

# Unit 1

## Exploring Indigenous Science Perspectives

### Overview

This unit brings together activities related to Traditional Ecological Knowledge and Shared Concepts of Indigenous Knowledge that are discussed in Part One, Foundations.

The activities help to scaffold the concepts of Indigenous Knowledge and Indigenous Science. They may be used together for a unit that explores Indigenous perspectives, or they could be individually incorporated into one of the thematic units, or a unit you have developed.

### *Guiding Questions*

- How can Indigenous Science help us understand our relationship with and responsibilities to the Earth?
- In what ways can Indigenous Knowledge and Science contribute to the Earth's sustainability and the preservation of diversity?
- How can Indigenous Science and Western Science work together?

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### Relevant BC Learning Standards for Senior Secondary Science

This unit does not deal with Content Standards directly, but does relate to the Curricular Competencies.

The Key Curricular Competencies for Secondary Science courses include:

<b>Questioning and predicting</b> <ul style="list-style-type: none"><li>• Make observation aimed at identifying their own questions, including increasingly abstract ones, about the natural world.</li><li>• Formulate multiple hypotheses and predict multiple outcomes</li></ul>
<b>Planning and conducting</b> <ul style="list-style-type: none"><li>• Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods and those of others</li></ul>
<b>Processing and analyzing data and information</b> <ul style="list-style-type: none"><li>• Experience and interpret the local environment;</li><li>• Apply First Peoples perspectives and knowledge, other ways of knowing and local knowledge as sources of information</li></ul>
<b>Evaluating</b> <ul style="list-style-type: none"><li>• Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and secondary sources</li><li>• Consider social, ethical, and environmental implications of the findings from their own and others' investigations</li><li>• Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems</li></ul>
<b>Applying and innovating</b> <ul style="list-style-type: none"><li>• Transfer and apply learning to new situations</li><li>• Contribute to finding solutions to problems at a local and/or global level through inquiry</li></ul>
<b>Communicating</b> <ul style="list-style-type: none"><li>• Express and reflect on a variety of experiences, perspectives, and worldviews thorough place.</li></ul>

### Resources

For further information on these resources, see the annotations in the Bibliography, beginning on page [273](#).

### Suggested Resources

Print

- Judson, Gillian. *A Walking Curriculum: Evoking Wonder and Developing Sense of Place* (K-12). 2018. 68 pages.
- *People of the Land: Legends of the Four Host First Nations*. Theytus Books, 2009.
- *River of Salmon Peoples*. Theytus Books, 2015
- White, Ellen Rice. *Legends and Teachings of Xeel's, the Creator*. Theytus Books, 2018.

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### Video

- *Indigenous Connections to the Land*. 4:37 min. Dr. Alannah Young Leon and Francine Burning, 2015. [https://youtu.be/vxJB\\_c9JqHc](https://youtu.be/vxJB_c9JqHc)
- *Two Sciences*. Native Counselling Services of Alberta. 7:51 min. NCSA Video Channel, 2015. Online at <https://youtu.be/hDMcLi9IIqY>
- *Two-eyed Seeing*, Cheryl Bartlett 2012, 8:44 min. [https://youtu.be/\\_CY-iGduw5c](https://youtu.be/_CY-iGduw5c).

### Website

- *First Voices*. First Nations Language Resource. <https://www.firstvoices.com/>
- Ignas, Veronica. *Two Ways of Knowing, Traditional Ecological Knowledge Meets Western Science*. 2003. <http://www.ecoknow.ca/curriculum.html>.

### Additional Resources

- *Earth's Systems Interact*. <http://bit.ly/2dxPXyw>
- Four Spheres Part 1 (Geo and Bio) and Four Spheres Part 2 (Hydro and Atmo) <http://bit.ly/2ddXDql> and <http://bit.ly/2dq47kW>.
- Great Bear Sea, Environmental Science 11 & 12. [www.greatbearsea.net](http://www.greatbearsea.net)
- Two-Eyed Seeing, [www.integrativescience.ca](http://www.integrativescience.ca), <https://tinyurl.com/fnesc47>

### Blackline Masters


- 1-1 Indigenous Science
- 1-2 What is Traditional Ecological Knowledge?
- 1-3 Traditional Knowledge About Plants
- 1-4 Responsibilities to the Land
- 1-5 Thinking About Transformation

