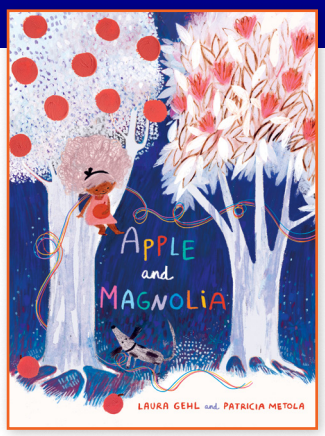


# APPLE and MAGNOLIA

LAURA GEHL and PATRICIA METOLA

★ What's not to love about this endearing and effervescent picture book?
—*Kirkus Reviews* (starred review)

## How Trees Are Connected to One Another and to Us

### *A Discussion and Activity Guide*

Although *Apple and Magnolia* is a fictional story, the book was inspired by scientific research showing that trees can communicate with and take care of one another. It is also true that people and trees can help one another in numerous ways. This guide by Laura Gehl, who worked as a science writer before becoming a full-time children's author, introduces the science of tree communication and delves into the relationship between humans and trees. Gehl also provides children's activities for further exploration of these ideas.

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## How do trees communicate and help one another?

*"She tied a string with two cups so that Apple could hear Magnolia's sighs. . . ."*

In the story, Britta connects Apple and Magnolia with a phone system made from cups and string. In the forest, trees are connected in a different way. Their roots are linked to an underground network made of fungi that connects them to other trees. In some forests, nearly all the trees—even different kinds of trees—are linked together. Using the network, trees share important resources like water and nutrients and even send alarm signals to one another. Scientists sometimes jokingly refer to this network as the wood wide web, and just like the internet (the *world* wide web), it's an amazing communication system.

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In one example of tree communication, when Douglas fir seedlings lose their leaves because of drought or insects, making them likely to die, they send chemical signals to ponderosa pine trees nearby. The ponderosa pine trees then activate their defense systems to protect themselves from the same fate.

In another example, when young trees are shaded by larger trees and don't have enough sunlight to survive, nearby trees can help. Trees make their own food using a process called photosynthesis. Photosynthesis requires sunlight, water, carbon dioxide from the air, and chlorophyll, the substance that makes leaves green. Without enough sunlight, photosynthesis is impossible! But small trees in the shade can survive by receiving food from older trees that are tall enough to reach the sun.

In addition to communicating underground, trees can send information through the air using scent signals. One example of this occurs in sub-Saharan Africa. When a giraffe chews on an acacia tree, the tree sends distress signals into the air to warn neighboring acacias. When the nearby trees receive this signal, they push chemicals into their leaves to make them bitter. The bitter taste keeps giraffes from wanting to munch on those leaves.

## How do trees help us?

*"She watched Apple give Magnolia gifts."*

The story focuses on the friendship between Apple and Magnolia, but trees help not only one another, they help us too! Trees give us gifts every day. For example:

- Trees give us food, from bananas to apples, from coconuts to cashews, from lemons to mangoes.
- Trees give us medicines.
- Trees give us shade and cool down the air.
- Trees protect land from erosion, fire, flooding, and wind. They also help slow down global warming and climate change.

- Trees clean our air and help us breathe. During photosynthesis, they remove carbon dioxide and airborne particles from the air while producing oxygen.
- Trees make us happier! Scientists have found that even looking at trees makes people calmer, and spending time in a forest or climbing trees is even better. During the COVID-19 pandemic, the forestry service in Iceland encouraged people to go out and hug trees once per day to help with loneliness and isolation.

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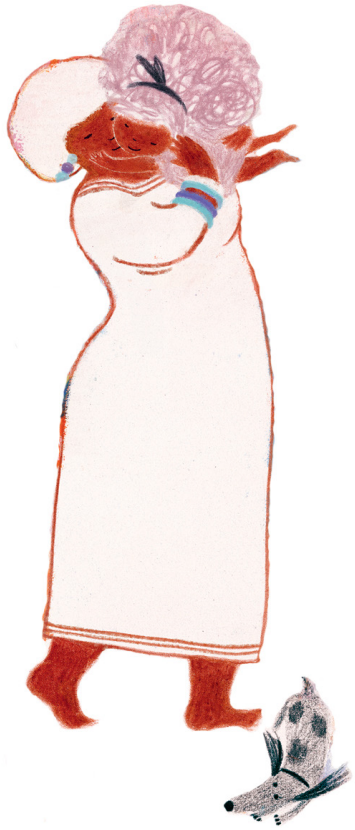
## How can we help trees?

