
WÁHTA
TEACHINGS

Sponsors

Queen's University

INDIGENOUS TEACHER EDUCATION PROGRAM (ITEP)

Science Odyssey Presents Science Rendezvous Kingston

Million Tree Project

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ACKNOWLEDGEMENT

Acknowledging a traditional territory involves recognizing a history that predates establishment of the earliest European colonies. It also means acknowledging the territory's significance for Indigenous peoples who lived, and continue to live, upon it, and whose practices and spiritualities are tied to the land and continue to develop in relationship to the territory and its other inhabitants.

Wáhta Teachings was created in what's now called Kingston, Ontario. It's our understanding that this territory is included in the Dish with One Spoon Wampum Belt Covenant, an agreement between the Haudenosaunee Confederacy and the Confederacy of the Ojibwe and Allied Nations to peaceably share and care for the resources around the Great Lakes. The Kingston Indigenous community reflects the area's Anishinabek and Haudenosaunee roots. Métis peoples and First Peoples from other Nations also live here today.

We hope that people across Turtle Island will use Wáhta Teachings, and we invite everyone to reflect on all the traditional territories on which we live. Wáhta reminds us of our responsibility to reciprocate the gifts the land brings us by revitalizing our relationship with our Mother the Earth. We hope that this guide becomes a stepping stone for moving beyond acknowledgement of the land to an understanding of the importance of Wáhta and our Mother the Earth as a whole.

As educators, it's our responsibility to teach our students the true history of Turtle Island and the impacts of settler-colonialism on this land. We must help students become empathetic and culturally aware so that they can recognize their roles and responsibilities as Treaty people on Indigenous lands. Education rooted in equality, diversity, and inclusion will prepare our future leaders to build a better future for seven generations to come.

INTRODUCTION

Maple trees are as Canadian as hockey — after all, the leaf is on our flag! In the sugar bushes of Ontario, Quebec, and the Maritimes, making maple syrup is a tradition that goes back generations. But maples have mattered much longer than that. From time immemorial, maple trees and their gifts have been central to the cultures and practices of Indigenous peoples, who continue these practices today.

Throughout this guide, Traditional Indigenous Knowledge and the science of sugar maples appear side by side. But first, we begin with the importance of Wáhta and the Words Before All Else.

Why Wáhta Matters to the Kanyen'kehá:ka

(Mohawk People, of the Haudenosaunee Confederacy)

Kanyen'kehá:ka are taught that Wáhta — the sugar maple — is the leader of all the trees in the natural world. The running of the maple sap is the first sign of new spring life and marks the re-awakening of Mother Earth after her long winter sleep. Maple sap is a diuretic and inner cleanser. Maple syrup is a natural sweetener in traditional foods. Every year, the Kanyen'kehá:ka have a ceremony to thank Wáhta for all she provides. It's important to plant and preserve these trees for seven generations to come, so that our descendants can continue to offer thanks to the maple and everything she gives us.

We give Wáhta special recognition in the Ohén:ton Karihwatéhkwen: Words Before All Else. These Words acknowledge and give thanks to Wáhta and all our relations. Please view this video of the Kanyen'kehá:ka Words Before All Else before moving on.

Kanyen'kehá:ka Words Before All Else *(Video: 4:33)*

Glossary of Indigenous Words

Some Indigenous words and phrases related to maples are given here. Click to hear proper pronunciations of Kanyen'kéha words. Recordings of many Anishinaabemowin words are available from The Ojibwe People's Dictionary.

English	Kanyen'kéha	Anishinaabemowin
Maple	Wáhta	(no direct equivalent)
Maple tree	Wáhta nikakwirò:ten	Ininaatig
Forest	Kahrhá:kon	Mitigwaaki
Syrup	Wáhta óshes	Zhiiwaagamizigan
Sap	Aotiharennawèn:te	Ziinzibaakwadwaaboo
Sap is running	Yorontokhá:'on	Onjigaa
They give thanks	Tenhontenonhwerá:tons	Miigwechiwendamog
You hang it up (e.g. the bucket)	Seniyón:ta	Gidagoodoon
They collect it	Ratiró:roks	Odasiginaanaawaa
Big pot	Ka'nahkowá:nen	Gichi-akik
He will boil it	Tenhahnekóntyehte	Owii-ombigamizaan

WÁHTA TEACHINGS

This guide features Kanyen'kehá:ka Teachings surrounding sugar maples. Click here to view Anishinabek stories on YouTube *(Video: 11:41)*. Other Indigenous peoples have different and equally valuable Teachings – we encourage you to learn about them, too!