### Outline of Activities

- 1.1 What is Traditional Ecological Knowledge?
- 1.2 Reciprocal Relationships with the Land
- 1.3 Circles of Life: Transformation and Renewal
- 1.4 Interconnectedness
- 1.5 Sense of Place
- 1.6 Two Ways of Seeing the World

## Suggested Activities

Note: There are more activities here than most teachers will incorporate into their units. It is not expected that you will use all of the activities, or follow the sequence as it is described. These activities are intended to be adapted to fit the needs of your students and classroom, as well as inspire ways that you can respectfully include relevant Indigenous knowledge and perspectives in your course.


 Blackline Master  
1-1, page 49,  
*Indigenous Science*

### What is Indigenous Science?

Blackline Master 1-1, page 49, *Indigenous Science*, can be used in a variety of ways. It could be enlarged and made into an anchor chart, or copies made for each student to keep as a reference.

## Activity 1.1

### What Is Traditional Ecological Knowledge?

 **Foundations**  
For more about  
Traditional Ecological  
Knowledge, see page  
13.


If students are not familiar with the term Traditional Ecological Knowledge or TEK, you can use these activities to introduce the concept. It can also be used as review.


Traditional Ecological Knowledge is simply stated, but it encompasses many different, and at times, complex strands. These activities will help to establish a basic understanding of the concept.

- a. Begin by asking the students the question, “What does a person need to know to survive in the modern world?”
  - Leave the question open to interpretation, and have students work in groups to answer it, then share with the whole class.
  - You may want to have students classify their responses, such as knowledge to provide basic needs, to work, to use technology, or to raise a family.
- b. Discuss the question “How would you survive if the power suddenly went off for good?”
- c. Have students think about the question, “In the past, how did First Peoples live on their territories from one generation to the next?”
  - Ask students to brainstorm what types of things the people living on the local lands would have needed to know to sustain life for thousands of years.
  - Students can explore how seasonal rounds helped First Peoples to live on their territories from one generation to the next. Find resources that illustrate the seasonal rounds of local First Nations. Some First Nations communities have calendars in which the traditional names of the months reflect the seasonal relationships with the land.
  - Develop a list of types of knowledge and wisdom people would need to know.

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- d. Discuss with students why living sustainably on the land was essential to their survival. Guide students to think about how First Peoples interacted with the plants and animals that live on the land, and to consider the importance of making sure the resources of the land were not depleted.
- e. If it hasn't come up yet, introduce the term Traditional Ecological Knowledge. Elicit ideas of what it might involve.
- As a starting point, you may want to use Blackline Master 1-2, page 50, *What is Traditional Ecological Knowledge?* Students could elaborate on each of the main points, working in pairs or groups.
  - Students can hunt for examples of specific types of scientific knowledge or principles that are part of the Traditional Ecological Knowledge of plants. Although First Peoples did not traditionally use the terminology used by scientists today, such as physics, chemistry and biology, the understandings and processes are still part of the traditional knowledge.
  - Students could read Blackline Master 1-3, page 51, *Traditional Knowledge About Plants* to find out some examples of Indigenous scientific knowledge.
- f. Emphasize that Traditional Ecological Knowledge is dynamic and always changing to accommodate new information or changing conditions.
- As an example of the dynamic nature of TEK, you could use a case study about pine mushrooms, which is a significant industry in parts of northern BC. Ignas, Veronica. *Two Ways of Knowing, Traditional Ecological Knowledge Meets Western Science*. 2003. <http://www.ecoknow.ca/curriculum.html>.
    - See Lesson 4, Reconceptualizing Ecological Knowledge: The Pine Mushroom in Northwestern British Columbia, pages 36-41.
- g. To explore how Traditional Knowledge can be used in collaboration with other scientific studies, you may want to use some activities found in Exploring the Great Bear Sea, Environmental Science 11 & 12 ([www.greatbearssea.net](http://www.greatbearssea.net)). See Lesson 2: Traditional Knowledge and Collaborative Research (pages 33-43).


 Blackline Master 1-2, page 50, *What is Traditional Ecological Knowledge?*

 Blackline Master 1-3, page 51, *Traditional Knowledge About Plants*

## Activity 1.2

### Reciprocal Relationships With the Land

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 **Foundations**  
For more information about Reciprocal Relationships, see page 15.

a. Respecting the Land.

