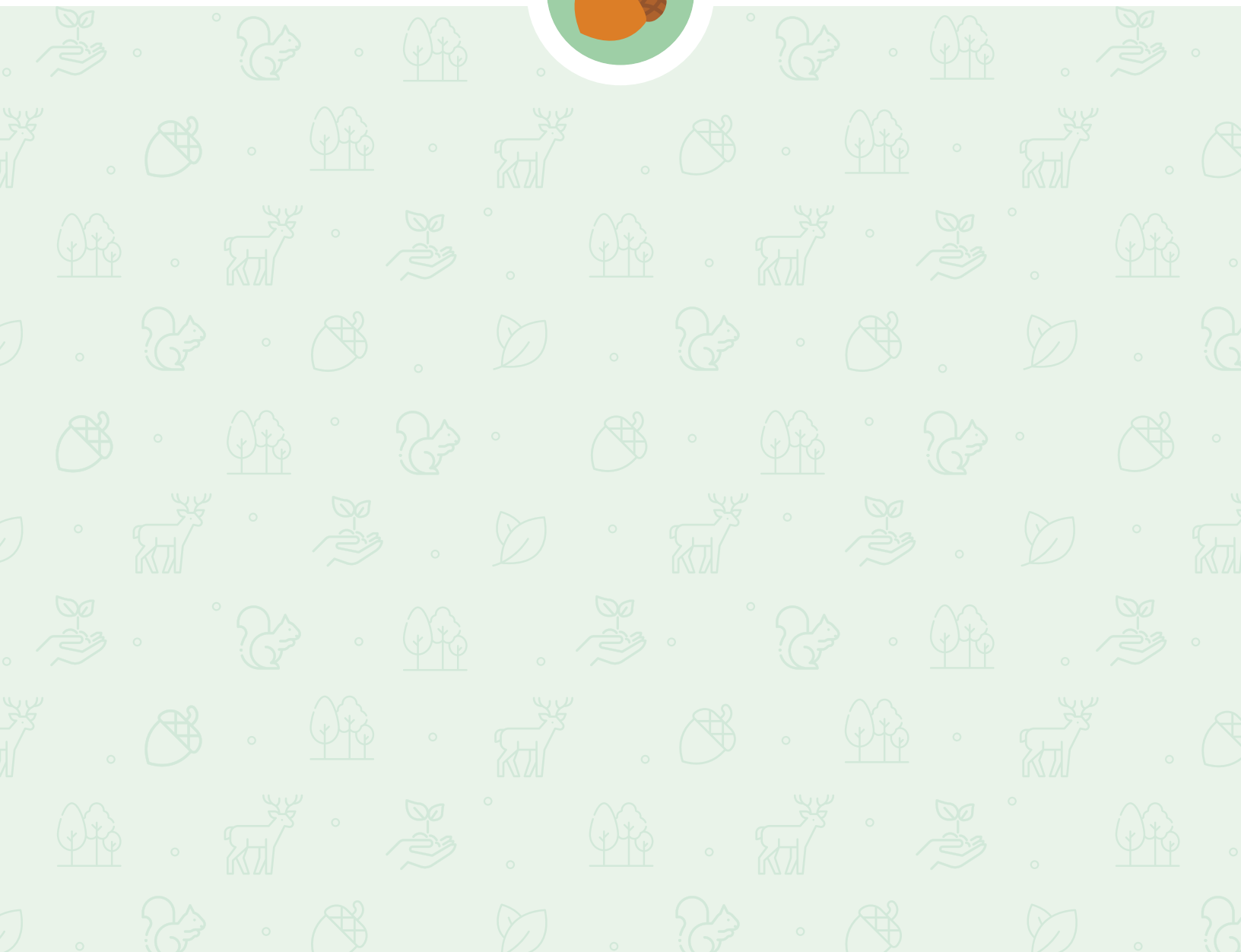
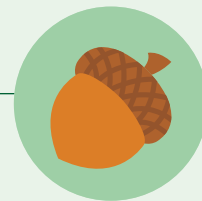


# Tree Biology





# Tree Biology

## Introduction

Just like all living things, a tree goes through different stages as it grows and changes. From a tiny seed to a towering tree, each step in a tree's life cycle is important for its own survival and plays a part in the health of the environment around it. Recognizing and understanding the life cycle of trees helps foster responsible environmental stewardship and appreciation for the processes that sustain life on Earth.

