari do right away to help solve the problem? (She planted trees in her own backyard.)

? On page 25, the book says there were "30 million trees where there were none." Did Wangari plant all 30 million trees? (No, she had the help of many women.)

Explain that because of Wangari's work planting trees in Kenya and helping women, she received one of the most prestigious prizes in the world, the Nobel Peace Prize. She was the first African woman to ever receive the prize.

Google Earth Field Trip to Mount Kenya

Reread pages 30–31, "And if you were to climb to the very top of Mount Kenya today, you would see the millions of trees growing below you, and the green Wangari brought back to Africa." *Ask*

? Would you like to stand at the very top of Mount Kenya to see the trees that Wangari planted? (Most students will likely say, "Yes!")

Tell students that Mount Kenya is the second-highest mountain on the continent of Africa and that you are going to take them there on a "virtual" field trip! Open the Google Earth app and project the program on a screen. Tell students that this app allows you to see Earth from space, "fly" around the globe, land on the ground, and look around. Follow the instructions below to take a Google Earth field trip to Mount Kenya.

1. Begin at your school by entering the address of your school in the search box.
2. Type *Africa* in the search box to fly across the ocean to the continent of Africa.
3. Type *Kenya* in the search box to zoom in on the country of Kenya.
4. Type *Mount Kenya* in the search box to zoom in on Mount Kenya.
5. Zoom out to show the green ring around the bottom of the mountain. Tell students that this map is made from photographs taken from a satellite orbiting the planet. The green ring around the mountain shows the millions of trees that Wangari and the women that worked with her planted.
6. Zoom back in on the top of the mountain, and drag the "Street View" icon ( ) to the top of the mountain.
7. Use the controls at the top, right-hand corner to turn around and look at the views from the top of Mount Kenya.

Using Google Earth

Tell students that, next, they are going to learn about why trees are so important, which will help them understand why planting trees was so important to Wangari.

explore

Observe a Tree

Connecting to the Common Core
Mathematics
Measurement and Data: K.MD.1

Choose a tree in your school-yard or nearby for the students to observe. Any tree will do, but a

more mature tree might be best for this activity. In advance, use a tree identification app or the Arbor Day Foundation's website to determine the species of the tree (*www.arborday.org/trees*).

Give each student a copy of the Observe a Tree student page, a clipboard, and a pencil. Tell students that they are going outside to observe a tree. Be sure to bring a tape measure. Invite students to sit quietly in the shade of the tree. You may want to bring towels or blankets for students to sit on. Have students begin by drawing the general shape of the tree on their student page. Then, *ask*

? How could we find out how big around the tree trunk is? (Answers will vary.)

Show students the tape measure. Model how to measure around the trunk of the tree with the tape measure, and have students record that measurement on the student page. Explain that the distance around a circular object is known as the *circumference*.

Next, show students a leaf from the tree and discuss its shape. Have students draw the shape of the leaf on the student page. Tell students that the shape of a leaf is one way to figure out the kind of tree. Tell students what kind of tree it is and how you figured that out.

Finally, share a reason that you think this tree is important (e.g., it provides homes for animals), and ask students to think of some other reasons it is important (e.g., it provides shade). Then, have students complete the sentence "This tree is important because …" on the. student page, listing some reasons this tree is important. Refer to *Wangari's Trees of Peace* and remind students that Wangari thought trees were important—so important that she dedicated a lot of time and energy to planting trees in her country. *Ask*

? Why are trees important? (Answers will vary.)

? What things do people get from trees? (Answers will vary.)

? Can you think of any other living things that benefit from trees? (Answers will vary.)

? What questions do you have about trees? (Answers will vary.)