Begin the unit with a First Nations story that demonstrates an understanding of the need for a reciprocal relationship with the land. Depending on the source, you could have a local First Nations storyteller recount it to the class, you could read a published version aloud, or students could read it themselves.


- If possible, find a story from the local First Nations cultural group.
- A number of stories from different First Nations tell what happens when children mistreat resources from the land, or disrespect the animals in some way. Often the children mistreat salmon.
  - One such story is found in *People of the Land: Legends of the Four Host Nations*, pages 105-112. Watsauk Siem, a Tsleil-Waututh story, tells of the great leader Watsauk, and how his teachings about caring for the salmon were disrespected. The telling of this story emphasizes relationships with the natural world: “Watsauk’s way of managing our path of life was through relationships (107).” Each year the leader welcomes the returning salmon. After some boys disrespect the salmon, the fish disappear and the people suffer. The boys apologize to the salmon and Watsauk sings a song; the salmon return.

b. Another resource to help students understand the theme of reciprocal relationships with the land is the video *Indigenous Connections to the Land*. This 4:37 min. video shows Coast Salish people and their connections with the land, including a young girl and her grandmother, and Musqueam elder Larry Grant. Available online at [https://youtu.be/vxJB\\_c9JqHc](https://youtu.be/vxJB_c9JqHc).

- Ask students to watch and listen for examples of ways that people in the video show respect for the land.
- After they view the video, ask students to write a personal response to the video. Ask questions such as,
  - How did it make you feel?
  - What was the most important idea you gained from the video?
  - What further questions do you have about the content of the video?
- Discuss with the class the key ideas in the video. Some possible ideas include:
  - First Peoples have spiritual connection to the land and waters
  - Identity is connected with the land.
  - If you don’t respect the land, you lose access to resources like salmon.
  - We took care of the land and the land took care of us.
  - First Peoples still have strong connections to the land.
  - “I am the land.”

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- Ask, what do you think these ideas have to do with science? (For example, they relate to the natural world studied by science, because they discuss a First Peoples perspective of understanding the natural world.)
- c. Students can use Blackline Master 1-4, page 52, *Responsibilities to the Land*, to investigate the question of why the land should be treated with respect.
- First, students can annotate three quotes that were used in the video. They can highlight key words, add their own comments and questions in the margins. If students are not familiar with annotating text, you could model the activity by annotating the first one on the board.
  - Students can then search for another quote that says something about responsibilities or respect for the land. They may use books or internet sources to find a quote. You may want to have a discussion of what the best key words would be to search successfully.
  - Students can add a statement of their own that reflects their understanding of what responsibility people have for caring for the land.
  - Students can represent one of the statements from the *Responsibilities to the Land* Blackline Master in an illustration, drawing or diagram.
- d. Ask students if they know the meaning of the word “reciprocity.” Students can suggest definitions, or they can look up the word in a dictionary. Ask students to suggest different ways the word can be used.
- Ask students to consider what a “reciprocal relationship” would be. Ask them to give examples from life.
  - Ask students to explain what a “reciprocal relationships with the land” means. You could use the Think-Pair-Share strategy to help students to develop a definition.
  - As a class, agree on a group definition of a reciprocal relationship with the land. (The key idea that should be included is that there is a benefit for both sides of the relationship; if we take something from the land, we have to give something back.)
- f. Discuss the question, “What does a reciprocal relationship with the land look like?” Ask students to suggest some ways that people in a reciprocal relationship with the land would need to act. Ask, “How have First Peoples traditionally given back to the land?” (For example, show respect for the land, care for the land, live sustainably)
- Ask students to suggest examples of reciprocal relationships with the land illustrated in the video *Indigenous Connections to the Land* or the quotations about responsibility to the land.
- f. Have students work on their own or in pairs to create a web or concept map to represent their understandings about Reciprocal Relationships with the Land. Ask questions such as, how does the idea of “gifts” connect with reciprocal relationships? How can you show the idea of reciprocity visually?

 Blackline Master  
1-4, page 52,  
*Responsibilities to the  
Land*

 **Formative  
Assessment  
Strategy**

This activity can be used to assess students understanding of reciprocal relationships.

