



THE INTER-DEPENDENCE GAME

THEME

- Forest Health
- Ecology
- Plant Conservation

TYPE OF LESSON

- Instructor-Led
- Hands-On
- Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- Outdoors
- Virtual
- Classroom
- Other: One large circle or discovery stations

TEACHING STRATEGY

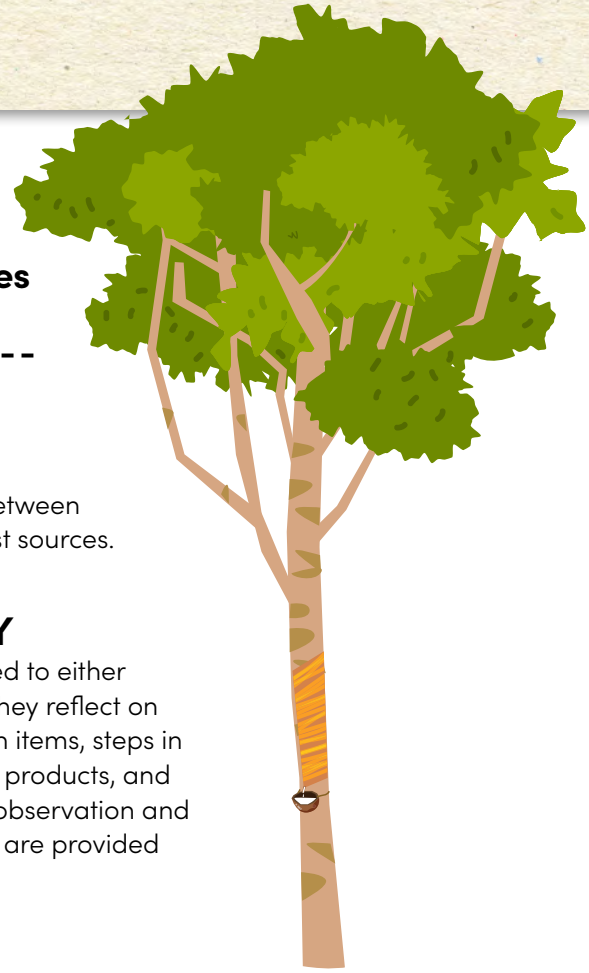
- Place-Based Learning
- Storytelling
- Nature Play
- Art / Movement
- Other: Inquiry-based Instruction

STANDARDS

- ESS3.C: Human impacts on Earth Systems. Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
- 5-LS2B: Cycles of Matter and Energy Transfer in Ecosystems. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. (Excerpt)

GRADES 4–5

DURATION 30 minutes



LESSON GOAL

Learners draw connections between common items and their forest sources.

LESSON SUMMARY

Learners look at images related to either rubber trees or maple trees. They reflect on connections between common items, steps in processing rubber and maple products, and the trees themselves through observation and group discussion. Two options are provided for conducting the activity.



WORD BANK

*blight
by-product
decomposers
ecosystem
interdependence
photosynthesis
pollinators
processed
sap*

PRINTED MATERIALS (included)

Activity Cards

- Rubber Duck activity card set
- Maple Syrup activity card set
- Background information sheet

OTHER MATERIALS

- Optional props for rubber activity:
rubber duck or rubber bands
- Optional props for maple activity:
maple syrup or maple syrup candy

SETUP

1. Review the **lesson procedure**.
2. Select the **Rubber Activity** or the **Maple Activity**.
3. Choose your activity approach and confirm you have an appropriate space.
 - **One large circle:** A space with enough room to gather in a large circle (inside or outside)
 - **Discovery stations:** A space to post images on the wall or display at tables
4. Review the optional **pre-** and **post-lesson explorations**.
5. Prepare the **lesson materials**.
 - Print a set of **Rubber Duck activity cards** or **Maple Syrup activity cards**.
 - Consider laminating the activity cards or placing them in protective sleeves.
6. Collect the option props if using.





