



# **Indigenous Worldviews & Perspectives and Climate Change Education**

Helen Erickson - [helen.erickson@sd54.bc.ca](mailto:helen.erickson@sd54.bc.ca)







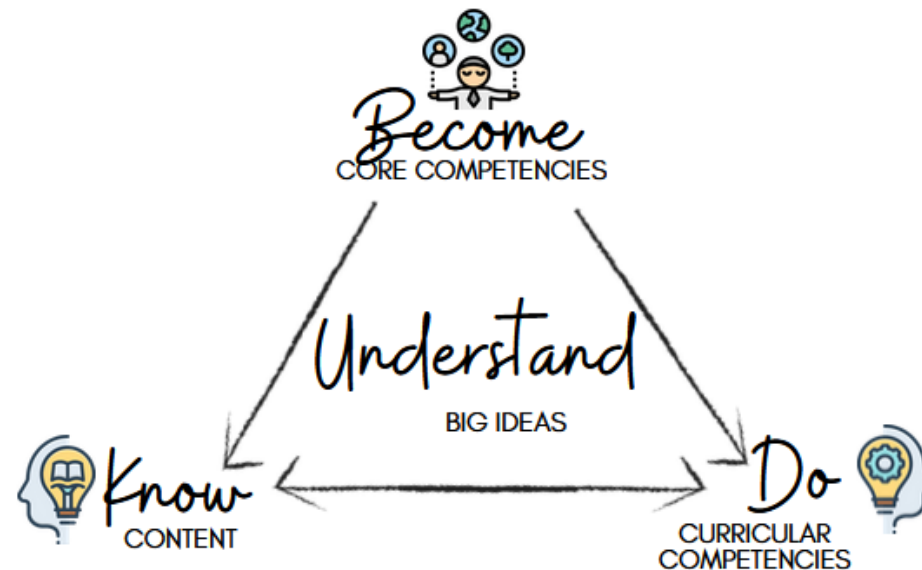
# MY LEARNING JOURNEY IN INTERDISCIPLINARY STUDIES



Student: \_\_\_\_\_

## Positive Deviance

"Using uncommon but successful behaviors and strategies to find better solutions to problems."

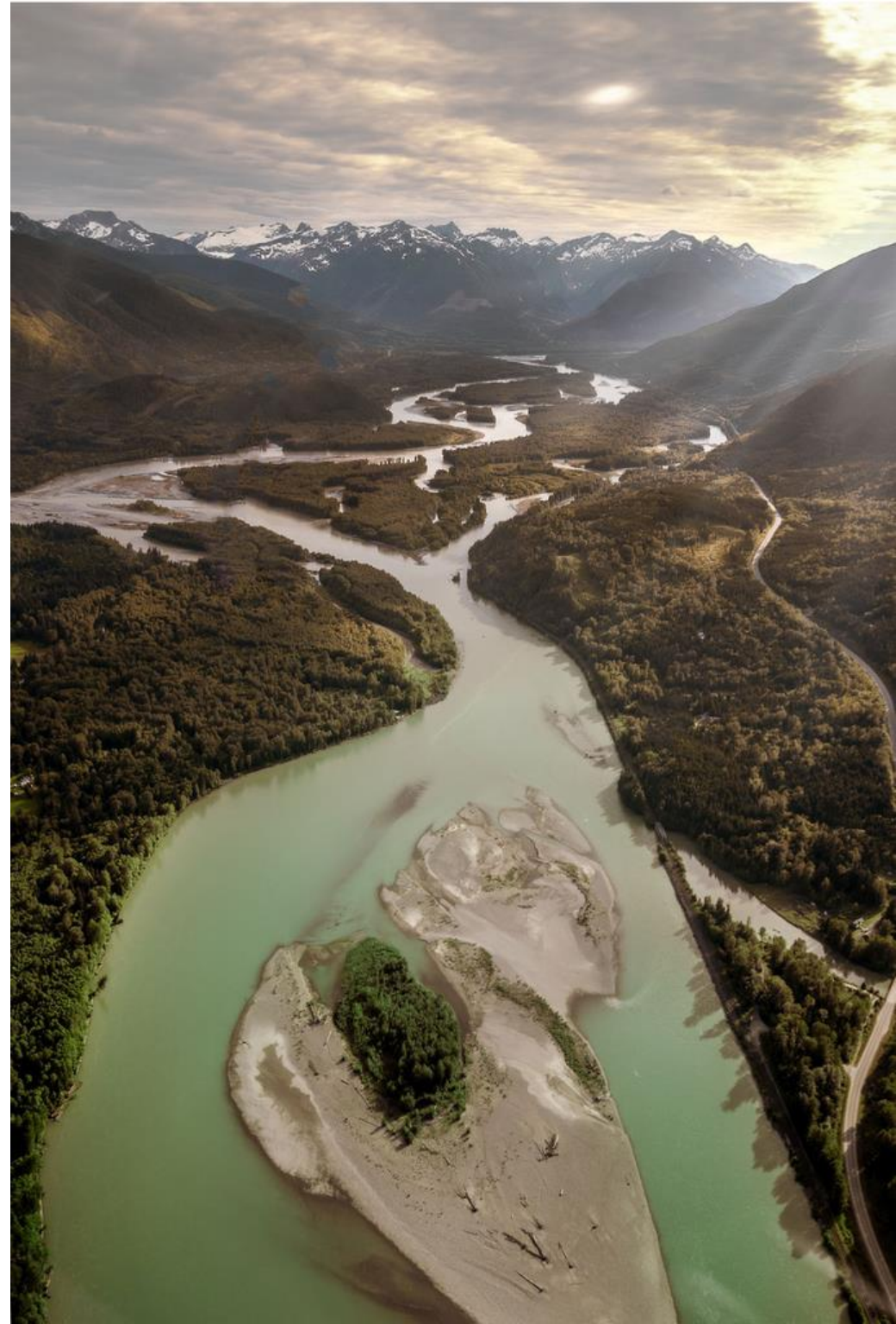


**Interdisciplinary Studies** is a course designed for students in grades 9-12 with a **wide curiosity** across different areas of interest who are looking to expand their studies **beyond** narrow academic disciplines.