## Activity 1.3

### Circles of Life: Transformation and Renewal

Students will consider different perspectives of the concept of transformation.



#### Foundations

For more discussion about Transformation and Renewal, see page 16.

Thinking about the concepts of transformation and renewal is a way of bridging Indigenous and Western scientific perspectives. They relate to the cyclical nature of the natural world and many aspects of human lives.

- a. Have students think about the many ways that transformation occurs in our world and our lives. Ask students to brainstorm as many examples of transformation as they can in two minutes. If they are unsure how to respond, ask them to think of examples in different spheres of life, such as home life, science, the natural world, the arts, or personal life.
  - Students can create a mind map as they brainstorm, individually, in a group on chart paper, or as a whole class on the board.
  - Discuss some of the most significant transformations in the students' lists. What makes them significant? (For example, it might be the scale of transformation that makes it significant, or the personal impact.)
  - Ask students to explain what transformation is in their own words.
- b. Transformation Walk. Take students for a walk around the neighbourhood or in a park or other location to observe Transformation in action. Ask students to look at the world through the lens of change. Ask what do you see that is changing? What has changed? What will change? Which changes are good, bad or neutral?
- c. Ask students to compare change and transformation. Ask if change and transformation are different, and if so, how?
  - Ask students if they think there is a difference between the terms “climate change” and “climate transformation?”
  - Ask students if evolution is change or transformation. Have students explain their choice.
- d. Share one or more traditional First Peoples stories that include the concept of transformation or renewal. (See Activity 1 of unit 2 for suggestions.)
- e. Work with students to find out words in the local First Nations language for concepts like change, transform or transformation. If possible, find the etymology or root of the word. For example, in the Ts'msyen language Sm'algyax, *lulook* which means transform has the root *loo*, meaning to move quickly.
  - Students can use the website FirstVoices to find words in the local or other First Nations languages. Either search on the specific First Nation or language, or use the search field on the home page to find words that appear in all the languages that are on the site.



#### Land-based Activity Transformation Walk




#### First Voices

First Nations  
Language Resource  
<https://www.firstvoices.com/>



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- Students can also note the names of the Transformer or Trickster characters who are central to some First Nations creation or origin narratives. For example, in Stó:lō narratives, Transformers are Xexá:ls.
- f. Have students read the quote about Transformation by Gregory Cajete on Blackline Master 1-5, page 53. Discuss how his understanding of transformation is similar or different to the concepts the class has been discussing.
- g. Have students suggest examples of transformation in science topics they have studied. Students could illustrate one of the examples of transformation in science, or perhaps express it in another form, such as a flow chart, an animation or skit.

 Blackline Master 1-5, page 53, *Thinking About Transformation*

### Activity 1.4 Interconnectedness

Provide students an opportunity to understand the concept of Interconnectedness as a central part of First Peoples' understandings of the world. Below are some suggestions for approaching this topic with your students.

- a. Find out if there is a word or phrase in the local First Nations language that expresses the idea of interconnectedness.
- For example, the Nuu-Chah-Nulth say *Hishuk ish ts'awalk* which means "everything is one." In Haida, it is *Gina 'waadluxan gud ad kwaagid*; "Everything depends on everything." In Secwepmc, *Kweseltnews* means "We are all family."
  - If you have First Nations language classes in your school, perhaps the language teacher could help students develop their own phrase in the language.
- b. Invite an Elder or knowledgeable First Nations speaker to discuss examples of interconnectedness in the local First Nations culture.
- If possible ask them to tell a story that illustrates the idea that everything is connected.
- c. Read the traditional story "The Creator and the Flea Lady from *Legends and Teachings of Xeel's, the Creator*, by Ellen Rice White. This book was prepared for secondary students and includes four stories and commentaries by Snuneymuxw Elder Kwulasulwut (Ellen White). This short story clearly illustrates many strands of the Interconnectedness of people with the universe.
- In this story the little flea lady is overwhelmed when her baby is near death. She calls to Xeel's the Creator for help. "I know you are out there somewhere. You are in the water, in the air, in the sky, in the earth." She

 **Foundations**  
For more information about Interconnectedness, see page 15.



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gets the help she needs, from the energies of the universe, from the sand and rocks, and from her family. They work to build an ingenious incubator, using the elements of the land and sea.