THE INTERDEPENDENCE GAME

LESSON PROCEDURE

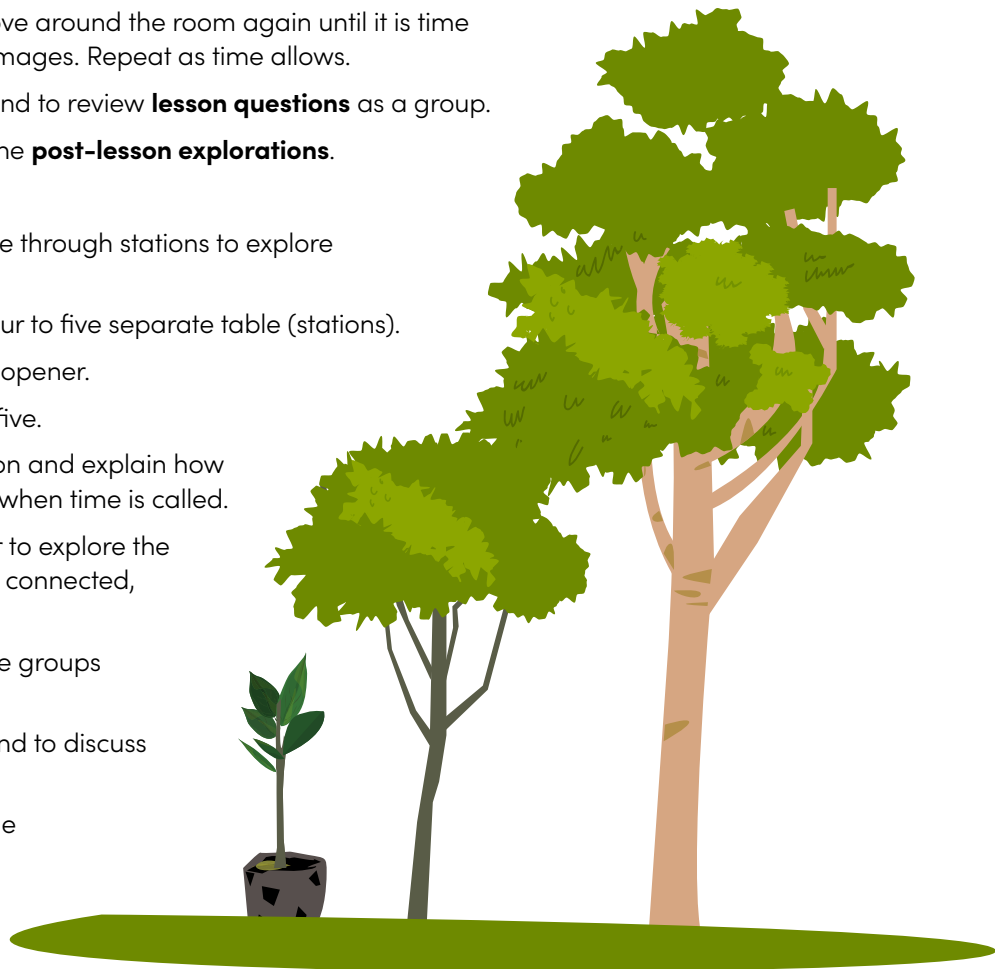
1. Optional: Complete one or more of the **pre-lesson explorations**.
2. Follow the procedure below for either (A) **one large circle** or (B) **discovery stations**.

A. ONE LARGE CIRCLE: Learners work together to explore the interdependence of images.

1. Gather learners in one large circle.
2. Share **lesson opener**.
3. Hand out an activity card to every other participant.
4. Ask each participant without a card to pair up with someone with a card.
5. Instruct pairs to move around the room together until time is called, noticing the other pairs' images as they circulate.
6. Call time after two minutes and ask each pair to find another pair with a photo that could be related to their photo.
7. When groups are matched, have them play detective to figure out how their two images are connected.
8. After two minutes, instruct pairs to move around the room again until it is time to form new groups and discuss the images. Repeat as time allows.
9. Reserve five to seven minutes at the end to review **lesson questions** as a group.
10. Optional: Complete one or more of the **post-lesson explorations**.