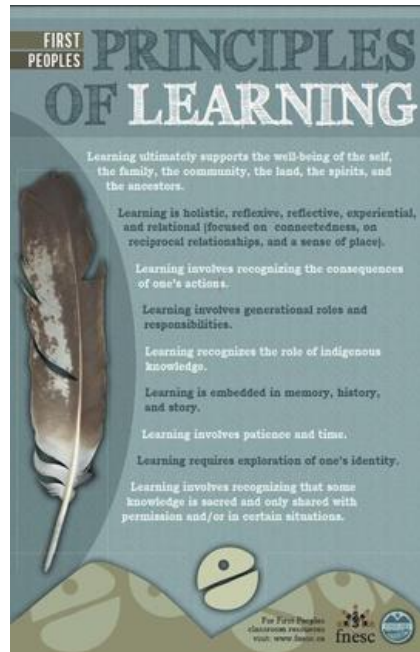
This course will help students combine the **skills** required for and **knowledge** of different subjects and disciplines to **solve problems**, **make decisions**, **create personal meaning** and **present findings** beyond the scope of a single subject or discipline.



# 3 Year Journey



# Affordances of Interdisciplinary Studies...



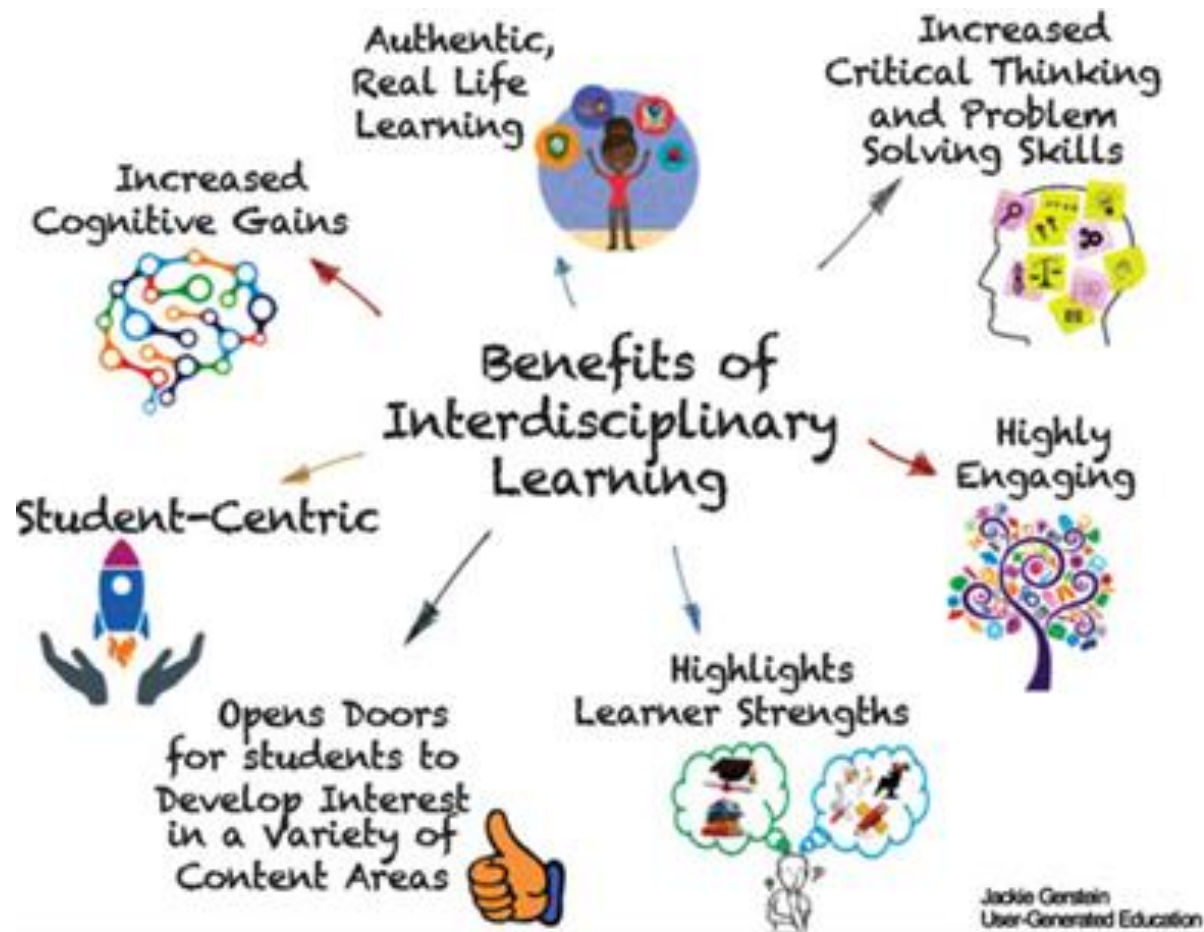
**Experience the  
First Peoples  
Principles of  
Learning**