- In a commentary that follows, Ellen discusses the ideas in the story, including the ideas of our connections with the universe. “The universe is made of energy. All things, inanimate as well as animate, are imbued with it; and we are all connected by universal energy” (p 20.)
  - Discuss with students the examples of natural, social and spiritual connections the Flea Lady had. Students could illustrate the connections to demonstrate their understanding.
- e. Use other stories, narratives and personal accounts, local ones if possible, to illustrate the idea of interconnectedness.
- *River of Salmon Peoples* contains some good discussions of interconnectedness:
    - p. 22 Dakelh community, “what happens in one area of the river affects what happens upstream or downstream.”
    - p. 33 Sardis Stó:Lō, “The Fraser is the main artery of Mother Earth for us.”
    - p. 71 Musqueam, “Our traditional viewpoint is to regard the salmon as brethren with spirits of their own.
    - p. 97-99 Sardis Stó:Lō, relationship of salmon, the river and the people
    - p. 113, Musqueam, paying respect to salmon, trees when harvesting them
    - p. 116, Seabird Stó:Lō, “What we call a relational world view is where everything is interconnected and related.”
- f. Make a word wall of words related to the idea of interconnectedness, such as holistic, unified, and integrated.
- g. Introduce or review the scientific perspective on the interconnectedness of the earth’s systems or spheres: atmosphere, biosphere, geosphere (also called the lithosphere) and hydrosphere.
- Use available resource materials as a focus for discussion. One suggestion available online is a six minute video *Earth’s Systems Interact*, found at the link <http://bit.ly/2dxPXyw> or search for title keywords.
    - Videos that describe the four spheres in an engaging way (but do not talk about interconnectedness) are Four Spheres Part 1 (Geo and Bio) and Four Spheres Part 2 (Hydro and Atmo) online at Youtube. For links go to <http://bit.ly/2ddXDqI> and <http://bit.ly/2dq47kW>.
  - Sphere stations. This activity encourages students to make connections between the spheres to demonstrate how everything is dependent on everything else.
    - Around the classroom put five pieces of chart paper labelled Sun, Atmosphere, Biosphere, Geosphere, and Hydrosphere.

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- Divide students into five groups and provide each group with a different colour of sticky notes.
  - The groups will rotate through each of the stations. At each station they write on the sticky notes ways that the subject interacts with the other spheres.
  - Add the note to the poster.
  - At the end, the teacher or students can read aloud some of the responses.
- h. Web of life activity. You will need a ball of string and a list of organisms.
- Give each student the name of an organism. One can have the sun.
  - You may have prepared cards or have students write assigned words on a piece of paper.
  - The person holding the sun tosses the ball of string to someone else in the circle, making sure they hold onto the end of the string.
  - The person who catches the string tells one way that their organism interacts with the sun.
  - Students continue tossing the ball of string, holding onto their section of string so that it forms a web. Each person explains one way that their organism interacts with the previous organism.
  - If someone gets stuck, others can help out.
  - Eventually a tangled web will be created.
  - Discuss what would happen if one of the objects was removed from the web. Ask how this is similar to a real ecosystem.


### Activity 1.5

#### Sense of Place

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Students engage in activities that help them identify and build their own sense of place, and understand the importance of the sense of place in an Indigenous context.

- a. Interacting with the land.
- These activities give students an opportunity to experience and develop a sense of place when they visit a local site. This could be a stand-alone activity when introducing concepts about First Peoples Science, or could be used at the beginning of a larger land-based activity.
  - When students are at the site, ask them to observe the landscape around them. Ask questions such as:
    - Use all your senses to experience the site. What do you feel about the place when you pay attention with all your senses?
    - Find one feature in the site and observe it from all four directions: north, east, south and west. Does changing direction add anything to your understanding or experience of this feature?

 **Foundations**  
For more about the Sense of Place see page 16.

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- What patterns can you find in the site?
  - How are the features of the site interconnected? What relationships do they have with each other? What is your relationship with the elements of the site and the site as a whole?
- b. Walking. Find ideas for taking students on theme-based walks in *A Walking Curriculum: Evoking Wonder and Developing Sense of Place* by Gillian Judson. See also the associated website linked at <https://tinyurl.com/fnesc46>.
- c. Ecotherapy: Well-being and the Land

Students learn about a recent trend called ecotherapy and compare it with Indigenous understandings and relationships with the land.