B. DISCOVERY STATIONS: Learners cycle through stations to explore the interdependence of images.

1. Divide and display activity cards on four to five separate table (stations).
2. Gather learners and share the lesson opener.
3. Divide learners into groups of four to five.
4. Assign each group to a different station and explain how learners will rotate to the next station when time is called.
5. Ask station members to work together to explore the images and think about how they are connected, and how they relate to trees.
6. Call time after two minutes, and rotate groups through stations as time allows.
7. Reserve five to seven minutes at the end to discuss the **lesson questions** as a group.
8. Optional: Complete one or more of the **post-lesson explorations**.



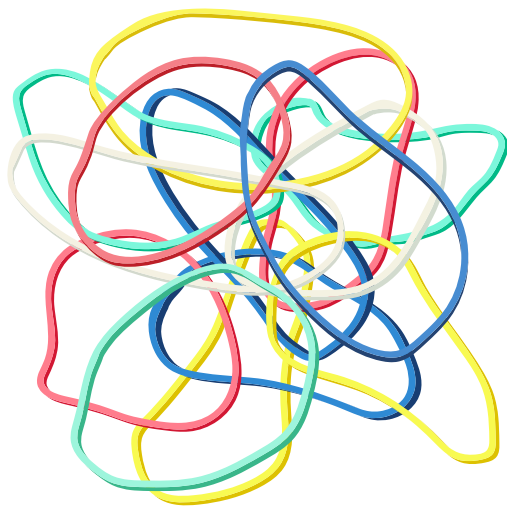
LESSON OPENER

Share the following with learners to orient them to the topic:

- Everything we use comes from the Earth. Sometimes the materials look natural (like they would grow on a tree). But much of the time, we need to look very closely to find out how the things we use are made.
 - Together we are going to do some detective work to figure out how some common items are linked to trees.
-

LESSON QUESTIONS

- What connections did you make between the images you investigated? Explain your thinking.
- What was the connection to trees in the items you explored? Explain your thinking.
- Was there anything you couldn't figure out?
- Did any new questions come up for you or your group?



PRE- LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **Where do products come from?** Look at three items in your classroom, and discuss where they came from and how they were made. Try to find plastics and other processed materials, and have learners guess how they are made.
 - **Plant parts and their functions:** Show an example of each of the parts of a plant. Talk about the stem, leaves, roots, seeds, and fruits, and ask or show examples of plant parts that we eat (examples: celery, lettuce or herbs, carrots, beans, and an orange).
-

POST-LESSON EXPLORATIONS

Create a set of forest sources cards for an item from your classroom: Choose an item to investigate in the classroom (e.g., a desk, a pencil). Make a classroom set of cards to explore the forest sources for this item. As a whole class activity, write a list on the board of possible sources where this item may have come from. Have each learner choose one source and draw a card to represent it.

Write a short story: Have learners cast three of the forest sources as starring roles in a paragraph and write how the sources interact with each other.

Write a letter to yourself: Have learners write a letter to themselves recapping their favorite parts of the lesson. Provide a template and prompts to guide the writing:

e.g., Dear Myself, On MM/DD/YYYY we practiced acting out insects and plants. I'll never forget...One question I wished I asked was...

Collect and share the letter by reading selections out loud to the class and inviting discussion, or by displaying them for learners to read on their own.

Investigate: Make a guess, and then estimate and research, how much sap it takes to make a gallon of maple syrup, or a sheet of rubber.