Tree Biology focuses on the stages of a tree's life cycle, the roles trees play in the ecosystem throughout their lives, the benefits and products trees provide, and how human activities impact a tree's life cycle.

---

## Questions to guide explorations and experiments

 How does a tree live and grow?


---

 What do trees need to grow and survive?


---

 What do you think might affect how a tree grows?

---

 How does a tree's life cycle compare to the life cycles of other living things?


---

 Why do we need trees?

---

 What impact do trees have on the environment?

---

 How are trees a renewable resource?

---

 How does the renewable nature of trees tie into their life cycle?

---



---

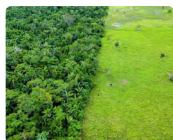
### Helpful “tree-sources” for this topic



#### How Trees Grow from One Tree Planted

Shares the life cycle of trees

[youtu.be/GtYCO0dHMfk](https://youtu.be/GtYCO0dHMfk)



#### Working Trees: Reforestation and Responsible Forestry from the Nature Conservancy

Explores responsible forest management

[youtu.be/b-j28Qd8WJ8](https://youtu.be/b-j28Qd8WJ8)



#### The Benefits of Trees from Tree Canada

A long list of all trees offer with links to more information

[treecanada.ca/resources/benefits-of-trees](https://treecanada.ca/resources/benefits-of-trees)

---

### Children's Books

#### FICTION

- *Acorn Was a Little Wild* by Jen Arena (ages 4-7)
- *The Apple Pie Tree* by Zoe Hall (ages 4-7)
- *Avocado Magic / ¡Viva el aguacate!* by Taltal Levi (ages 4-8)
- *Big Tree Down* by Laurie Lawlor (ages 4-8)
- *Call Me Tree / Llámame árbol* by Maya Gonzalez (ages 4-7)
- *The Cottonwood Tree* by Serena Mangus (ages 7-10)
- *Have You Seen My Acorn?* by DK Ryland (ages 4-8)
- *Little Sap: The Magical Story of a Forest Family* by Jan Hughes (ages 4-8)
- *Log Life* by Amy Hevron (ages 4-8)
- *One Day This Tree Will Fall* by Leslie Barnard Booth (ages 4-8)
- *Red Leaf, Yellow Leaf* by Lois Ehlert (ages 4-7)
- *This Table* by Alex Killian (ages 3-7)
- *Tree Song* by Tiffany Stone (ages 3-7)
- *Treemendous: Diary of a Not Yet Mighty Oak* by Bridget Heos (ages 3-8)
- *Wake Up, Little Pin! The Story of a Sleepy Sapling* by Loretta Garbutt (ages 4-8)
- *Whirl* by Deborah Kerbel (ages 3-8)
- *The Wind and the Trees* by Todd Stewart (ages 4-8)



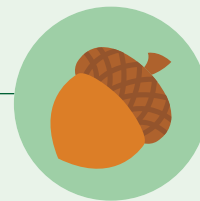
## Tree Biology

### POETRY

- *It Starts with a Seed*  
by Laura Knowles (ages 4-8)
- *Trees: Haiku from Roots to Leaves*  
by Sally M. Walker (ages 7-9)

### NONFICTION

- *21 Things to Do with a Tree*  
by Jane Wilsher (ages 6-9)
- *Be Thankful for Trees*  
by Harriet Ziefert (ages 4-8)
- *Before We Stood Tall: From Small Seed to Mighty Tree* by Jessica Kulekjian (ages 3-7)
- *Branching Out: How Trees Are Part of Our World* by Joan Marie Galat (ages 8-12)
- *Fire! A Renewal of a Forest*  
by Celia Godkin (ages 6-9)
- *From Cone to Pine Tree*  
by Emma Carlson-Berne (ages 5-9)
- *From Tree to Paper / Del árbol al papel*  
by Avery Toolen (ages 5-9)
- *Forestry A-Z* by Ann Walsh and Kathleen Cook Waldron (ages 6-9)
- *The Gentle Genius of Trees*  
by Philip Bunting (ages 6-9)
- *How Do Maple Trees Grow? / Cómo crecen los arces?* by Kathleen Connors / and Diana Osorio (ages 4-7)
- *The Life Cycle of a Tree / El ciclo de vida del árbol* by Bobbie Kalman (ages 7-10)
- *Little Brown Nut* by Mary Auld & Dawn Cooper (ages 5-8)
- *One Small Place in a Tree*  
by Barbara Brenner (ages 6-10)
- *Rise to the Sky: How the World's Tallest Trees Grow Up*  
by Rebecca E. Hirsch (ages 4-9)
- *The Second Life of Trees*  
by Aimee M. Bissonette (ages 4-8)
- *The Sequoia Lives On*  
by Joanna Cooke (ages 4-8)
- *A Tree Is a Home*  
by Pamela Hickman (ages 4-8)
- *A Tree Is a Plant*  
by Clyde Robert Bulla (ages 4-8)
- *A Tree Grows Up*  
by Marfe Ferguson Delano (ages 4-6)