# Diversity of Students

**Flexible Structure**

# Relationships

# Wicked Problems



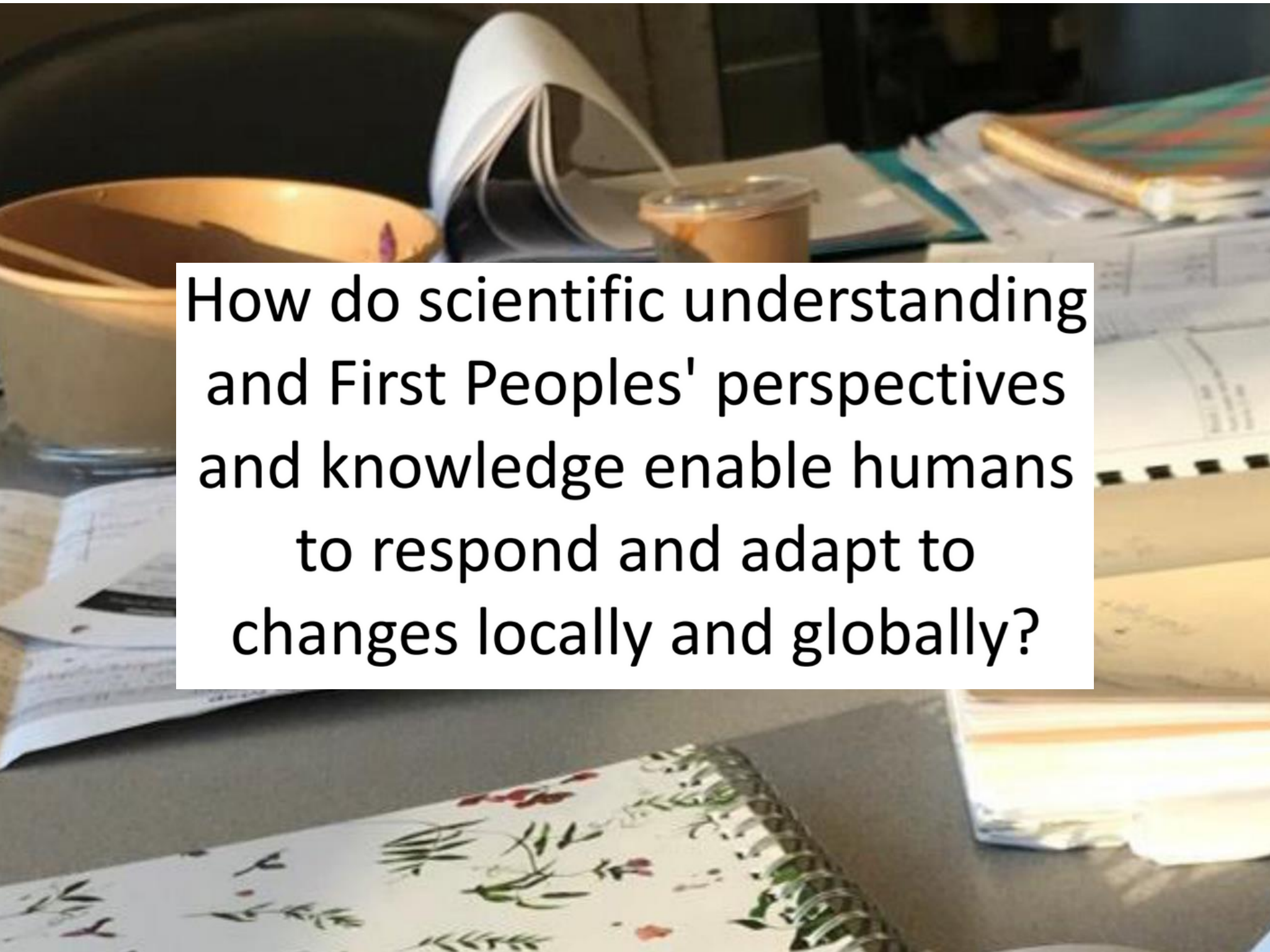
**“Students today face an unprecedented range of social, scientific, economic, cultural, environmental, political, and technological issues. To deal with these issues, they first need competencies derived from discrete disciplines.”**





When we walk together in a good way,  
we learn to see the world  
through two eyes.

# Year

A photograph of a desk with various items. In the foreground, there is a spiral-bound notebook with a floral pattern. To the left, a clear glass is partially visible. In the center, a white cup with a lid sits on a saucer. Behind it, a white folder or notebook is open. To the right, there are several sheets of paper, some with diagrams or text. The background is slightly blurred, showing a dark surface, possibly a chair or another desk.

How do scientific understanding and First Peoples' perspectives and knowledge enable humans to respond and adapt to changes locally and globally?