WHAT IS WÁHTA?

OH NAHÒ:TEN NE WÁHTA? | AWENEN NINAATIG?

Wáhta is the sugar maple, which scientists call *Acer saccharum*. Sugar maples grow in Ontario, Quebec, and the Maritimes. They're common in the Deciduous (Carolinian) and Great Lakes-St. Lawrence forest regions of Canada.

How to Spot a Sugar Maple

Out for a nature walk? Use these features to identify a wild Wáhta!

- **Trunk:** straight; up to 35 m tall and >100 cm in diameter at breast height
- **Bark:** grey; smooth on young trees, splitting and curling with age
- **Branches:** large; form a dense, narrow, round-topped crown
- **Leaves:** in pairs along the twigs; dark yellowish-green on top, lighter underneath; deep U-shaped notches between the side lobes and middle lobe
- **Seeds:** called keys, with two wings up to 35 mm each; grow in dangling clusters; plump seedcases mature in autumn

WÁHTA TEACHINGS

We asked Indigenous Indigenous community members to explain, in their own words, what sugar maples means to them. Wáhta reminds Lindsay Brandt that "there's a lot of sweetness even in the darker times of winter." Deb St. Amant says that sugar maples sustain many people in many different ways. For both, sugar maples are a reminder that we cannot just take from the natural world: we must also give back. To learn more, watch the video.

Community Members *(Video: 4:47)*

ACTIVITIES

1. Do you live where maples grow? On your next walk, use the list above to spot sugar maples in your neighbourhood. You can find more detailed guidelines here: Natural Resources Canada: Sugar Maple Fact Sheet
2. Take a closer look at the bark: is the maple young or old? Are there other clues to the tree's age?
3. No maples in your area? Try using photos from Google Image Search. Can you see the differences between sugar maples, red maples, and black maples?

Did you know?

Some sugar maples in Quebec are more than 300 years old!

AIR

ÓWERA | NESEWIN

One large sugar maple makes enough oxygen for four people—every single day! Their big, fluffy crowns cast delicious summer shade, cooling forests and backyards and city blocks. Their leaves catch dust and ash, reducing air pollution. When those leaves rustle in the breeze, their movements help disperse smog. Maple trees also capture carbon dioxide — a greenhouse gas that causes climate change. They do so through a process called photosynthesis.

Photosynthesis

Animals get energy from food, but trees — like Wáhta — make their own. Inside maple leaves, carbon dioxide from the air mixes with water from the soil and energy from the sun… becoming sugar. This sugar is energy: the tree's fuel for life.

Sugar is also a building block for roots and twigs and other bits that make up growing trees. Called biomass, these body parts are food for all kinds of animals. Biomass is also a living storage system for carbon: one sugar maple with a trunk diameter of 15 cm has already captured 100 kg of atmospheric carbon dioxide!

Did you know?

During summer, maples store extra sugar from photosynthesis in the form of starch. The following spring, trees convert that starch back into the sugar that gives maple sap its famous sweetness!

WÁHTA TEACHINGS

Chlorophyl is a pigment with two jobs: photosynthesis, and making leaves green. In autumn, chlorophyl breaks down, revealing yellow pigments that were already in the leaves. But red pigments — like those of fiery maples — get made just for autumn! These red pigments might delay leaf-fall, giving trees more time to pull essential nutrients back into their branches. Watch the video for a Teaching that explains why Wáhta — and many other trees — lose their leaves in autumn.