*"But Nana asked if Britta had a plan to help Magnolia."*



We can all find ways to help the trees around us! Here are a few things you can do:

- Reduce, reuse, and recycle products that come from trees, such as paper and cardboard. For example, use both sides of a piece of paper for drawing or homework, and carry your lunch in a lunchbox instead of paper bags. Find new uses for toilet paper tubes and cardboard boxes, like making the tubes into binoculars and the boxes into spaceships.
- When buying paper products, such as toilet paper, choose ones that are made from recycled material.
- With permission, plant more trees in your yard, at your school, or in a nearby park. Native trees—meaning trees that originated in your area—are especially good.
- Help prevent wildfires by never playing with matches or lighters and by putting campfires out completely before leaving a campsite.
- Spread the word! Tell your friends and family about how trees help people and how people can help trees.

## Writing prompts and discussion ideas

- In *Apple and Magnolia*, Nana says "unusual friendships can be the most powerful of all." Imagine an unusual friendship. Is it a cat and a dog who share the same owner? A pencil and a crayon? A bumblebee and a flower? A snail and a race car? Write or tell the story of the unusual friendship you have imagined. How do the two friends take care of each other?
- Bronwyn and Dad both doubt Britta's claim that Apple and Magnolia are friends and can help each other, while Nana believes her. Think about a time when someone in your life doubted you or when someone in your life believed in you. Write or tell the story about what happened and how that person made you feel.
- In the story, Apple gives Magnolia the gift of apples! In real life, trees give people a lot of different gifts. Some of those gifts are listed above. Can you think of others? Write or tell a story about some of the gifts we get from trees.

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# Activities

## Stretch like a tree!

Start as a seed, curled up in a ball on the ground.

Now grow . . . grow . . . grow . . . until your trunk (body) stands tall.

Wiggle your roots (toes) in the soil.

Reach your branches (arms) up as high as you can. Touch the sky!

Wave your twigs (hands) to say hi to the birds.

Shake your leaves (fingers) in the breeze.

## Watch for tree visitors

Go outside and find a tree. Bring a snack or even a picnic lunch if you want. Sit down where you can see your chosen tree and . . .

*watch*. Who visits your tree? Birds? Squirrels? Chipmunks? Ants? Why do you think each animal is visiting your tree? What might they be looking for? You might also want to bring art supplies and draw a picture of what you see.

## Make bark and leaf rubbings

To make a bark rubbing, tape a piece of paper on the trunk of a tree. Remove the paper wrapping from a crayon (jumbo crayons work well) and gently rub the side of the crayon back and forth over the paper. Try this with three different trees and compare! How are the textures and patterns created by the bark different?

To make a leaf rubbing, collect at least three different leaves. Make sure the leaves are dry. Place the leaves on a flat surface with a piece of white paper over the leaves. Gently rub the side of a crayon over each leaf until the leaf shape and its veins appear on your paper. You can also try oil pastels instead of crayons.

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## Websites for children and families to explore

https://www.nwf.org/Trees-for-Wildlife

https://www.nwf.org/Kids-and-Family

https://www.nature.org/en-us/get-involved/how-to-help/plant-a-billion

https://www.worldwildlife.org/habitats/forest-habitat

https://www.arborday.org/kids

https://www.earthday.org

## Resources for adults about how trees communicate

"Do Trees Talk to Each Other?" by Richard Grant, with photographs by Diàna Markosian, *Smithsonian Magazine*, March 2018.

"The Social Life of Forests," by Ferris Jabr, with photographs by Brendan George Ko, *The Daily*, *New York Times Magazine*, December 6, 2020.

"'Wood Wide Web'—the Underground Network of Microbes That Connects Trees—Mapped for First Time," by Gabriel Popkin, *Science*, May 15, 2019.

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