# Interpreting and Analyzing Scientific Texts

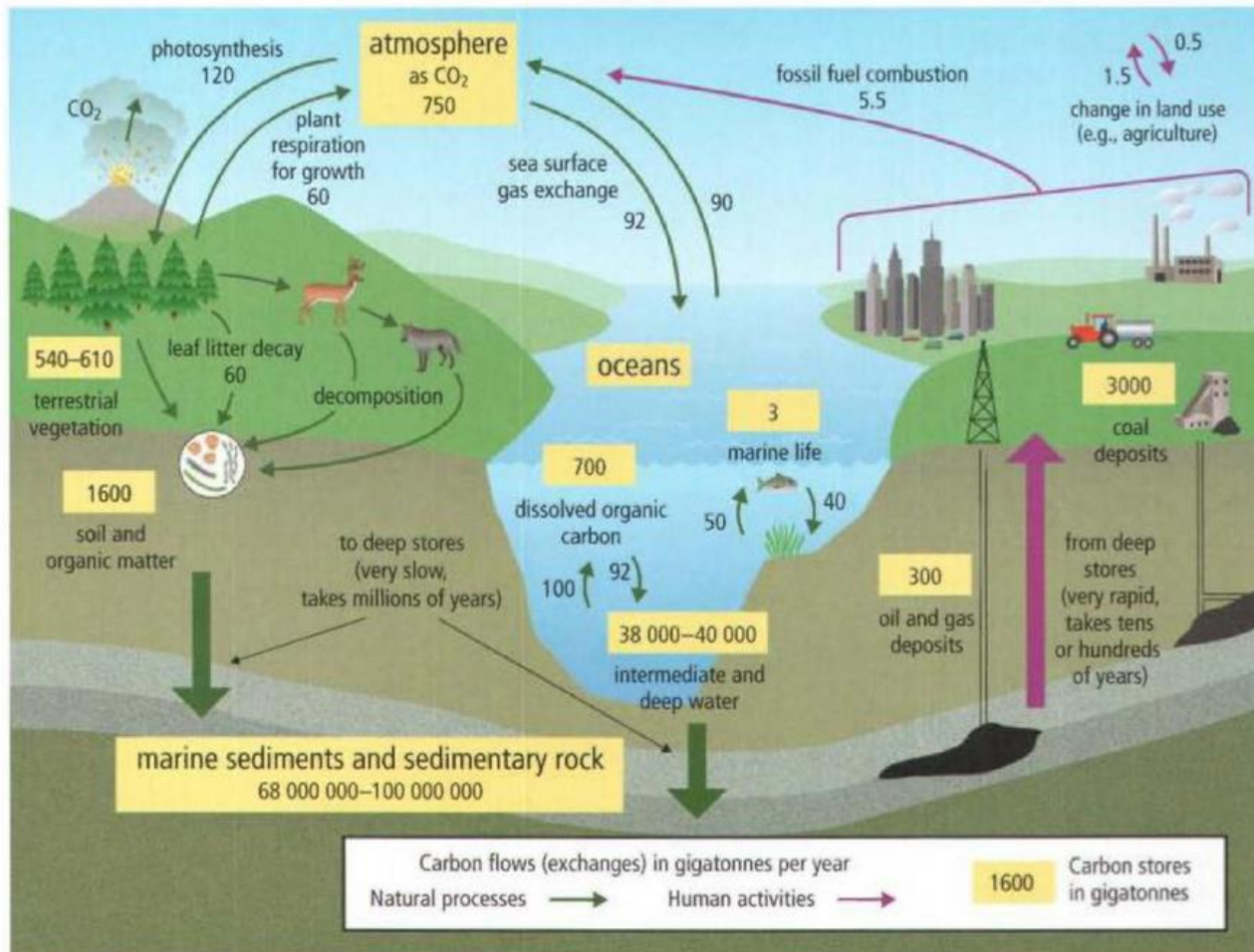


Figure 2.27 The carbon cycle

Data current as of 2008

## The Greenhouse Effect

Solar energy passes through the clear

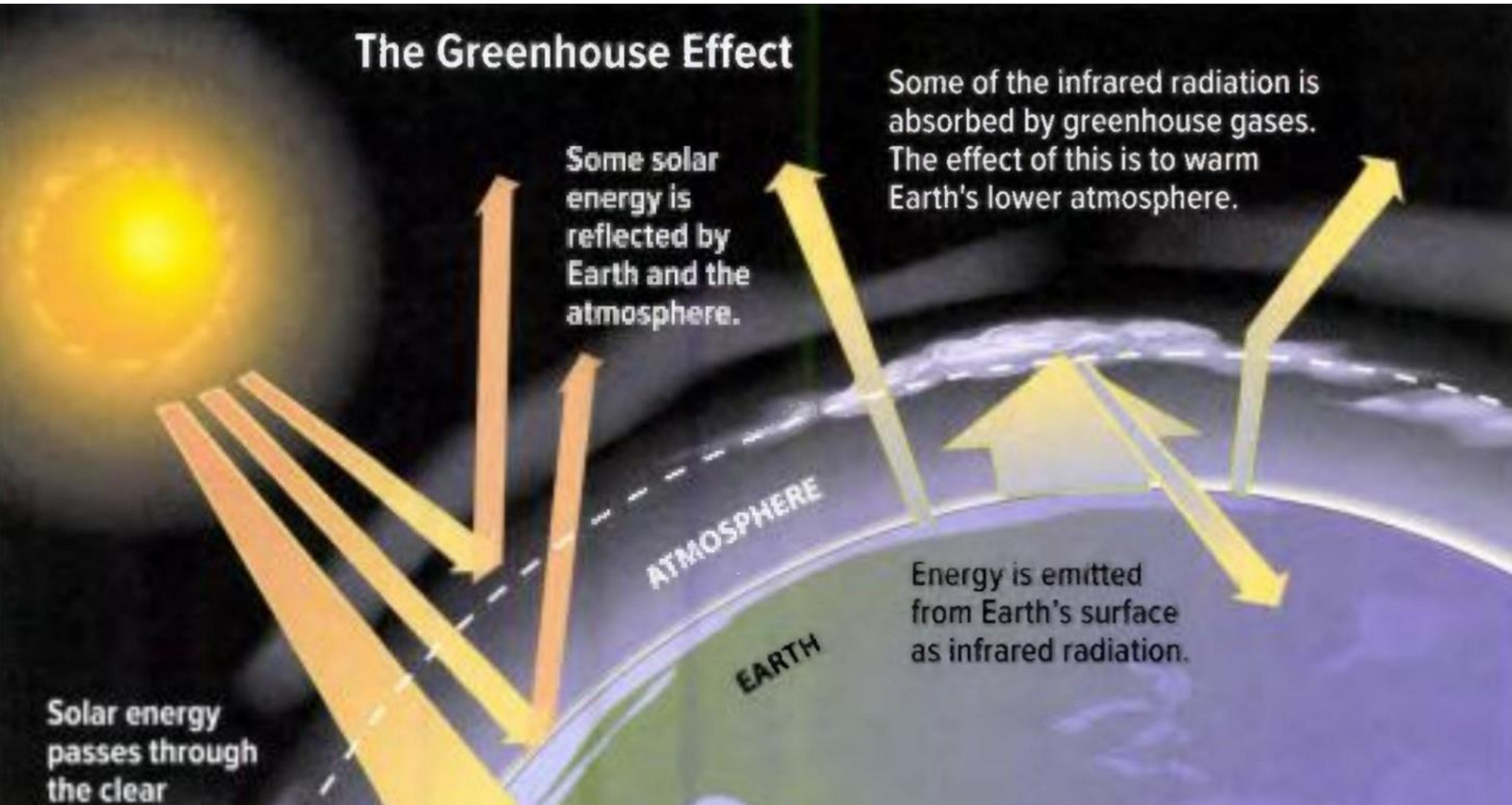
Some solar energy is reflected by Earth and the atmosphere.