Then, tell students that you have a book that can help them learn more about why trees are important. You may want to read the book outside near the tree you have been observing.

explain

We Planted a Tree Read-Aloud

Connecting to the Common Core
Reading: Informational Text
Integration of Knowledge and Ideas: K.8, 1.8, 2.8

Show students the cover of *We Planted a Tree* and introduce the author, Diane Muldrow, and illustrator, Bob Staake. Open to the dedication and copyright page, and tell students that the author included a quote from Wangari Maathai. Read the quote aloud: "When we plant trees, we plant the seeds of peace and seeds of hope." Tell students that the author of this book, Diane Muldrow, was inspired by Wangari's work, so she included a quote from Wangari on the dedication page of the book.

Determining Importance

Tell students that as you read the book aloud, you would like them to listen for how trees make the world better. Have them signal by wiggling their fingers in the air (to represent branches) when they hear an example of how trees make the world better. Read the book aloud, stopping to discuss the benefits of trees each time they are mentioned.

After reading, remind students that the book said, "We planted a tree, and that one tree made the world better." *Ask*

? What evidence does the author give that trees make the world better? (The tree in the story provided shade, clean air, sap for syrup, fruit, and food for animals. It also held the soil in

place and made the soil better for growing a garden.)

Explain to students that trees are cut down every day all around the world. Forests are cleared to make room for planting crops. Trees are cut down to make paper, wood products, and building materials. Things that we use from nature, such as trees, water, and land, are called *natural resources*. Explain that although we benefit from natural resources, we have to be aware of how using them affects other living things. Trees are important parts of ecosystems. An *ecosystem* is all the living things, such as animals and plants, that share an environment. Everything in an ecosystem has an important role, or job. Removing one thing from an ecosystem can harm the other living things in the ecosystem. So it is important to think about the whole ecosystem when using natural resources such as trees. *Ask*

? How could removing trees harm other living things in an ecosystem? (Animals would lose their homes, food, or both; the soil might wash away, which would harm the other plants; people would lose shade; etc.)

? What are some things that we can do to reduce the harmful effects of cutting down trees? (Answers will vary but may include using less wood or paper, recycling paper products, planting trees, etc.)

Tell students that one thing they can do to help is replace some of the trees that are cut down by planting new trees.

elaborate

"Plant for the Planet" Video

Making Connections: Text to Text

Tell students that Wangari Maathai once said, "It's the little things that citizens do. That's what will make the difference. My little thing is planting trees." Tell students that you have a video to share about a child who was so inspired by Wangari's story that he began a tree-planting project of his own. Show the first 1:37 min. of "Plant for the Planet" (see "Websites" section), which features 11-year-old Felix Finkbeiner from Germany, who was inspired to plant millions of trees. After the video, *ask*

? Would you like to plant a tree in our schoolyard or community so that you can make a difference like Wangari and Felix did? (Answers will vary, but most students will likely say, "Yes!")

? Where do you think would be a good place to plant a tree? (Answers will vary.)

Research a Planting Location and Type of Tree

Tell students that they can use the Google Earth app again to see the area surrounding the school. Enter your school address in the Google Earth app. Zoom in and out to look around, and drag the "Street View" icon ( ), which allows you to "walk around" the school grounds. Locate a few places that might be good for a tree to grow (e.g., a place with plenty of sunlight, with room to grow, and away from places with a lot of foot or vehicular traffic). Next, take a walk around the school grounds, noting the trees that are already there, and visit the places you selected on Google Earth. Choose the location where your class thinks the tree would grow best. Be sure to get the planting location approved by your school or district administration ahead of time. (You may also want to talk to your neighborhood planning department to find planting areas in your community if there is not an appropriate area on your school grounds.)

Tell students that it is important to choose a tree that will thrive in your area. For example, if you live in a cold area, a palm tree might not survive because it is a tree that typically grows in tropical areas. Demonstrate for students how to use the Arbor Day Foundation's Best Tree Finder: Tree Wizard (see "Websites" section) to generate a list of trees that will thrive in your school's plant hardiness zone. Project the website on your screen. Go through each step until a list of appropriate trees is generated for you. Read about the trees, look at

Planting a tree

the pictures, and then select a tree to plant. You may want to contact a local arborist to help make your decision. (See Materials lists for suggested resources for acquiring donated trees.) Research the tree you selected so that students know what kind of fruit or nut it will produce, what its shape will be when it grows and the leaves have filled out, what the tree might be used for, how big it will grow, and so on.