# Life Cycle of a Tree

## Introduction

All living things are born, grow, change, reproduce, and die over time. Together, these stages form a **life cycle**. Sometimes, a life cycle happens very quickly. For fruit flies, the life cycle is over in about two weeks, while Greenland sharks can live for hundreds of years.

Trees can also live for hundreds of years—or more. Kids are often interested in understanding beginnings and endings. Learning about the life cycle of trees can help Tree Trekkers understand the things all life cycles have in common, see patterns in nature, and connect with the world around them.

---

## Supplies

- Collection (or pictures) of various tree seeds: acorns (oak), samaras (maple), spiny burs (sweetgum), cone (pine), etc.
- Copies of Life Cycle of a Tree handout (page 32)
- Tree Trekker Journals (or notebooks)
- Writing and drawing tools

---

## Get kids thinking

Ask kids to think about life cycles they are familiar with. What living things do they notice growing and changing around them? How does that growth and development happen? How does their own growth and development compare to that of other living things?

---

## Let's get started!

**Start with a book!** *Treemendous: Diary of a Not Yet Mighty Oak* by Bridget Heos, *Red Leaf, Yellow Leaf* by Lois Ehlert, or *A Tree Is a Plant* by Clyde Robert Bulla are fiction and nonfiction options for taking readers through the different stages of development and growth of trees.

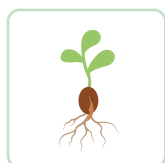


## Life Cycle of a Tree

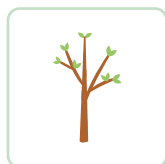
After reading, talk with kids about how trees begin as seeds. Nearly every big, tall tree once started out as a small seed! Share your collection (or pictures) of tree seeds and see what kids can tell you about the stages those seeds have to go through to become mature trees.



In your discussion, reinforce that in the right conditions, seeds that get enough sunlight, water, and nutrients **germinate**, crack open, and **sprout**.



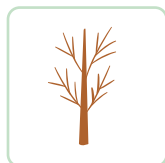
That small shoot that comes out of the seed breaks into the soil. Roots develop and a tiny stem appears, pushing through the ground. As the first leaves unfold, a **seedling** is born.



As the tree continues to grow, it develops into a **sapling**, a young tree that can't yet grow flowers and fruit.



Once the tree develops a wide trunk and lots of branches that sprout leaves and can grow flowers and fruit, it is a **mature tree** that can reproduce and disperse seeds. A mature tree may continue to grow and live for hundreds of years.



But eventually, a tree reaches the end of its life due to circumstances such as damage or disease and begins to decay. Though no longer producing life, the upright dead tree, or **snag**, helps sustain other life, including insects, fungi, and other creatures.