Some of the infrared radiation is absorbed by greenhouse gases. The effect of this is to warm Earth's lower atmosphere.

Energy is emitted from Earth's surface as infrared radiation.

ATMOSPHERE

EARTH



# Resources Guests...



**David DeWit**  
Natural Resources Manager  
Office of the Wet'suwet'en



**Matt Herzog**  
Smithers Fire Department  
Bulkley Valley Emergency  
Support Services



**Mel Bazil**  
Alcohol and Drug Counselor  
Dze L' Kant Friendship Centre

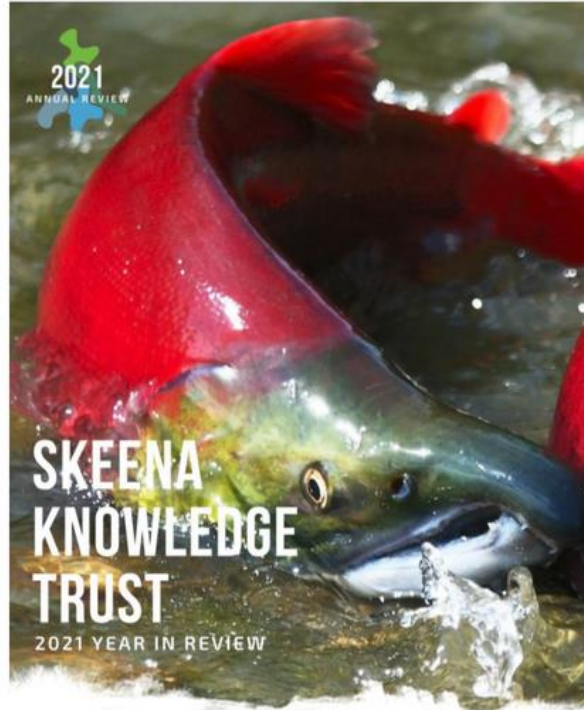


**Who?**

**Role?**

**Background Knowledge:**

**Questions:**





# Resource Guest Protocol



Welcome



Land Acknowledgement



Food



Dialogue



Thank you

**Big Question:**

How does scientific understanding and First Peoples perspectives and knowledge enable humans to respond and adapt to changes locally and globally?

**What I heard:**



**What I saw:**



**What I think:**



**What I feel:**



**AHA!**

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# Learning to monitor Riparian Ecosystems

David DeWit and Tieasha Pierre  
Natural Resources - Office of the  
Wet'suwet'en



