

MAPLE SUGAR ECOSYSTEMS by Tia Bankosky

GRADE LEVEL/SUBJECT/COURSE: Grade 7, Science

OVERALL EXPECTATION(S): Understanding Life Systems Interactions in The Environment: 1, 2, 3

SPECIFIC EXPECTATION(S): 1.1, 2.2, 2.4, 2.5, 3.1, 3.3, 3.4, 3.8

OVERVIEW: This lesson aims to increase students' understanding of ecological, spiritual, and cultural connections the Michi Saagiig Nishnaabeg have with their territory as well as the responsibilities human beings have as members of ecosystems. It also aims to integrate Western science concepts and terms pertaining to ecosystems and food webs with Indigenous ways of understanding the environment.

KEY WORDS: ecosystem, habitat, producer, consumer, decomposer, gratitude, Ziinzibaakwadgummig, Innitiatig

PLAN OF INSTRUCTION (approximately 60-75 minutes):

Step 1: Warm up (12 minutes)

Watch “Ziinzibaakwadgummig - The Sugar Bush” Video 4: Innitiatig – The Maple Tree” with Elder Gidigaa Migizi, while watching make written or mental notes on things that surprise you, things you wonder about, or things that connect to our previous lessons about ecosystems.

Find the video here: <https://www.nccie.ca/videos/ziinzibaakwadgummig-the-sugar-bush/>

Step 2: Discussion (15 minutes)

After watching, in small groups, share your notes and reflections of the video using the following guiding questions:

- What elements of the ecosystem did Elder Gidigaa Migizi discuss as supporting or related to sugar maples? (Other species, specific actions?)
- Were there new elements that you hadn't considered before?
- What forces impact Michi Saagiig Nishnaabeg from harvesting sap?

Choose one or two people from each group to share your group's discussions with the class.

This is an opportunity for evaluation to test their existing knowledge at the beginning of the lesson. Instructors should be prepared for and encourage discussion around:

- Ecosystem elements of basswoods, white ash, animal teachers, weather, spirits
- Potential new elements: animals as teachers, spirits, stories, gratitude
- Forces: weather and seasonal changes, pollution like acid rain, climate change
 - Students may also make connections to previous lessons, recognizing force of impacts of colonialism like dispossession of land and displacement of Indigenous lessons, loss of culture and language

If some of these main points are not mentioned, highlight them to students to prepare them for the next activity.

Step 3: Modeling (15 minutes)

This activity is designed to model the entire class as the elements of the ecosystem that supports maple sap as introduced by Gidigaa Migizi. If possible, take the class outside for this exercise for greater impact. Instructors will need two balls of different colours as well as several blankets or coats.

Ask the class some introductory questions that will build on previous lessons and practice unit vocabulary (if the class hasn't gone over these terms yet, introduce them briefly now):

- What is an ecosystem?
- What is a habitat?
- What is a producer/consumer/decomposer? How does energy flow between them?

Another opportunity for evaluation of unit terminology. Instructors should be prepared for and encourage answers that sound like:

- Ecosystems: series of interactions between beings of a specific area
- Habitat: an area that is suitable for specific beings to live in
- Producer: produces energy by converting sunlight into useable energy through photosynthesis, example: maple trees
- Consumer: consume other organisms for energy (bonus: through cellular respiration)
- Decomposer: breakdown dead matter into useable materials creating compost and decay (bonus: helps with nutrient cycling)
- Energy flows through food chains and food webs by eating other beings or converting energy into useable forms
 - producers → consumers → decomposers → producers
 - producers → decomposers → producers → consumers

Ask students to form a circle. Assign each student with a role within the ecosystem drawing from the video and other lessons. Roles to consider can include, some students can be assigned with the same role:

- Maple tree
- White ash tree
- Water
- Soil
- Sun
- Nishnaabeg
- Language
- Story
- Culture
- Frost
- Rain/snow
- Squirrels (animal teachers)
- Sap

Explain that the ball is a representation of the energy that transfers between the members of the ecosystem. Ask students to pass the ball around the circle a few times as practice runs and discuss relationships, reciprocity, and responsibility. Every student and member of the ecosystem as a role and purpose. They are essential to overall well-being of the ecosystem and transfer of energy through the food web. By passing the ball to each other students are fulfilling their responsibilities and forming relationships.

Switch it up, and have students pass the ball across the circle to make activity more dynamic.

Step 4: Guided Practice (15 minutes)

Next, we will use the ecosystem model to explore the impact of climate change and colonialism.

Ask the students to remember the earlier discussion and video of what kinds of impacts there were to this ecosystem. This is an opportunity for evaluation of how well students can recall the lesson from two different sources of information. Students should identify climate change, pollution like acid rain, and seasonal variation. They may also identify deforestation, loss of culture, habitat fragmentation and other impacts.

Let's test the impact of two or three of these impacts.

Seasonal variation is a normal impact to maple sugar ecosystems, but it impacts them regardless! Use the blanket and coat to wrap around the students representing frost and sap so that they can no longer catch the ball. Pass the ball of energy around the circle. It has to skip over frost and sap because warm weather doesn't provide the conditions need for sap to flow in the maple trees. Energy still flows, but it takes a different path.

Acid rain is a harmful impact to the ecosystem, let's explore. Remove the coats of students and continue passing the ball normally. Now, to introduce acid rain, give the other ball(s) to the student(s) representing rain and water. When the original ball comes to them, they then have to pass the two balls around the circle. One ball continues to represent energy, the other represents pollution. Students will likely struggle to catch and throw both balls at the same time. This demonstrates how pollution is hard on ecosystems and the beings that make them up. It also shows that pollution impacts every aspect of the ecosystem.

Colonialism is another huge impact to the maple sugar ecosystem because of its drastic impacts to language, culture, and story. Explain that these items provide the instructions for how human beings are meant engage in the ecosystem and what our responsibilities are. These elements are directly tied to the interactions between beings in the specific habitat, so therefore, when forcibly removed from this land, these elements are greatly disrupted. To demonstrate this, give the students representing language, culture, and story a blanket or coat. Ask them to stand in the middle of the circle with the blanket or coat stretched between their hands at eye level. Now, ask the other students to pass the ball between them still. This has become much harder because the blankets are blocking the path. The disruption of language, culture, and story also has serious implications for the transfer of energy.

Step 5: Independent Activity (5-10 minutes)

Ask students to return to class for a reflection of the activity. Independently, students will be given time to write down their reflections of the modelling ecosystem they just participated in.

Some guiding questions for their reflection:

- What are two new things you learned from the exercise or video?
- What is one thing that surprised you during the exercise?
- Can you think of potential other impacts to the maple sugar ecosystem?
- Are there ways to reduce the harm of some of these impacts?

Step 5: Sharing / Discussing / Teaching (5-10 minutes)

Students will be given the option to sharing one item that they reflected upon with the class if they choose.

ASSESSMENT:

There are several opportunities of evaluation identified in the lesson plan. The written reflection at the end of the activity can also be assessed by the instructors to evaluate how well the lesson met the learning goals as well as how well the students engaged with it.

SOURCES:

Betasamosake Simpson, L. (2013). *The Gift is in the Making: Anishinaabeg Stories*. HighWater Press, Winnipeg, MB.

Gidigaa Migizi (Speaker) & National Centre for Collaboration in Indigenous Education (Producer). (2020). Ziinzibaakwadgummig - The Sugar Bush (4. Ininiaatig - Maple Trees). Retrieved from <https://www.youtube.com/watch?v=eccanboAeHA&list=PLF4laWyz-XqIS2jGQahB7ADOjdjuQk6S0&index=4>