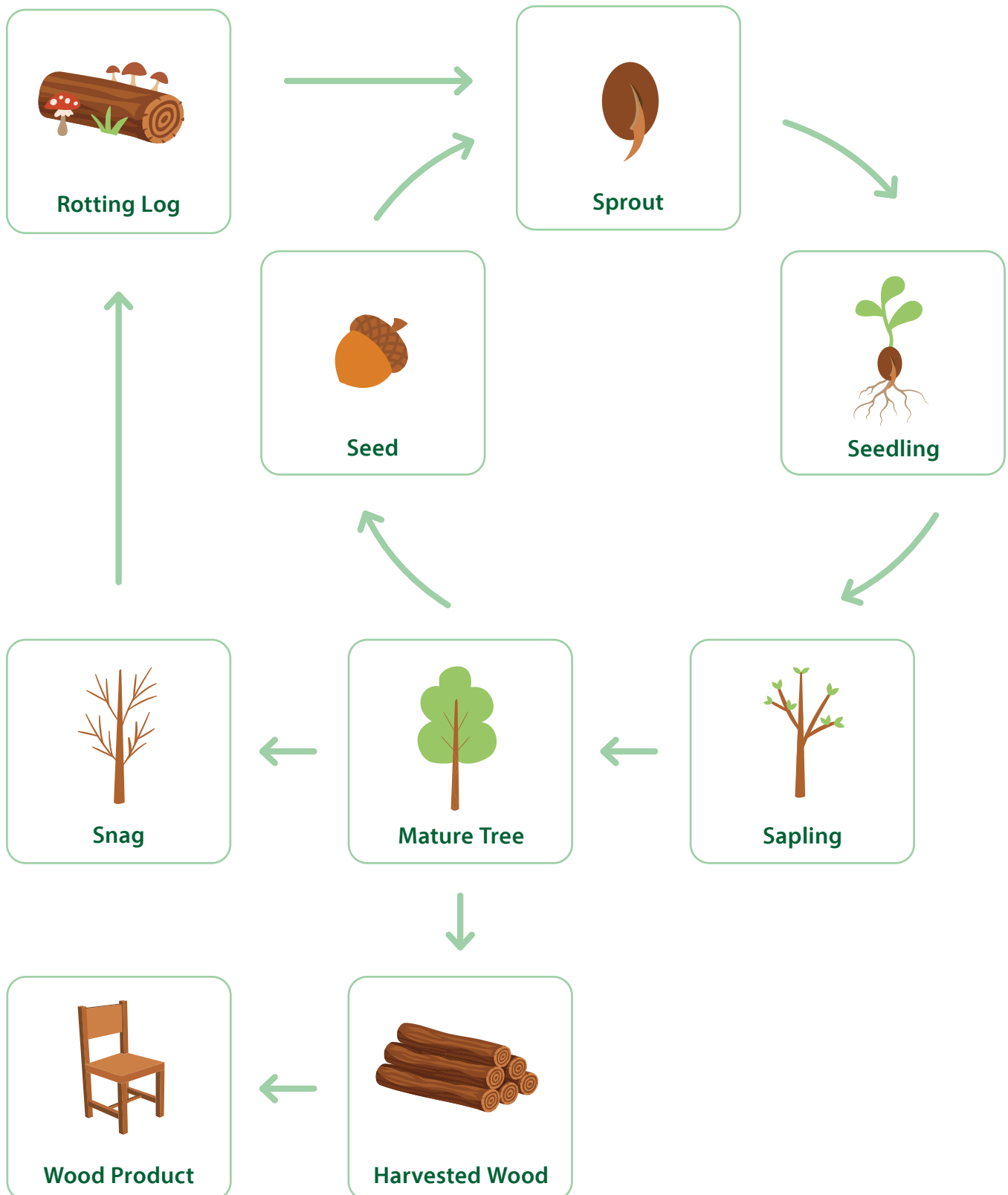


A tree that has fallen and decayed may also help sustain life as a **nurse log**, providing nutrient-rich spaces for germinating seeds.

**Ask kids:** What could happen to interrupt the life cycle of a tree? Have them consider both natural and man-made possibilities, such as lightning strikes, fires, flooding, insects, disease, construction, or harvesting trees for wood products. Talk about how things that affect trees can impact the ecosystem. You might share another book such as *Big Tree Down* by Laurie Lawlor or *Fire! A Renewal of a Forest* by Celia Godkin to prompt your discussion.



## Diagram: Life Cycle of a Tree





## Life Cycle of a Tree

Now that kids are familiar with the life cycle of trees, share the Life Cycle of a Tree handout (on page 32) with them and have them complete the diagram by drawing the various stages. When finished, have them use their work to think about how they could interpret the life cycle using movement.

### Start them with the example:

I'm a seed! [Curl your body up into a tight ball or curl your hand into a fist.]

### Together, come up with movements and poses for:

1. I've sprouted!
2. I've grown roots!
3. I've grown a stem and leaves!
4. I've grown taller!
5. I've grown branches!
6. I've spread out my roots!
7. My crown is round and full!  
(or narrow and conical!)
8. I've grown flowers!
9. I've grown fruits!
10. I've been blown by the wind  
and spread my seeds!
11. I've been hit by lightning!  
(or attacked by insects!)
12. I've lost a branch!
13. Birds and animals are using  
me as a home!
14. I fall down in a storm!
15. I've become a nurse log.

For younger children, you may want to develop the movements yourself then call out instructions for them to imitate you.