# **Rafting with Skeena Water Conservation Society**

# Malco Lookout Class Hike



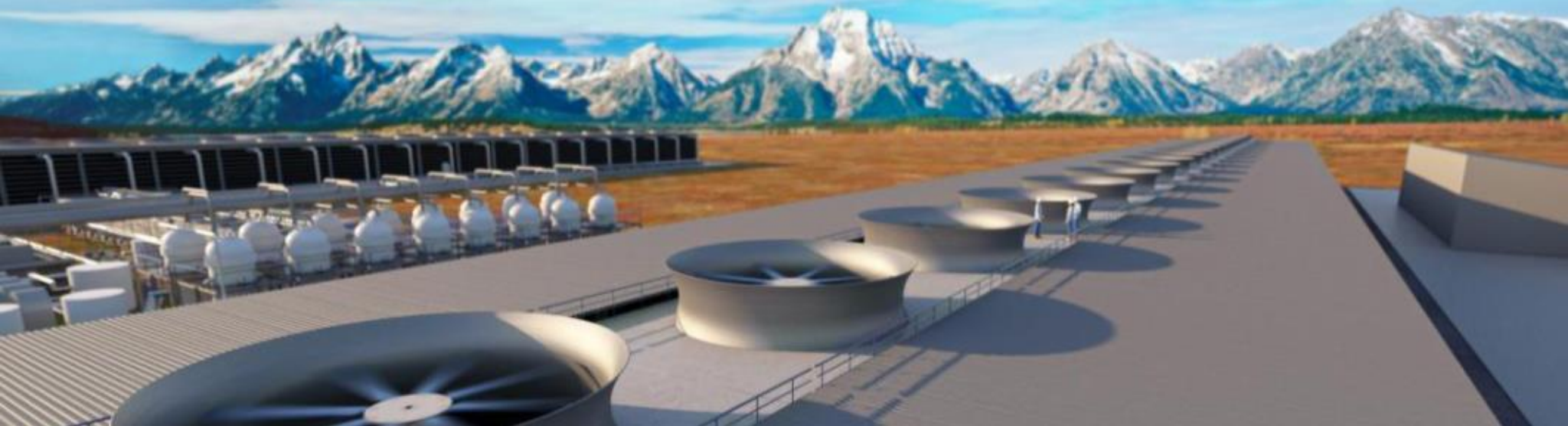


# **‘Ksan Historical Village**

We believe  
humanity can  
solve climate  
change.

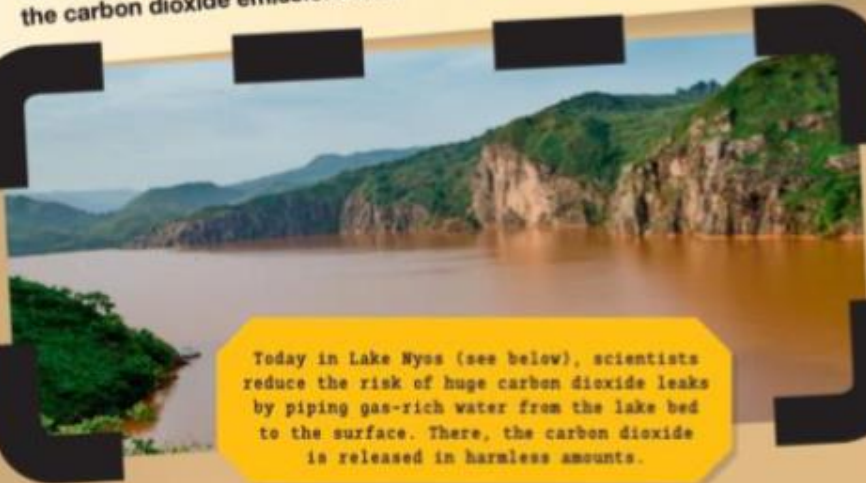
We believe we can create a future in which our children and neighbours inherit the same planet we've enjoyed; where we deliver prosperity and well-being while avoiding environmental impact. Creating this future will require leadership, collaboration, and creativity, and will involve a diversity of new technologies, business ideas, and social innovation. Getting there is a challenge, but also an imperative.

At Carbon Engineering, our contribution to this future is a Direct Air Capture technology – more than 12 years in the making – that captures carbon dioxide directly out of the atmosphere.



# GAS TRAPPING

**Carbon capture and storage (CCS)** is a new technology developed to reduce the quantity of greenhouse gas emissions entering the atmosphere. In this technology, huge fans capture emissions from the burning of fossil fuels. The gases are passed through a watery solution that pulls out and traps carbon dioxide. It can capture up to 90 percent of the carbon dioxide emissions from burning fossil fuels.



Today in Lake Nyos (see below), scientists reduce the risk of huge carbon dioxide leaks by piping gas-rich water from the lake bed to the surface. There, the carbon dioxide is released in harmless amounts.

## HOW IT WORKS

The technology has three parts. First, the carbon dioxide is captured. Second, it is transported by ship or pipeline to a storage site. And finally, it is securely stored underground in old oil and gas fields, or deep in underground rock that also holds salty water. People against the technology are concerned about

what would happen if there was a sudden release of this stored carbon dioxide. A similar release happened naturally when massive amounts of carbon dioxide erupted from Lake Nyos in Cameroon in 1986. Seventeen hundred people died, along with thousands of cattle and many birds and other animals.

## WHEN WILL IT HAPPEN?

Scientists are working on CCS technology to see if it can be effective and affordable. It may be one way of reducing greenhouse gases and preventing Earth from overheating. It is a huge challenge. Large-scale CCS does not yet exist. The U.S. government signed a budget bill in 2018 that encourages organizations to capture and store emissions.

The technology necessary for capturing carbon is expensive. Because of this new bill, companies who take the first steps toward capturing carbon will save a lot of money on their **taxes**, or money they pay to the government. As more and more companies do this, the technology will improve and the cost of CCS will come down.

## TOMORROW'S SECRETS

Carbon Engineering is an energy company backed by Microsoft founder Bill Gates. The company has proven that it can turn a carbon-dioxide-rich watery solution into an alternative fuel. It heats and treats the solution, and takes out chemicals needed for fuel—including gas, diesel, and jet fuel. The next step will be to turn this technology into an affordable product that can be sold.



Burning jet fuel in the airline industry accounts for 3 to 9 percent of the total climate change caused by humans.



Indigenous House at the University of Toronto is the latest building from a Chipewyan architect whose timeless designs blend modern and traditional ideas.

