

Wangari Maathai The Woman Who Planted Millions of Trees

Grade Band: 3-5 STEM Designed Lesson	Literature: <i>Wangari Maathai</i> The Woman Who Planted Millions of Trees By Franck Prevot	Posted: Maureen Foelkl http://straubenvironmentalcenter.org/
Brief Lesson Description: Wangari Maathai founded the Green Belt Movement whereas she empowered people (strong focus on women) to battle against deforestation in Africa. Students will understand how Maathai became the first African Woman to become the recipient of the 2004 Nobel Peace Prize while opening up the field of science to women. They too, will understand how their leadership in sustaining a balanced ecosystem in their own neighborhood will provide solutions toward positive changes in their own community.		
Essential Questions: <ul style="list-style-type: none"> • What are examples of ways people depend on trees? • What happens to organisms when their environment changes? • How do living things interact with water? • What is deforestation? • How are we responsible for our environment? • How do trees help people and ecosystems? 		
Core Vocabulary: Plants Energy Sunlight Water Producer Consumer Decomposer Air (carbon dioxide) Habitat Environment Organisms Resources Environmental Changes innovative		
Standards		
NGSS Standards: 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment		
Common Core State Standards: Language Arts: (RI.3.1), (RI.3.2), (RI.3.3), (W.3.1), (W.3.2), (SL.3.4) (RI.5.7) Mathematics: (MP.2), (MP.4) Social Sciences: (D2.Civ.6.3-5.) (D2.Eco.1.3-5) (D2.Eco.2.3-5.) (D2.His.3.305)		
Science & Engineering Practices: 3-LS4-4. Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds. Make a claim about the merit of a solution to a problem by citing relevant evidence about how it	Disciplinary Core Ideas: 3-LS4-4. LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. LS4.D: Biodiversity and Humans	Crosscutting Concepts: 3-LS4-4. 5-LS2-1. A system can be described in terms of its components and their interactions. 5-LS2-1.

<p>meets the criteria and constraints of the problem.</p> <p>5-LS2-1.</p> <p>Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model to describe phenomena.</p>	<p>Populations live in a variety of habitats, and change in those habitats affects the organisms living there. Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.</p> <p>5-LS2-1.</p> <p>Interdependent Relationships in Ecosystems</p> <p>The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.”</p> <p>Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.</p>	
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Skills, Reasoning and Claims:

3-LS4-4.

Supported claims: Students make a claim about the merit of a given solution to a problem that is caused when the environment changes, which results in changes in the types of plants and animals that live there.

Identifying scientific evidence: Students describe the given evidence about how the solution meets the given criteria and constraints. This evidence includes: i. A system of plants, animals, and a given environment within which they live before the give environmental change occurs. ii. A given change in the environment. iii. How the change in the given environment causes a problem for the existing plants and animals living within that area. iv. The effect of the solution on the plants and animals within the environment. v. The resulting changes to plants and animals living within that changed environment, after the solution has been implemented.

Evaluating and critiquing evidence: Students evaluate the solution to the problem to determine the merit of the solution. Students describe how well the proposed solution meets the given criteria and constraints to reduce the impact of the problem created by the environmental change in the system, including: i. How well the proposed solution meets the given criteria and constraints to reduce the impact of the problem created by the environmental change in the system, including: 1. How the solution makes changes to one part (e.g., a feature of the environment) of the system, affecting the other parts of the system (e.g., plants and animals). 2. How the solution affects plants and animals

5-LS2-1.

Components of the model: Students develop a model to describe a phenomenon that includes the movement of matter within an ecosystem. In the model, students identify the relevant components, including: i. Matter. ii. Plants. iii. Animals. iv. Decomposers, such as fungi and bacteria. v. Environment. Relationships: Students describe the relationships among components that are relevant for describing the phenomenon, including: i. The relationships in the system between organisms that consume other organisms, including: 1. Animals that consume other animals. 2. Animals that consume plants. 3. Organisms that consume dead plants and animals. 4. The movement of matter between organisms during consumption. ii. The relationship between organisms and the exchange of matter from and back into the environment (e.g., organisms obtain matter from their environments for life processes and release waste back into the environment, decomposers break down plant and animal remains to recycle some materials back into the soil). Connections: Students use the model to describe: i. The cycling of matter in the system between plants, animals, decomposers, and the environment. ii. How interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs. iii. That newly introduced species can affect the balance of interactions in a system (e.g., a new animal that has no predators consumes much of another organism's food within the ecosystem). iv. That changing an aspect (e.g., organisms or environment) of the ecosystem will affect other aspects of the ecosystem.