Wáhta Story 1 *(Video: 4:12)*

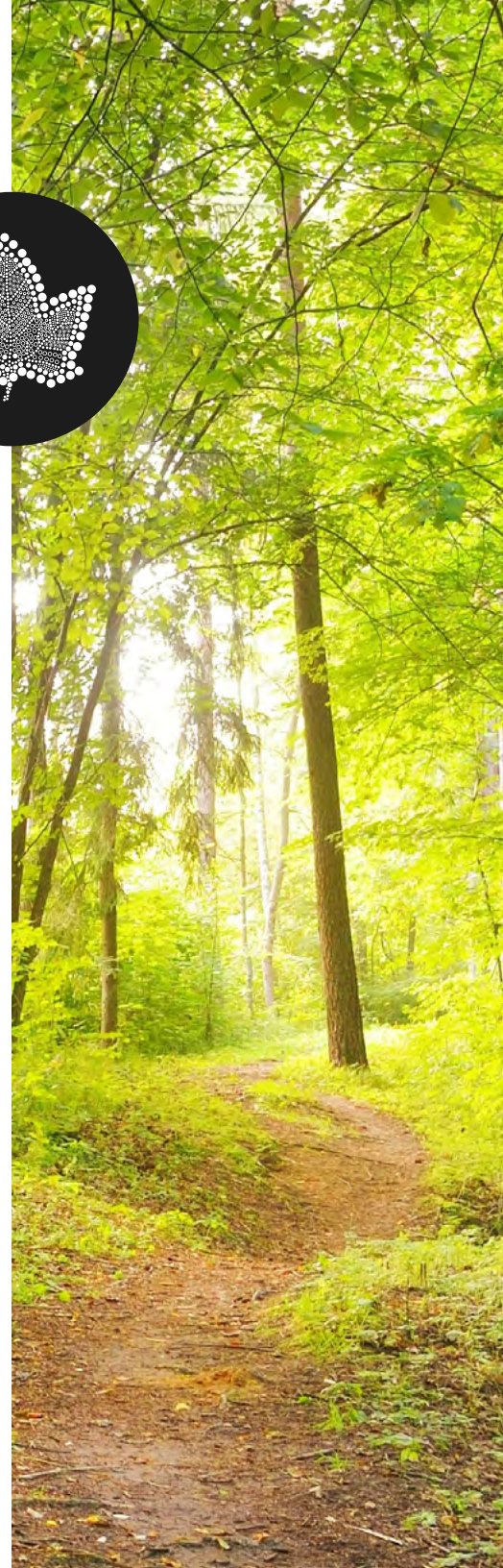
ACTIVITIES

1. Measure the air temperature while standing in the summer sun. Now measure the air temperature under a large tree. Is there a difference? How big?

2. Standing in the open, close your eyes and smell the air. Do the same thing standing in a wooded area. Is there a difference in smell? How would you describe it?

3. In autumn, collect fallen maple leaves. How many different colours can you find? What words would you use to describe them?

4. Measure a maple leaf from top to bottom and side to side. Which way is bigger? What happens when you fold the leaf in half? Try it both ways to compare!



WATER

OHNÉ:KANOS | NIBI

The Sap is Running!

Spring is coming: the days are warm but the nights are cold. Thirsty roots find water in the soil… the pressure fluctuates within her trunk… and Wáhta's sap begins to run.

In Canada, the flow of sweet water (maple sap) usually starts in late February and ends sometime in April. For many Indigenous peoples, maple season is a sacred time — a celebration of new life and fresh food after a long hard winter.

From Sweet Water to Syrup

To collect sweet water, Haudenosaunee and Anishinabek peoples traditionally cut a V-shaped notch into Wáhta's bark, then insert a wooden tap, or spile. Sap runs down the spile into birch bark containers that are emptied into larger pots for boiling. European settlers introduced metal spiles and buckets; today, many syrup producers use plastic tubing to carry sap directly from the tree to the boiling shed. Either way, no more than 1.5 L of sap should be taken from a single maple — this is essential, because harvesting too much harms the tree.