# BUILDINGS THAT BUILD MEANING

## CREATIVE COMBINATION

To honour Indigenous cultures, the new Indigenous House at the University of Toronto Scarborough blends traditional structures with modern design. Currently under construction, it borrows aspects of the winter wiigiwaam and takes them in an exciting direction. A wiigiwaam is a domed building with a frame made of flexible saplings that are covered by insulating layers of birchbark. On some, the roof can be opened, a bit like the flap of an envelope, to increase circulation. The design for Indigenous House borrows from this heavily. Its frame is made of curved beams of a laminated timber called glulam. Also, its curved ceiling has one side that is higher than the other—this creates an opening that is filled with glass. Inside, the building feels like a wiigiwaam.

Indigenous House will have fire detectors that sense heat, not smoke. This will allow Indigenous Peoples to carry out a ritual called smudging without alerting the fire trucks!



Waugh's designs are often full of curves and slopes that mimic the land surrounding the building.

## RESPECTING CULTURE

This project is the latest by Indigenous architect Alfred Waugh. A member of the Fond du Lac Dene Nation of northern Saskatchewan, Waugh is the founder of Formline Architecture. His company specializes in environmentally responsible and culturally sensitive projects, and he doesn't work alone. For this project, he worked with local Elders who acted as advisers on the culture of their nation. In this way, Waugh was able to design a modern building that respects tradition. For example, Indigenous House's central meeting hall will open up to a garden full of plants that have meaning in Indigenous cultures. Nature is never far away!

## KEEPING IT GREEN

Waugh's designs also connect ideas in Indigenous cultures with cutting-edge green architecture. Just as a wiigiwaam relies on natural airflow and birch insulation to regulate temperatures, Indigenous House will use a central concrete air intake tube that connects to pipes laid underneath the structure to moderate its temperatures, in both summer and winter. Indigenous House is expected to be completed in 2022.

TEXT: JOHN CROSSINGHAM PHOTOS: FORMLINE ARCHITECTURE

Incredible!

Working on citizen science projects is a great way to learn and make friends!

These rangers in the David Suzuki Foundation's Butterflyway Project plant habitats for bees and butterflies!

Whether with a traditional camera or a phone, it's important to keep records of the animals that you observe.

# Citizens ENGAGE!

Technology is helping to make citizen science the new frontier in scientific research.

Who is a scientist? Is it a person who has gone to school and spent years researching, studying, and conducting experiments in a certain field? Yes. But science is something that anyone can participate in. We're talking about citizen scientists!

## WHO ARE THEY?

Citizen scientists are everyday people who conduct experiments and other scientific research. They can work alone or in groups. They can work under the guidance of professional scientists or carry out research on their own. "That's the beauty of citizen science—it can be anybody," says Jode Roberts of the David Suzuki Foundation (DSF). "Citizen science projects are an incredible resource because they give kids and adults the tools to gather, share, and review scientific data. You just need basic tools, like a camera, a phone, binoculars, or a notebook."

## WHAT KINDS OF PROJECTS?

Citizen scientists can participate in all kinds of projects, from astronomy to biology! They can gather information on pollution in their local ecosystems. They can collect data on local animal species, from bats to frogs to butterflies. All citizen scientists need is a passion for the subject and some dedication. Well, that and maybe some technology, too!

## TECHNOLOGY TO THE RESCUE

In science, data collection is everything. It involves finding the answers to questions like, When did something happen? Where did it take place? What were the other conditions that day? Doing this work requires patience and attention to detail. But now there are apps to make data collection much easier. "As technology has evolved," says Roberts, "scientists have better tools

to encourage folks to participate. In our pockets is a supercomputer that has a camera built into it and a GPS—our phones!" Now when people photograph a species in nature, for example, apps automatically tag the image with the time, date, location, and more—all of the important details that scientists need during their research.

## CONNECT TO NATURE

Roberts helps run the DSF Nature in Cities program—this is all about connecting people to nature that exists in their neighbourhoods. "Part of my role in citizen science is to use these tools and platforms to reconnect people to nature nearby." He says that once people begin to observe the many species that live in their own backyards, they see their connection to nature in a completely different light!

## HELP THE PROS!

This work helps professional scientists, too. Imagine trying to catalogue the many species of insects that live in an area all by yourself. It would take years! Now imagine that you have dozens of people who already live in that area feeding you information every day about what species they see. That's a power that Roberts harnesses in citizen science projects like Bees in My BackYard and the Butterflyway Project, which use people of all ages to monitor local insect populations. How will you use your own citizen science power?

## APPS FOR SCIENCE!

Here are a few apps to bring out the citizen scientist in you. Some even have scavenger challenges similar to Pokémon Go! but with real creatures.



• **iNaturalist:** This is the leading app for citizen scientists looking to record information about animal and plant species in the wild. It also helps identify species!



• **Seek:** A junior version of iNaturalist, this app is full of activities. Perfect for beginners!



• **PlantSnap:** This app will help you identify local plants in a snap!



• **eBird:** Made for people who love birds, this app identifies species by appearance, song, behaviour, and more.



• **Globe Observer:** Use this app to take pictures of the sky around you. The data helps the NASA Globe Cloud Observation Project to better understand our atmosphere.

Growing bee- and butterfly-friendly plants helps the insects and attracts them so you can make observations!

# First Peoples' Knowledge and Perspective

Yinta – We are the land, and the land is us.