Plant a Tree

Plan a day when you will plant the tree as a class. The specific instructions for planting a tree depend on whether the tree's roots are exposed, potted, or bound. For detailed instructions on planting your tree, see the Arbor Day Foundation's step-by-step instructions and videos. Allow all students to be involved by letting them each place a scoop of dirt around the tree, with either a small shovel or their hands. You may want to invite parents to help plant or the local newspaper to document the planting. Take a class picture and celebrate your newly planted tree!

Tell students that Wangari said, "Anybody can dig a hole and plant a tree. But make sure it survives. You have to nurture it, you have to water it, you have to keep at it until it becomes rooted so it can take care of itself." Brainstorm ways that you will nurture your newly planted tree. For example, you can do the following:

- Water it regularly.
- Keep mulch around it.
- Put a small fence around it to keep animals from eating it.

evaluate

We Planted a Tree

Connecting to the Common Core
Writing
Text Types and Purposes: K.3, 1.3, 2.3

Writing

Give each student a copy of the We Planted a Tree student pages, along with a crayon or colorerd pencil. Tell them that in this booklet, they are going to write or draw the steps they followed the day they planted the tree. Students might write the following:

- First, we dug a hole.
- Next, we put the tree in the hole.
- Then, we put dirt around the tree.
- Last, we watered the tree.

The last page of the booklet refers to the book *We Planted a Tree* with the line "We planted a tree, and that one tree makes the world better because … ." Students can use crayons or colored pencils to draw or write any of the reasons previously discussed about how trees make the world better, such as by providing shade, clean air, sap for syrup, fruit, and food for animals; holding the soil in place; and making the soil better for growing a garden.

Optional activity: Create a video as a class to share your tree-planting experience. Begin with the line "We planted a tree, and that one tree makes the world better because …," and have each student, or pair of students, give one of the reasons he or she listed on the last page of his or her booklet. End with a shot of the whole class with the tree they planted. You may want to watch the student-made video titled "What Are Trees?" (see "Websites" section) for some ideas on how to format the video. This video features kindergarteners sharing information about trees.

STEM at Home

Have students complete the "I learned that …" and "My favorite part of the lesson was …" portions of the STEM at Home student page as a reflection on their learning. They may choose to do the following at-home activity with an adult helper and share their results with the class. If students do not have access to the internet or these materials at home, you may choose to have them view the Arbor Day Foundation's website at school.

"At home, we can choose a favorite tree nearby. We can draw its shape, use crayons to make a leaf rubbing, and measure the trunk …

For Further Exploration

This section is provided to help you encourage your students to use the science and engineering practices in a more student-directed format. This box lists questions and challenges related to the lesson that students may select to research, investigate, or innovate. Students may also use the questions as examples to help them generate their own questions. After selecting one of the questions in the box or formulating their own questions, students can individually or collaboratively make predictions, design investigations or surveys to test their predictions, collect evidence, devise explanations, design solutions, or examine related resources. They can communicate their findings through a science notebook, at a poster session or gallery walk, or by producing a media project.

Research

Have students brainstorm researchable questions:

- ? What is the largest tree in the world?
- ? What is the oldest tree in the world?
- ? What is Arbor Day?

Investigate

Have students brainstorm testable questions to be solved through science or math:

- ? What kinds of trees do we have in our school-yard, backyard, or local park?
- ? Compare the leaves of trees in your school-yard. Can you sort them into different groups?
- ? Compare the sizes of tree trunks in your schoolyard. Which one is the thickest?

For Further Exploration (*continued*)

Innovate

Have students brainstorm problems to be solved through engineering:

- ? Can you design a procedure for collecting apple seeds and sprouting them in your classroom?
- ? Can you design a structure to protect a newly planted tree?
- ? Can you design a poster to teach others about the importance of trees?