Background Information

A major goal of instruction is to create engaged citizens capable of making informed and reasoned decisions for the public good. More recently, the idea of global citizenry has come under discussion in classrooms across the county. One example of active citizenship is the Nobel Peace Prize winner Wangari Maathai.

Dr. Wangari Maathai (1940-2011) is known for her extraordinary work as an environmentalist, political activist, and supporter of women's rights. To achieve her environmental goals, she founded the Green Belt Movement, a campaign that expanded beyond her native Kenya to other African nations. Her extensive grassroots projects to combat deforestation earned her the name Mama Miti, or "the mother of trees." As a member of the Kenya's Parliament, she worked to promote voter registration and constitutional reform. Her efforts to support sustainable development, democracy, and peace earned her a Nobel Peace Prize in 2004. Background information from *Inquiry and Integration Across the Curriculum: Global Citizenry*, Myra Zarnowski and Mary Ann Cappiello

Materials:

- Wangari Maathai ,The Woman Who Planted Millions of Trees, Franck Prevot
- Field Notebook
- Pencil
- Examples of animal ecosystem drawings (attached)
- 8x10 white art paper
- Variety of mediums for adding color to art pieces
- Native tree for planting
- timeline (attached)
- Kenya ecosystem (attached)
- tablets (if available)

LESSON PLAN – 5-E Model

ENGAGE:

Introduce the lesson with the following paragraph.

Kenya is rich in biological diversity. Around 25,000 species of animal and 7000 species of plants have so far been recorded, along with at least 2000 fungi and bacteria. It is now clear that this rich biodiversity is under threat from a variety of sources some of which are natural while others are anthropogenic. Without concerted effort for research and focused conservation actions, we are likely to lose many species and the ecosystems in which they are found, according to the Kenya Wildlife Service.

Read *Wangari Maathai, The Woman Who Planted Millions of Trees*. Introduce the story using the cover of the book and the information on the inside jacket cover. What do we already know about this story? I wonder what the Green Belt Movement was that saved the Kenyan forest. Turn and talk. What do you think this movement was? Why? Have students respond. Read the text through for enjoyment.

During the second read, have students respond to the following questions. Stop frequently and add I wonder statements.

Read pages 5-13. Describe the ecosystem of Ithithe? What organisms live within this system?

Read pages 14-19. Why might attending school change Wangari's life? How were Kenya and the United States the same for Wangari? Different? For more than ten years, black people have been demanding the right to cultivate their land...What does this statement infer? What does it mean to cultivate?

Read pages 19-21. How has Kenya changed? Why has this ecosystem changed? What evidence from the text supports your thinking?

Read pages 22-29. What was the Green Belt Movement? Why would the government want to stop the Green Belt Movement? In your opinion, should the government have been involved? Why or why not? What evidence from the text supports your opinion? How is the word perseveres used in the last paragraph on page 28? How did Wangrai persevere?

Read pages 29-35. How is a democracy like trees? How did Wangari stop President Moi from dividing the people? How did Wangari cultivate friendships within the tribes? How do you cultivate friendships? How are you and Wangari alike? Different?

Read pages 36-37. Why was Wangari awarded the Nobel Peace Prize in 2004? How does the illustration help us understand Wangari's tree planting and her supports were successful? How does the text support the illustration?

Finish reading the final section, Wagari Maathai, Mother of Forests. Review her life story. Use a timeline (attached) or a digital timeline (referenced below) to sequence the major events of Maathai's life.

EXPLORE:

Ask students to identify the plants, animals and decomposers in *Wangari Maathai*. Create an anchor chart showing how and what types of matter move among plants, animals and decomposers in Kenya. Explain that Wangari's village of Ithi was once a balanced ecosystem. What is an ecosystem? What would be included in a balanced ecosystem? You can refer to the references below to assist with clarification. How did this ecosystem become unbalanced over time? Identify some of the organisms from the story. Refer to the Kenya ecosystem (attached).

Explain to students that you want them to visualize the variety of plants, animals, nonliving things, and different weather conditions in their schoolyard in the past week. Identify as many characters as possible and how they affect one another. Create a chart and place it next to the anchor chart created above.

Next, venture out into the schoolyard with science notebooks and sketch, label or write what they have discovered. Return to the classroom and add to the chart. Ask the students what they noticed. Is their school a balanced ecosystem? Why or why not? How might the schoolyard change over time? Give students time to engage in identifying scientific evidence and reasoning.

Then the students are going to create a piece of art that demonstrates their understanding of a balanced ecosystem. Choosing an animal or tree from their schoolyard, the students will outline that figure to be at least an 8x10 size. (See attached, examples of animal ecosystems.) Inside the figure, the students will add the organisms that would create a balanced ecosystem.