- Background. Ecotherapy, also known as nature therapy or green therapy, is a growing field of health and well-being that encourages healing by interacting with nature. In some countries doctors are writing prescriptions for people to take a walk in the park, or to engage in some other activity that gets them out into nature. In Japan, a traditional practice, Shinrin-Yoku, also known as Forest Bathing, has been part of the national health system since 1982. Participants reconnect with nature by slowly walking through the forest, using all the senses to immerse themselves in the experience. Although finding healing through connections with nature is timeless, the term ecotherapy was first used in 1996 by H.J. Clinebell. As the concept has developed in North America, many branches of ecotherapy have emerged, such as horticultural therapy, green exercise, animal assisted therapy, wilderness therapy, natural lifestyle therapy, eco-dreamwork, community ecotherapy, dealing with eco-anxiety and eco-grief. In Western science, ecotherapy is often associated with ecopsychology, the scientific study of human emotional connections with nature.
- National Healing Forest. Students may be interested to investigate a project that encourages forests or green spaces dedicated to bringing about Reconciliation and healing. The idea of healing forests across the country came about after the Truth and Reconciliation report in 2015. Some people wanted to do something to help the healing process for both Indigenous and non-Indigenous people.
  - Students can find out more about the National Healing Forest at the website <https://www.nationalhealingforests.com/>
  - Students could undertake a project to develop a proposal for a Healing Forest in your local region.
- Students could investigate a real-life example of a convergence of ecotherapy and traditional connections with the land. A young Saskatchewan woman, Michela Carriere, won first place in the Aboriginal Youth Idea Challenge for her company called Aski Holistic Adventures where she offers retreats on her father's northern Saskatchewan trapline. She calls them holistic ecotherapy retreats. "It's been a passion of mine to show

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people the way that I grew up,” she said. “The main part of the business is taking people out on the land and teaching them how to reconnect with nature and Cree culture as well.”

- See the article “Medicine woman-in-training excited to launch holistic eco-therapy retreat,” linked at <https://tinyurl.com/fnesc48>.
- Students can compare the goals and practices of ecotherapy with the sense of place and connections with the land experienced by Indigenous people.

### Activity 1.6. Two Ways of Seeing the World

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Students take part in an activity that asks them to look at objects from two different perspectives, a Western scientific way of seeing, and a way of seeing more aligned to an Indigenous perspective.

- a. Preparation. In preparation for this activity, ask students to bring in a “keepsake” or something that is important to them that has a personal or family story behind it.
  - It could be a rock they found on a beach with a friend or parent. It could be a picture or a picture of a keepsake.
  - Before students present their keepsake have them submit an image of it to you.
  - Collate the images and divide the students into groups. These groups will then analyze the pictures utilizing the scientific method.
  - It is suggested that you pre-set the groups and the pictures so a student does not accidentally get their own keepsake.
- b. Have students work in their groups to analyze the pictures of the keepsakes utilizing the scientific method of observation: Shape, size, colour, potential uses, and classification.
  - It is important that students show respect for the keepsake when doing their “scientific observations.” This could be a great time to discuss the idea of respect and its importance in the Indigenous world view. For example, the commodification of property/resources vs cultural use of property/resources.
  - Groups can then present their observations to the class.
- c. Next have students present their own keepsake and the story behind it. Student can do this in a variety of way, such as video, digital presentation, song, or spoken word.
  - Discuss how understanding is created through both the scientific method and the “cultural story” method.

- d. Introduce the idea of “Two-Eyed Seeing.” This is a term developed to describe a way of using the strengths of both Indigenous knowledge and Western scientific knowledge to understand the world.
- For more about this topic, see this article from the Integrative Science website, linked at <https://tinyurl.com/fnesc47>.
  - Students could view a video about Two-Eyed Seeing. See Two-eyed Seeing, Cheryl Bartlett 2012, 8:44 min) [https://youtu.be/\\_CY-iGduw5c](https://youtu.be/_CY-iGduw5c).
  - Another video dealing with two perspectives of science is *Two Sciences*. Native Counselling Services of Alberta, 2015 7:51 min. NCSA Video Channel, 2015. Online at <https://youtu.be/hDMcLi9IIqY>. A Cree knowledge-keeper and a Western ecologist discuss the similarities between Indigenous and Western science, particularly as it relates to wetlands.
- e. Ask students to reflect on why it is important to see the natural world from more than one perspective.
- Students can create a visual representation of the idea of two-eyed seeing, of Indigenous and Western Science working together.