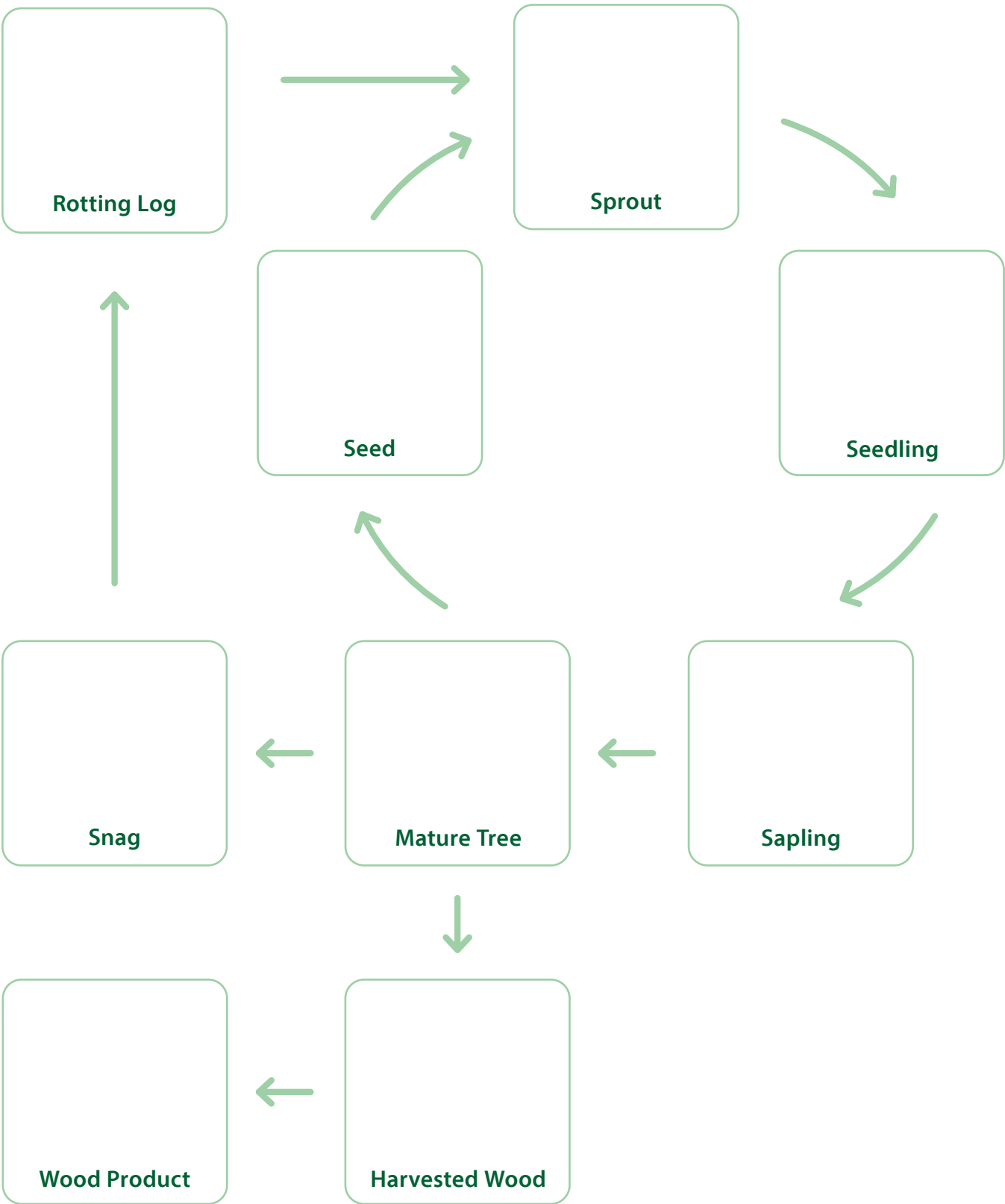
### BRANCH OUT!

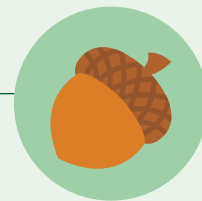
With everyone energized by their pantomime, **Branch Out!** and take a walk to look for trees in the different stages of their life cycle and note them in the Tree Trekker Journals.



# Life Cycle of a Tree

Draw the stages of the life cycle of a tree in the spaces below.





# What Wood We Do Without Trees

## Introduction

Trees play important roles in the lives of other living organisms—including people—throughout every stage of their lives.

One important thing trees do is to provide food for people, animals, and insects. They also improve our air quality when producing their own food through **photosynthesis**. Trees absorb carbon dioxide through their leaves, where **chlorophyll**, or green color in leaves, uses sunlight, air, and water to create food. The process not only removes **carbon dioxide** from the **atmosphere**, it also releases **oxygen**. As trees' root systems spread and grow, they secure and protect the soil and help prevent **erosion**. In various life cycle stages, they offer protection and homes for many animals.