Optional activity: Next, we can use a tree identification app or the Arbor Day Foundation's website (*www.arborday.org/trees/index-identification.cfm*) to try to find out what kind of tree it is."

Reference

Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. High-resolution global maps of 21st-century forest cover change. *Science* 342 (6160): 850–853.

Websites

Arbor Day Foundation's Best Tree Finder: Tree Wizard
www.arborday.org/trees/planting

"Plant for the Planet" (video)
www.pbslearningmedia.org/resource/yvcc-sci-plantplanet/plant-for-the-planet

"What Are Trees?" (kindergarten video)
www.youtube.com/watch?v=VFHUEkzohjI&feature=youtu.be

More Books to Read

Bulla, D. R. 2001. *A tree is a plant*. New York: HarperTrophy.
Summary: The life cycle of an apple tree is followed through the seasons.

Hopkins, H. J. 2013. *The tree lady: The true story of how one tree-loving woman changed a city forever.* New York: Beach Lane Books.
Summary: Kate Sessions's passion for trees transformed the city of San Diego. This is her story.

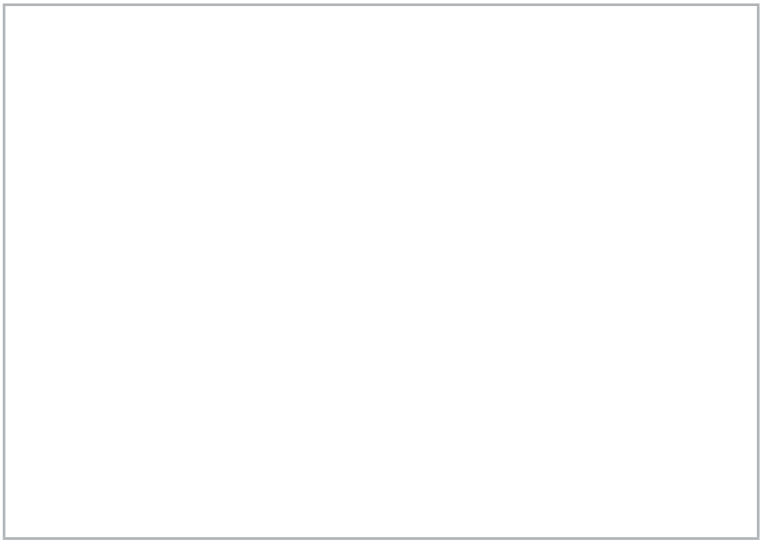
Johnson, J. C. 2010. *Seeds of change: Planting a path to peace.* New York: Lee & Low Books.
Summary: Sonia Lynn Sadler's vivid scratchboard-and-oil illustrations make this more-detailed biography of Wangari Maathai come alive.

Lauber, P. 1994. *Be a friend to trees.* New York: HarperTrophy.
Summary: This book discusses the importance of trees as sources of food, oxygen, and other essential things. It also gives helpful tips for conserving this important natural resource.

Name: _____

Observe a Tree

1. Drawing:



2. Trunk circumference (distance around the trunk): _____

3. Leaf shape:

4. Kind of tree: _____

5. This tree is important because _____

_____

_____

_____

We Planted a Tree

By: _____

We planted a tree, and that one tree made the world better because …

_____

_____

_____

_____

_____

First, we

Next, we

Then, we

Last, we

Chapter 16

STEM at Home

Dear _____,

At school, we have been learning about **how trees help the Earth.**

I learned that: _____

_____

My favorite part of the lesson was: _____

_____

_____

At home, we can choose a favorite tree nearby. We can draw its shape, use crayons to make a leaf rubbing, and measure the trunk.

Shape of Tree (Draw the shape of your tree.)	**Leaf Rubbing** (Place a leaf under this paper, and rub a crayon over top.)	**Circumference of Trunk** (Measure the distance around the trunk.)

This is our favorite tree because _____

_____

Optional activity: Next, we can use a tree identification app or the Arbor Day Foundation's website ***(www.arborday.org/trees/index-identification.cfm)*** to try to find out what kind of tree it is.