Maple sap contains minerals and protein and is about 2% sugar. Mostly, it's made of water! When sap is boiled, the extra water evaporates. This concentrates the sugar, producing thick, gooey syrup. Indigenous peoples often make dry sugar instead, which can be stored in birch bark cones or other containers.

Did you know?

It takes 40 L of sweet water to make 1 L of maple syrup!

Canada's Maple Industry

Canadians make 75% of the world's maple syrup. At 4776, Quebec has by far the most sugar bushes, but only Newfoundland, Alberta, and the Territories have none.

In 2020, Canadian maple farmers made 54 million L of syrup. Exports of maple products — including syrup, sugar, butter, and candy — exceeded $515 million.

WÁHTA TEACHINGS

Maple syrup the healthiest of all natural sweeteners and the first fresh food of spring. In some years, it was vital to Indigenous peoples' survival, providing both food and medicine. Watch the video for a Teaching that explains how Wáhta gives life to people who are sick and hungry.

Wáhta Story 2 *(Video: 3:06)*

WÁHTA AND WATER ACTIVITIES

Measuring Up

Measure the circumference of (distance around) a tree trunk's in two ways:

- How many hugs does it take to reach all the way around? Does the number change with the height of the person doing the hugging? Why?
- Wrap a string around the tree until the ends touch. Then measure the length of the string.

Find the trunk's diameter (width):

- Is there a "body part" method that would work?
- The distance around a tree is about 3 times its width. Starting from your string measurement, estimate the tree's diameter.
- For a more accurate width, use $C = 2 \pi R$ to calculate the tree's radius, then use $D = 2R$ to calculate its diameter.

Note: π is approximately equal to 3.14159

How do your measurements compare? Which methods are faster? More accurate? Which are best for knowing when a tree is big enough to tap?

Traditional Knowledge and Art

Watch this YouTube series that shares Traditional Anishinabek Knowledge of sugar maples.

Make a construction paper basket similar to the birch baskets used to collect maple sap. Do not use birch bark and spruce root for this activity without the presence and guidance of an Indigenous Elder.

- Click here for Ojibwe instructions
- Click here for Algonquin instructions

Did you know?

Scientists recommend one tap in a tree with a >30 cm diameter. Some Indigenous people measure differently — a tree that's one hug gets one tap!

Sweet Water and Syrup

Explore this resource from the Million Tree Project that explains how trees get their water!

When a tree is tapped, gravity pulls the sap down the spile and into the bucket. How does the angle of the spile affect the flow of the droplets? With the permission of a sugar bush operator, conduct an experiment to find out.

Watch this video. For 60 seconds, count the number of drops of maple sap that fall into the bucket. It takes 40 drops of sap to make 1 drop of maple syrup.

- Using tap water and an eyedropper, count the number of drops in 15 ml (1 tsp). How many drops of sweet water would it take to make 15 ml of syrup?
- If you only had one maple, how long would it take to collect enough sweet water to make 250 ml (1 cup) of syrup?
    - Given that only 1.5 L of sap can be taken from one tree, how many trees would you need to tap to collect the sap in less than one hour?
- In 2020, Canadian producers made 54 million L of maple syrup. How much sweet water did they use?
- Do you think that ALL sweet water collected becomes syrup or sugar? Consider other uses of sap and where/how sap might be lost or wasted.

Use this calculator to figure out how much energy it takes to boil 40 L of sap down to 1 L of syrup.

Did you know?