When projects are completed, have students do a gallery walk. Students will use reasoning to connect the evidence that supports the claim of a balanced or unbalanced ecosystem with argumentation. To support their thinking, students will describe a chain of reasoning that includes evidence from the ecosystem anchor chart.

Present finished pieces to community members such as your local watershed council, city organizations or Rotary Club. You may also wish to submit pieces to the River of Words, <http://www.riverofwords.org/>

EXPLAIN:

Students need to view themselves as passionate leaders and innovators in their community. Show the seven minute video, *Planting Hope* <https://www.youtube.com/watch?v=Es6eVgmPWJM> to the students. What risks did Wangari take to achieve her goals? How did Maathai empower other women to follow through on an idea that could make a difference? How was Wangari Maathai a leader? How does leadership drive innovation and creativity? How is a tree like a symbol of hope? Maathai brought back sustainable practices back to the women in her community. Her passion drove her to build positive changes within her community and globally. Wangari was a STEM thinker. She modeled innovative thinking while using authentic problem-solving to demonstrate that change and improvements can make a difference.

Share with students that ideas can be small but could affect a wider span over time and have a positive impact in our future. Remind students that we constantly test new ideas as we celebrate our failures and successes. What are some changes you would like to see happen at your school, home and the community? Students could expand their ideas at the state, national and global level through programs like Exploravision.

ELABORATE:

"The tree is just a symbol for what happens to the environment. The act of planting one is a symbol of revitalizing the community. Tree-planting is only the entry point into the wider debate about the environment. Everyone should plant a tree. We are planting seeds of hope. Right is right, even if you're alone," stated Maathai.

Students can identify a tree in their schoolyard or local neighborhood park. How do people and other organisms use this tree? What survival challenges might this tree face in the future? Obtain a native tree from your USDA plant hardiness zone. Have students plant the tree on Arbor Day. Many nurseries are willing to partner for a tree planting event.

Students along with their families can become a growing network of citizen scientists (<https://scistarter.com/>). There are many opportunities that require little to no funding to participate. Find a project that allows students to synthesize facts through exploration as they dive deeper into science.

EVALUATE:

Throughout this activity students demonstrate their understanding for strong, innovative leadership that create positive changes. The teacher can evaluate through student contribution and discourse. Final projects, such as the ecosystem art piece can be assessed for the understanding of a balanced ecosystem. Finally, student notebooks (timeline included) may be evaluate through resources such as NSTA guidelines for interactive notebooks (resource below).

Sources:**Books:**

- Johnson, J. C. (2010). *Seeds of Change: Planting a Path to Peace*. Ill. by S. L. Sadler. New York: Lee & Low.
- Napoli, D. J. (2010). *Mama Miti: Wangari Maathai and the Trees of Kenya*. Ill. By K.Nelson. New York: Simon & Schuster.
- Nivola, C. A. (2008). *Planting the Trees of Kenya: The Story of Wangari Maathai*. New York: Farrar, Straus and Giroux.
- Winter, J. (2008). *Wangari's Trees of Peace: A True Story from Africa*. Orlando: Harcourt.

Internet:

- <http://takingrootfilm.com/the-film/> Film of Wangari Maathai
- <http://web.unep.org/stories/story/citizen-science-helps-ecosystem-renewal-kenya> Citizen Science projects in Kenya
- <http://www.kws.go.ke/> Kenya Wildlife Services
- <https://scistarter.com> Citizen Science projects around the world
- <https://www.arborday.org/> Arbor Day Foundation
- <http://www.greenbeltmovement.org/> Green Belt Movement
- <https://www.theguardian.com/world/2011/sep/26/wangari-maathai> Life Story
- <https://www.plt.org/educator-tips/words-to-live-by-tribute-wangari-maathai/> A Tribute to Wangari Maathai
- <http://savannabiomeassignment.weebly.com/food-web.html> graphic of Kenya Savannah
- <http://www.kidsgeo.com/geography-for-kids/0164-ecosystems.php> define balanced ecosystems
- <http://www.riverofwords.org/> focus is on a balanced ecosystem
- <https://www.thehenryford.org/education/resources/> innovation curriculum
- <https://scistarter.com/> Citizen science projects
- <http://www.exploravision.org/> Exploravision innovation competition
- <https://elearningindustry.com/top-10-free-timeline-creation-tools-for-teachers> digital timelines
- <http://www.nsta.org/publications/news/story.aspx?id=51882> assessing interactive notebooks

Videos

- https://www.youtube.com/watch?v=dZap_QlwIKw Nobel Prize Lecture by Professor Wangari Maathai
- <https://www.youtube.com/watch?v=Es6eVgmPWJM> Planting Hope