ADDITIONAL RESOURCES

- 7 products you didn't know come from trees.
Info for learners. From World Wildlife Fund: bit.ly/PH-producttrees
- Background Videos for Educators:
 - Ever Wonder How Maple Syrup Is Made. From Highlights Kids: bit.ly/PH-maplesyrup
 - How It's Made—Natural Rubber. From Discovery Channel: bit.ly/PH-rubber

WORD BANK

blight: a type of plant disease or the organism that causes it

by-product: something extra that is produced when a main product is produced

decomposers: organisms that break down dead organic material to get energy

ecosystem: a community of interdependent organisms and their environment

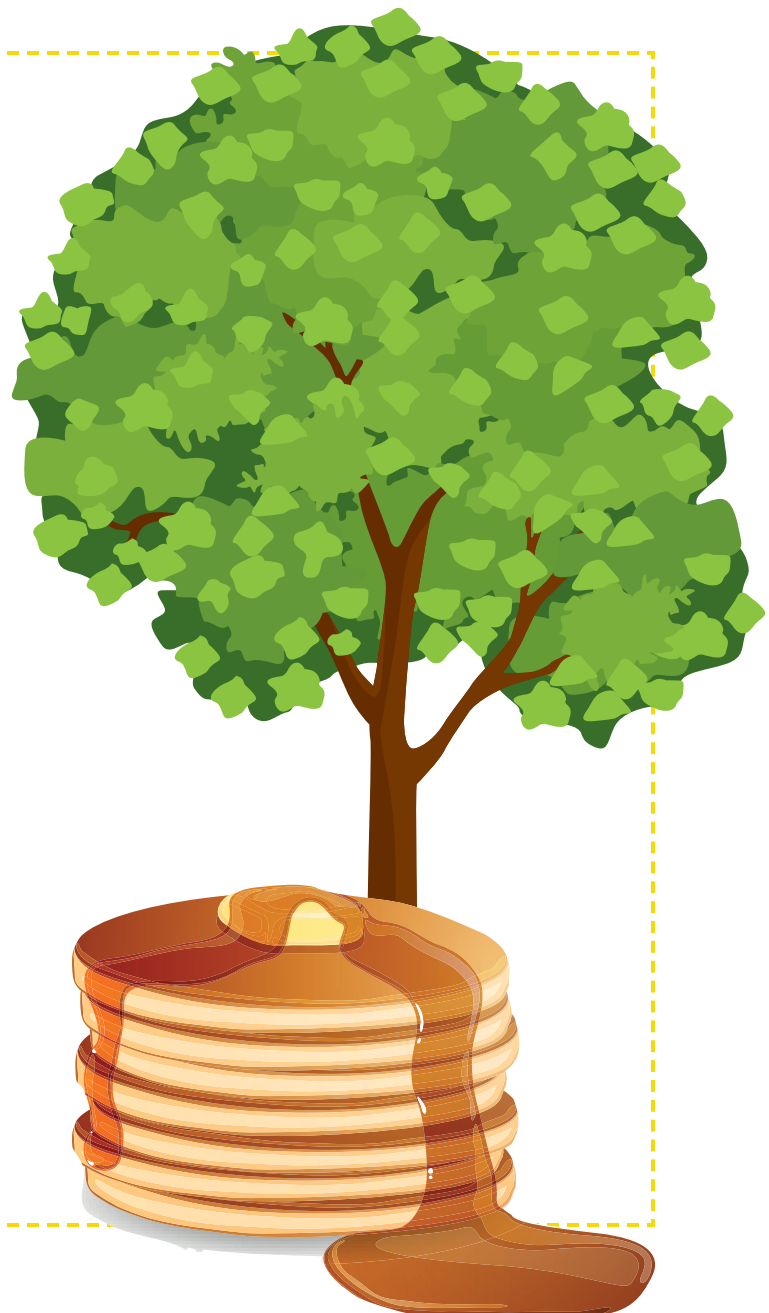
interdependence: when two or more things depend on each other

photosynthesis: the process plants use to make their own food from carbon dioxide, water, and stored energy from sunlight

pollinators: animals that help flowering plants reproduce by moving pollen around, often while the animals are feeding

processed: changed from a natural state into a product that humans can use

sap: a fluid that moves water and nutrients around inside a plant



BACKGROUND INFORMATION SHEET



NATURAL RUBBER is a by-product of the rubber tree (*Hevea brasiliensis*), which originated in the Amazon rain forest in South America.