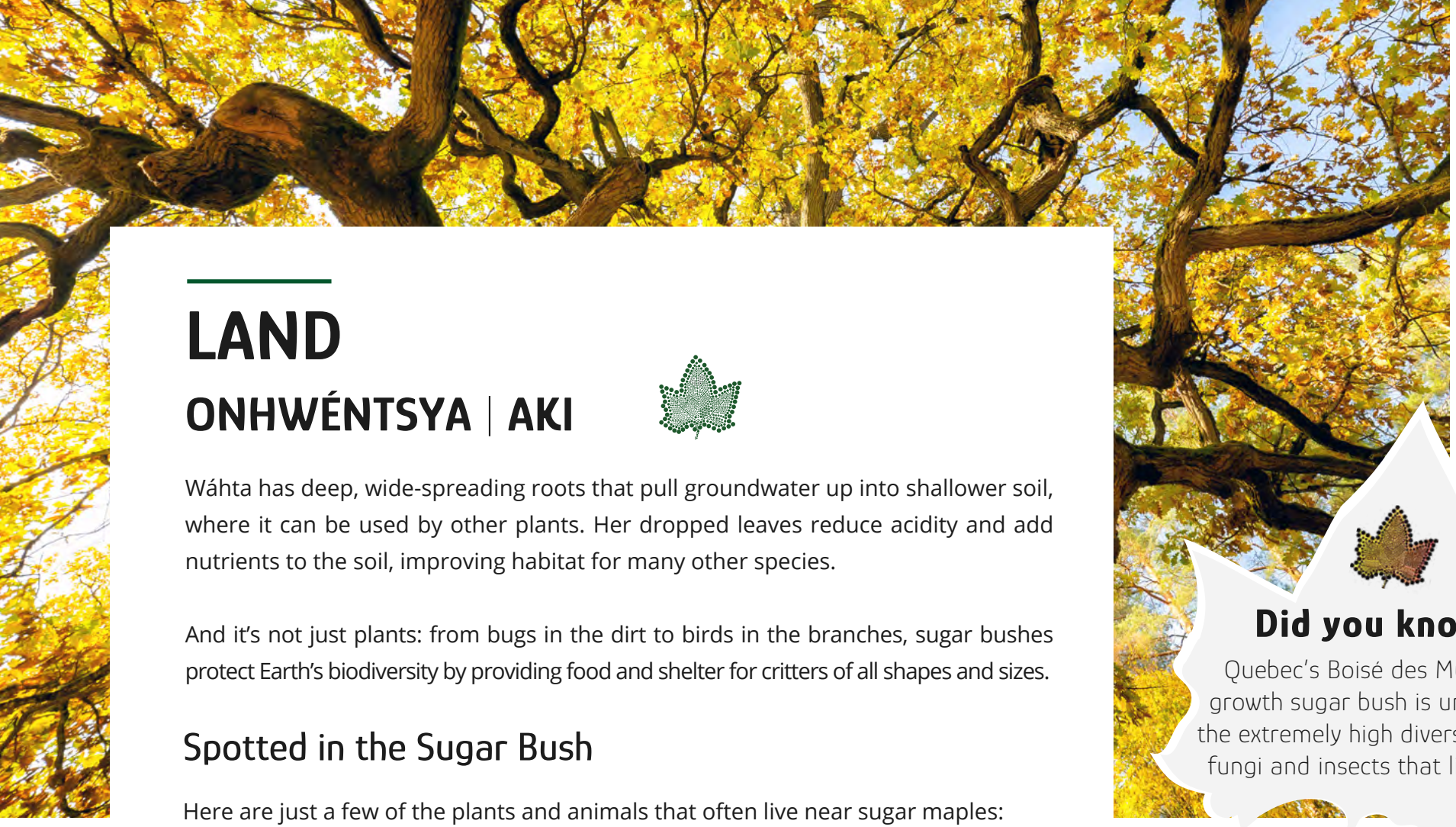
Moncton, NB, receives 1124 mm of precipitation per year. In spring and summer, one large sugar maple uses up to 6.99 mm of water per day!

Tastes of Spring

There are five basic flavours: salty, sour, bitter, savoury, and sweet. Everyone knows that maple syrup is sweet — but it's so much more! Scientists and professional tasters have identified 91 different words to describe the taste of maple. How many tastes can you identify? To find out:

- Buy maple products from several different sugar bushes.
- Click here for the Maple Flavour Wheel and instructions for tasting.

Use this recipe to make fresh maple taffy!



LAND

ONHWÉNTSYA | AKI

Wáhta has deep, wide-spreading roots that pull groundwater up into shallower soil, where it can be used by other plants. Her dropped leaves reduce acidity and add nutrients to the soil, improving habitat for many other species.