And they provide an incredible number of foods and products we use every day. Tree Trekkers can explore the uses for living and harvested trees, gain appreciation for the valuable resources trees provide, and create their own products from trees.

---

## Supplies

- Writing materials
- Tree Trekker Journals (or notebooks)
- Yarn or string in many lengths and colors
- Twigs (collected from the ground)
- Foods from trees (optional)

---

## Get kids thinking

Have kids look around the room and collect or make note of things that are made from or come from trees. How many things did they gather? Make a list together and add other things that were made from or came from trees that kids have used today.



## What Wood We Do Without Trees

Point out some of the less obvious products they may have missed such as those derived from chemicals in trees, like the sweetener in their toothpaste (turpentine-derived trans-anethole), flavorings for lots of different soft drinks (cola nut, sassafras oil, glycerol ester of wood rosin), and something to thicken their yogurt (gum arabic).

Are they surprised at how many things come from trees? How many things do they think we use everyday that come from trees? Did they know there are thousands of products that come from trees?

---

### Let's get started!

**Start with a book!** Read *Be Thankful for Trees* by Harriet Ziefert or selections from *Branching Out: How Trees Are Part of Our World* by Joan Marie Galat. Give kids a chance to share specific reasons they appreciate trees.

**Ask kids:** Which benefits from trees do they think are most important: the food they provide for animals and people, the products people make from them, soil protection, the air we breathe, or something else?

Given what kids know about the importance and benefits of trees, how do they feel about trees being cut down? How does harvesting trees fit into their life cycle?



Explain that trees are considered a **renewable resource**, a natural element that can renew itself in some way in a short time or never run out. But for trees to truly be a renewable resource, forested areas where trees are cut down or removed have to be adequately replanted or given the conditions to naturally replenish.

**Sustainable forestry** means managing trees in a way that meets our needs for forest products, recreation, clean water, and plentiful wildlife, while ensuring healthy forests grow back for future generations. What if trees are cut down faster than we grow them back? Forests shrink, and trees become a diminished resource. Forest managers use numerous practices called **silviculture** to ensure that forests remain healthy and are growing well.

**Deforestation** is when trees are cut down permanently to clear land and make room for something other than forests, like farmland for animals or crops, mining, roads, or construction. This can alter weather patterns, destroy habitats, and accelerate climate change.



## What Wood We Do Without Trees

Ask kids to think about what they can do to **conserve** trees or products from them carefully, avoiding waste or overuse. Brainstorm together and have kids make a list of ideas in their Tree Trekker Journals.



### BRANCH OUT!

People have built products from wood throughout history because it's a renewable resource that is strong, lightweight, and easy to work with. Talk with Tree Trekkers about things they could make with wood on a smaller scale with string or yarn and twigs they find on the ground. **Branch Out!** on a twig search so kids can gather twigs, then return to have them work individually or in pairs to build their wooden item—a picture frame, mobile, instrument, or a tiny den or raft. (Remember to only take twigs from the ground—and not too many! Birds need them for nests.)

Have them come up with their own designs or offer some examples and instructions:



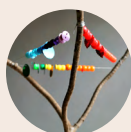
#### Twig picture frame

[aldoleopoldnaturecenter.org/wp-content/uploads/Twig-Picture-Frame-Craft.pdf](http://aldoleopoldnaturecenter.org/wp-content/uploads/Twig-Picture-Frame-Craft.pdf)



#### Twirling twig mobile

[babbledabbledo.com/engineering-for-kids-twirling-twig-mobile](http://babbledabbledo.com/engineering-for-kids-twirling-twig-mobile)



#### How to make a percussion stick musical instrument

[nurturestore.co.uk/how-to-make-a-percussion-stick-musical-instrument](http://nurturestore.co.uk/how-to-make-a-percussion-stick-musical-instrument)



#### Craft a craft

[startwithabook.org/content/pdfs/swab-craftacraft.pdf](http://startwithabook.org/content/pdfs/swab-craftacraft.pdf)

Showcase their efforts with a celebration that includes a food bar where “tastetree” treats from trees such as apples, cherries, oranges, peaches, pears, chocolate, maple syrup, walnuts, and almonds are offered for kids to try! (Be aware of any food allergies when planning what to serve.)