Latex is the milky white liquid the tree produces to guard against insect infestations. It was first harvested by local indigenous peoples and used for making fabric waterproof.

Latex is harvested from the tree's trunk and processed with sulfur, a bright yellow element, in an industrial oven. This process is called vulcanization, referencing Vulcan, the Roman god of fire. When the latex and the sulfur fuse together, they create much of the rubber product we use for tires, shoes, and even rubber ducks.

Latex production in its native range is severely limited due to the introduction of a fungal blight (*Microcyclus ulei*) that prevents farmed trees from growing in plantations. Latex can only be harvested from wild trees that are resistant to the blight. Most natural latex production occurs in Southeast Asia, and the latex is shipped to manufacturers across the globe. Today you cannot take a direct flight between South America to Southeast Asia as a result of efforts to keep the blight from jumping continents and impacting the industry.



MAPLE SYRUP is a by-product of the sugar maple (*Acer saccharum*) and originates from the northeastern United States and eastern Canada. It was first used by local indigenous

peoples as an important food and additive.

Today, sugar maple trees are farmed on orchards, used as landscape plants, and found in forest ecosystems.

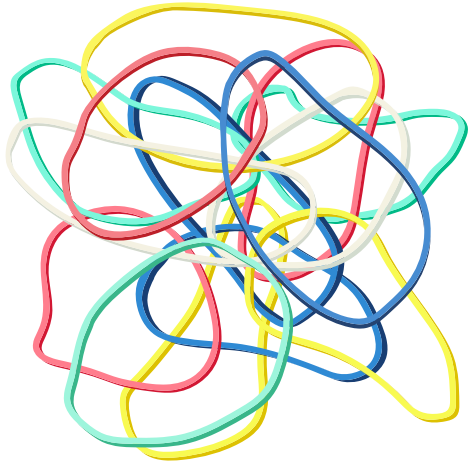
The tree's sap is collected in the early spring and brought to large vats to be boiled. It takes 40 gallons of sap to boil down into 1 gallon of maple syrup.

Maple syrup is used in its raw form to sweeten foods and can be used as a sugar substitute. Maple syrup is collected in its native range and transported around the world.

Some current threats to sugar maple trees include the Asian longhorned beetle (*Anoplophora glabripennis*), which is an invasive beetle that uses maples as a host plant, and climate change.