## **What is Indigenous Science?**

These are some of the key features of Indigenous Science

*Traditional Ecological Knowledge*

*Language and Story*

*Shared Concepts of Indigenous Knowledge*

- ❖ Reciprocal Relationships
- ❖ Interconnectedness
- ❖ Transformation and Renewal
- ❖ Sense of Place

## What is Traditional Ecological Knowledge?

*TEK is Local Knowledge*

*TEK is Cumulative Knowledge*

*TEK Understands Interconnectedness*

*TEK is Necessary for Survival*

*TEK Practices Sustainability*

*TEK is Dynamic, Always Evolving and Growing*

Traditional Ecological Knowledge understands the relationships between all aspects of the local ecosystem:

- Plants species
- Animals species
- Habitats
- Landforms
- Weather
- Seasonal changes



## Traditional Knowledge about Plants

These are some examples of scientific knowledge that First Peoples have known about plants since Time Immemorial. What other understandings can you add to the list?

### Edible roots such as camas, balsamroot

- Traditional knowledge: Slow cooking makes the roots more digestible, more nutritious and sweeter.

In the past these roots were very important food items for many First Peoples. However, they contain inulin, a type of sugar that people can't digest. Slow cooking converts the complex sugars to the more digestible fructans and fructose.

While First Peoples don't traditionally use these chemical names, they have always understood the properties of the plant. To prepare the roots for eating, they traditionally cook them very slowly in a pit for a day or more to produce a sweet nutritious food.

### Properties of different types of wood

- Traditional knowledge: Different species of trees produce wood with unique properties that can be used for different purposes..

Traditional understandings of what type of wood to use in a certain situation is an important part of Traditional Ecological Knowledge. This includes properties such as strength, durability and density. People know that western red cedar can be split cleanly along the grain, and that it can be bent and hold its shape by steaming. They know certain woods such as mountain alder are strong but flexible, so make good bows and snowshoes.

### Strong fibres from plants

- Traditional knowledge: Some plants contain strong fibres that can be used for things like fabric, nets and rope.

Some plants such as stinging nettles contain fibres that can be processed for many uses. Using the fibres requires many types of knowledge, such as when to harvest it safely, how to process the plant to extract the fibres and how to spin a strong fibre.

### Preserving berries by drying

- Traditional knowledge: Dehydration allows plants to be preserved for long periods of time.

All types of berries can be preserved by drying in the sun or wind. Traditionally berries were often cooked, mashed and spread on a mat to dry. The dried cakes had to be stored properly so they did not reabsorb water. When it was time to eat them, the berries could be eaten dried, or rehydrated.

## Responsibilities to the Land

1. Here are three quotes from First Nations leaders about our responsibilities to the land. As you read them, annotate the quotes by highlighting key words. Add comments and questions in the margins.

As long as the sun shines, the rivers are flowing and the grasses are green we will remember our sacred responsibilities to the lands as our relatives.

Chief Peguis, 1817.

Man did not weave the web of life – he is merely a strand in it. What ever he does to the web, he does to himself.

Chief Seattle, Susomich, 1854

Our responsibilities are reminders to ensure the health and well-being of the seven generations that are coming.

Oren Lyons, Ondondaga-Seneca, 2007

2. Find another quote that expresses a First Peoples perspective about our relationship with the land. Give the source of your quote.

3. What is your point of view? Add your own words that express something about our relationship with the land.

## Thinking About Transformation

Creation stories depict the lines separating humans, animals, and forces of nature as rather fluid instead of rigid. Animals transform into humans and humans transform into animals.

Biologically, the metaphor is accurate, because when we eat an animal we are “transformed” into that animal, and the animal is “transformed” into us.

When we are eaten by animals (including by the small bacteria that will eat us all eventually), we are then transformed back into cycles of nature.

In many ways, ancient Native myths preceded biological theories of evolution and transformation.

Gregory Cajete Native Science, 2000 p 40.