And it's not just plants: from bugs in the dirt to birds in the branches, sugar bushes protect Earth's biodiversity by providing food and shelter for critters of all shapes and sizes.

Did you know?

Quebec's Boisé des Muir old-growth sugar bush is unique for the extremely high diversity of soil fungi and insects that live there.

Spotted in the Sugar Bush

Here are just a few of the plants and animals that often live near sugar maples:

Trees	Plants	Amphibians	Mammals	Birds
Beech	White trillium	American bullfrogs	Moose and deer	Hermit thrushes
Basswood	Bloodroot	Western chorus frogs	Rabbits and hares	Ovenbirds
Yellow birch	Wild leek	Northern leopard frogs	Mice and voles	White-breasted nuthatches
Ironwood	Lily-of-the-valley		Porcupines	Black-throated green warblers
Eastern Hemlock	Blue cohosh		Squirrels	Hairy woodpeckers
Black cherry	Solomon's seal		Black bears	Red-eyed vireos
Balsam fir	Foam flower		Raccoons	Yellow-bellied sapsuckers
Eastern white pine			Fishers	Scarlet tanagers

WÁHTA TEACHINGS

Some sugar bush operators consider squirrels, porcupines, bears, deer, and raccoons to be “nuisance animals” because they chew on trees or sap collection tubes. The Kanyen’kehá:ka see things differently. Watch the video for a Teaching that shows how a squirrel helped a leader of the people discover Wáhta’s gifts.

Wáhta Story 3 *(Video: 2:26)*

ACTIVITIES

1. Close your eyes and imagine a sugar bush during tapping season. What do the sky, the water, and the trees look like? Are plants growing? What animals might be present? Draw a picture to share your ideas.

2. Take a nature walk in a sugar bush. Are there conifers as well as deciduous trees? Wildflowers blooming? Remember to look up for birds and listen for hidden critters!

3. Choose a tree near your home. For the next year, keep a scientist’s field notebook. Here are just a few of the things you could observe and document:
   - Growth
   - Changes in colours
   - Sounds and smells
   - Nearby plants, mosses, lichen, and fungi
   - Animals of all shapes and sizes!

Did you know?

Some Ontario sugar bushes are home to rare and endangered species, including: butternut trees, American ginseng, eastern ratsnakes, Blanding’s turtle, and five-lined skinks.

OUR MOTHER THE EARTH

YETHI'NISTÉNHA ONHWÉNTSYA | SHKAAKAMIG KWE

Wáhta is central to Haudenosaunee and Anishinabek cultures — and our wider Canadian culture, too. But, like other wild species, sugar maples are vulnerable to climate change.

Did you know?

Out of more than 300,000 maple seedlings in a single hectare, only a few hundred become mature trees.

How Climate Affects Maple Trees

Climate change models predict that, in future, tapping season will start and end one month earlier. This could have several consequences for Wáhta and the people who depend on her:

- During warmer summers, maples store less starch… so there's less sugar in next year's sweet water
- During warmer winters, there's less snow on the ground. Without an insulating snowpack, soil freezes deeper. Freezing damages Wáhta's roots and slows her growth. This limits her ability to capture carbon dioxide, or get big enough to tap for sap
- During tapping season, warmer weather reduces freeze-thaw cycles. This reduces the number of days that sap flows… and the amount of sap collected each day.

Can Maples Migrate?

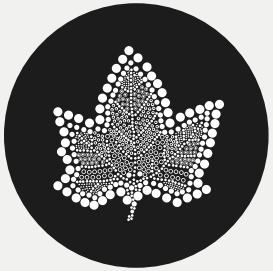
More than 1000 plant and animal species have already kept their cool by shifting their ranges up mountains or towards the poles. But North American trees don't seem to be moving north. That might be because trees need more than the right climate: they need the right soil.

The vast Boreal Forest is found north of the lands where Wáhta currently grows. Compared to southern soils, boreal soils are acidic and low in nutrients — stressful conditions for maple seedlings. Scientists have also discovered that different fungi live in different soils... and boreal fungi aren't quite right for Wáhta. Because of this, sugar maples might not be able to migrate as climate changes. They might have nowhere to go.