THE INTERDEPENDENCE GAME



NATURAL RUBBER Activity Cards



Photo: Boshun Li, Flickr.com

Rubber Duck



Photo: CIFOR, Flickr.com

Rubber Plantation



Photo: CIFOR, Flickr.com

Rubber Harvesting



Photo: Sivahari, Wikimedia

Raw Rubber Clumps



Photo: Adam Cohn, Flickr.com

Raw Sulfur



Photo: Reva G, Flickr.com

Sulfur Distribution



Photo: Andre Roberto Dereto Santos, Flickr.com

Fire



Photo: Bernard Spragg, NZ, Flickr.com

Cargo Ship



Photo: Plazak, Wikimedia

Rubber Factory



Photo: vagawi, Flickr.com

Rubber Tires



Photo: Konstantin Lazorkin, Flickr.com

Rubber Bands



Photo: ywjong, Flickr.com

Rubber Leaf Blight



Photo: Alexander Z., Wikimedia

Rubber Fins



MAPLE SYRUP Activity Cards



Photo: Mizzou CAFNR, Flickr.com

Maple Syrup



Photo: Jeanne, Flickr.com

Sugar Maple Tree



Photo: Putneypics, Flickr.com

Sugar Maple Tap



Photo: Paul VanDerWerf, Flickr.com

Cooking Vat of Maple Syrup



Photo: Scott W. Vincent, Flickr.com

Truck Delivering Maple Syrup



Photo: Jazz Guy, Flickr.com

Farm Stand Selling Maple Syrup

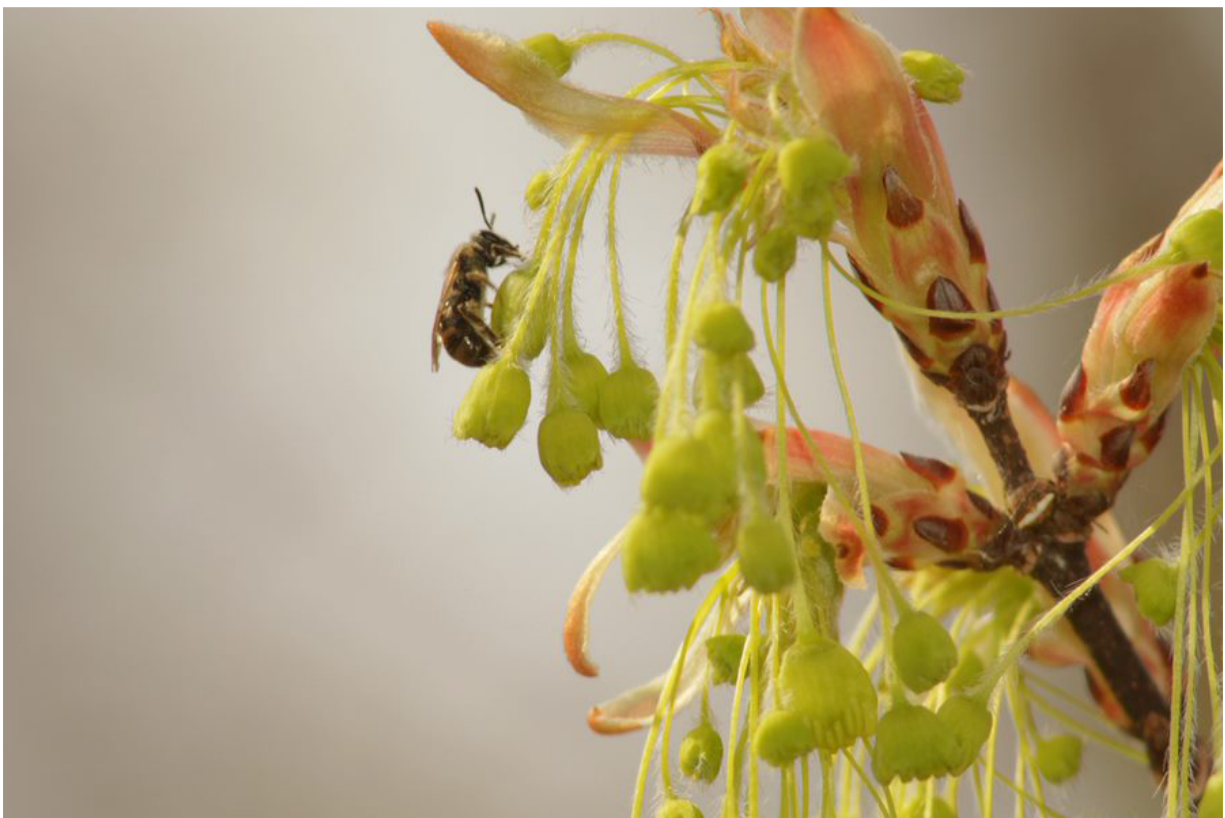


Photo: Patrick Coyn, Flickr.com

Sugar Maple Pollinator



Photo: Ronald S. Kelley, Bugwood.org

Sugar Maple Galls

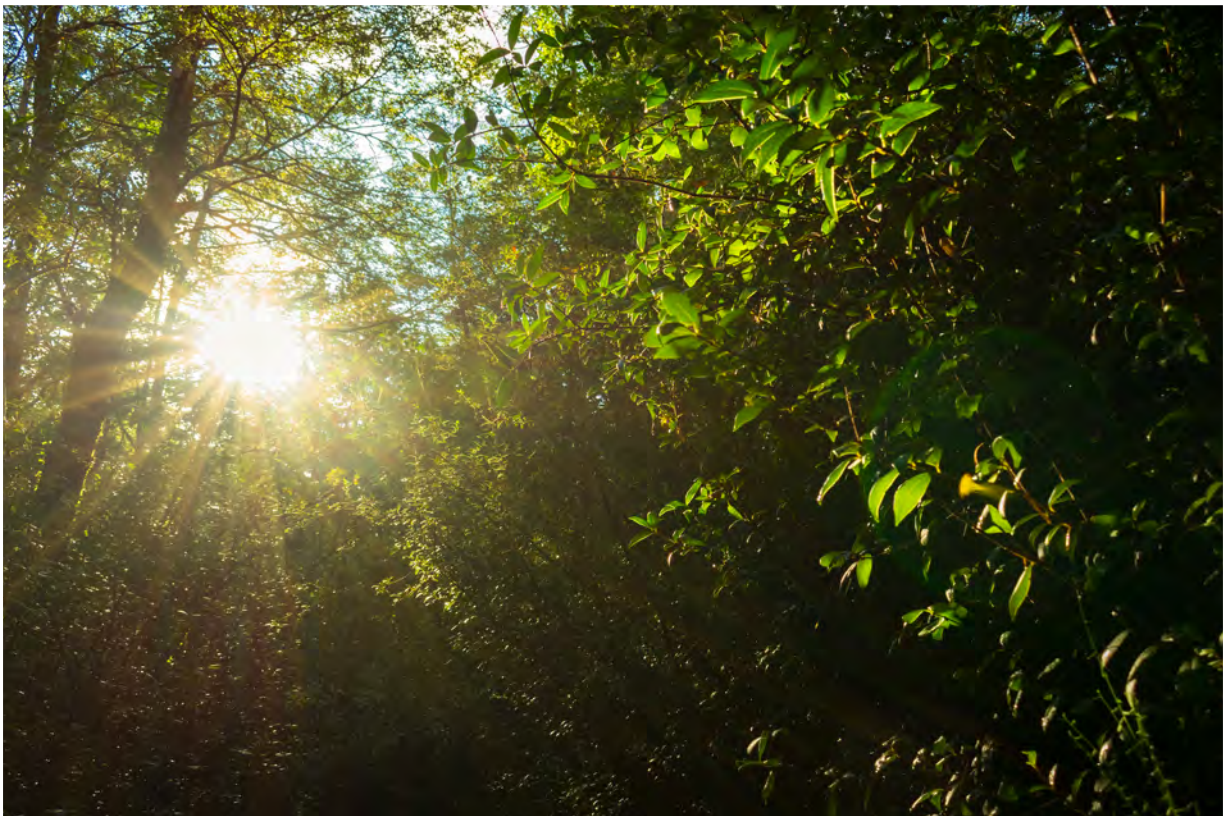


Photo: Faber_32, Flickr.com

Sun



Photo: Jonas Witt, Flickr.com

Clouds



Photo: Susy Morris, Flickr.com

Tapping into a Maple Tree



Photo: jefferyw, Flickr.com

Syrup on Pancakes



Photo: Ernesto Andrade, Flickr.com

Maple Syrup Cookies



Photo: Morrow Long, Flickr.com

Sugar Maple Tubing



Photo: 1Cuthbertson, Flickr.com

Maple Leaf Litter