ACTIVITIES

1. Participate in the Million Tree Project by collecting and planting maple keys!
2. Read this article about new methods of collecting maple sap. Should this technology be used? Use the Wáhta Teachings from this guide to support your answer.

WÁHTA TEACHINGS



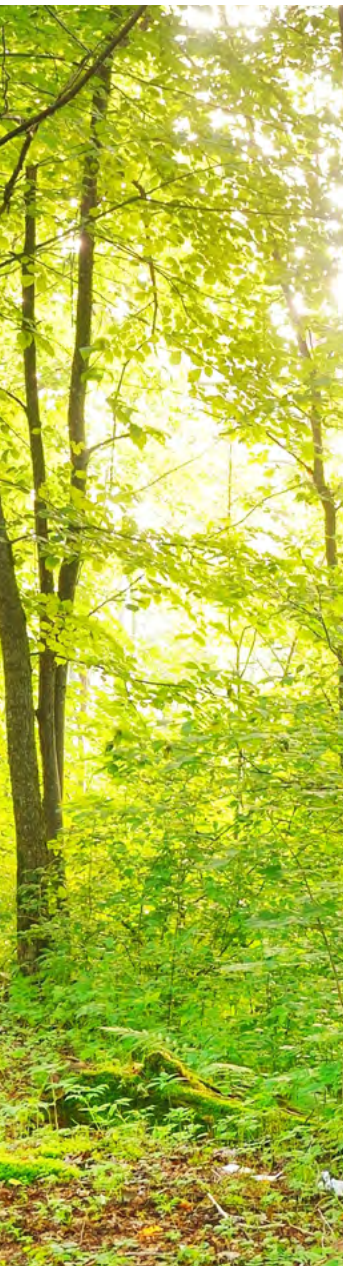
Wáhta teaches us:

- To be grateful
- To never take the first, the last, or too much from the natural world
- To preserve medicines and resources for seven generations to come

Following these teachings will help us fight climate change — protecting Wáhta, our Mother the Earth, and all our relations.

Watch the video to learn more about the importance of gratitude and respect for Wáhta's gifts.

Wáhta Story 4 *(Video: 3:49)*



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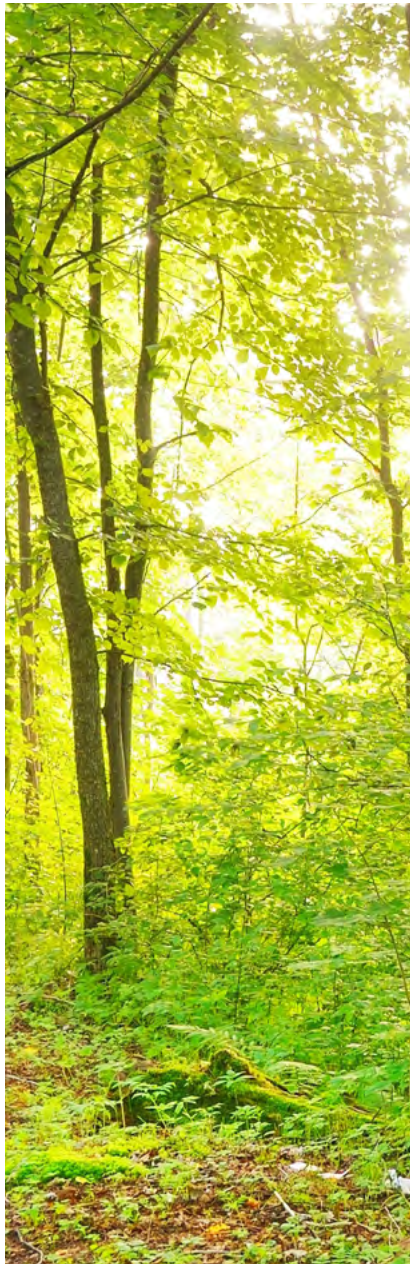

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