Traditional Ecological Knowledge

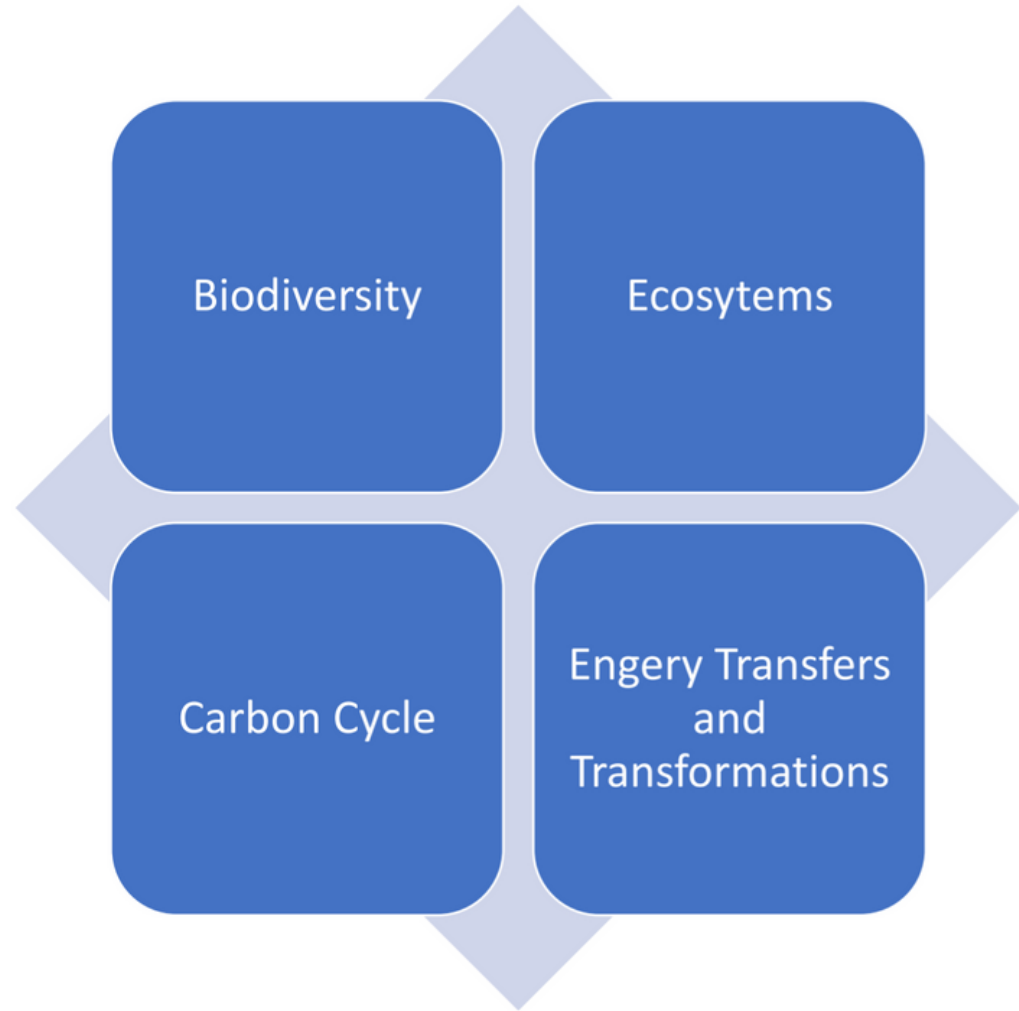
Etuapmunk (Mi'kmaq) – Two Eyed Seeing

Listen with two ears and two eyes

7th Generation Principal

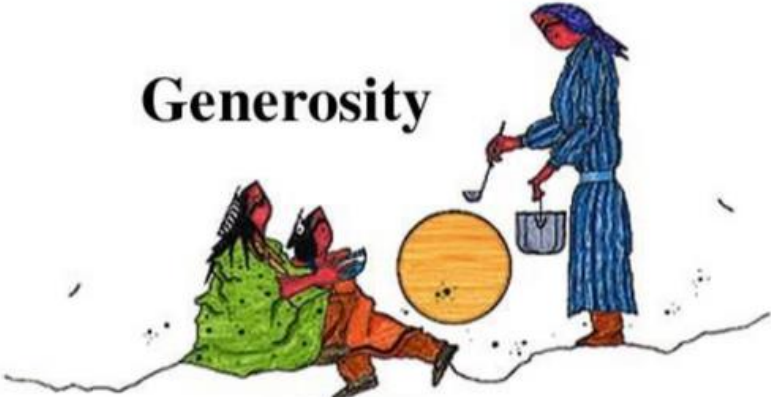
Walk Softly

# Scientific Understanding





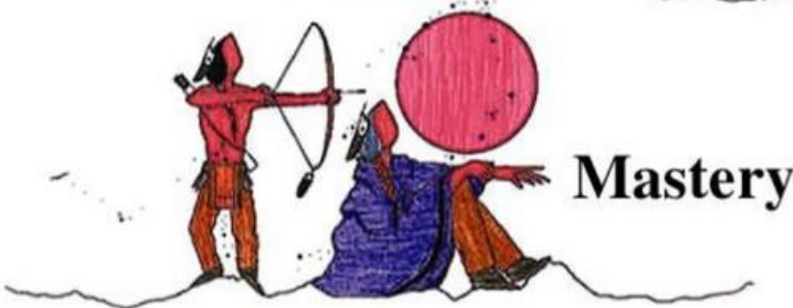
**Generosity**



**Independence**



**Belonging**



**Mastery**

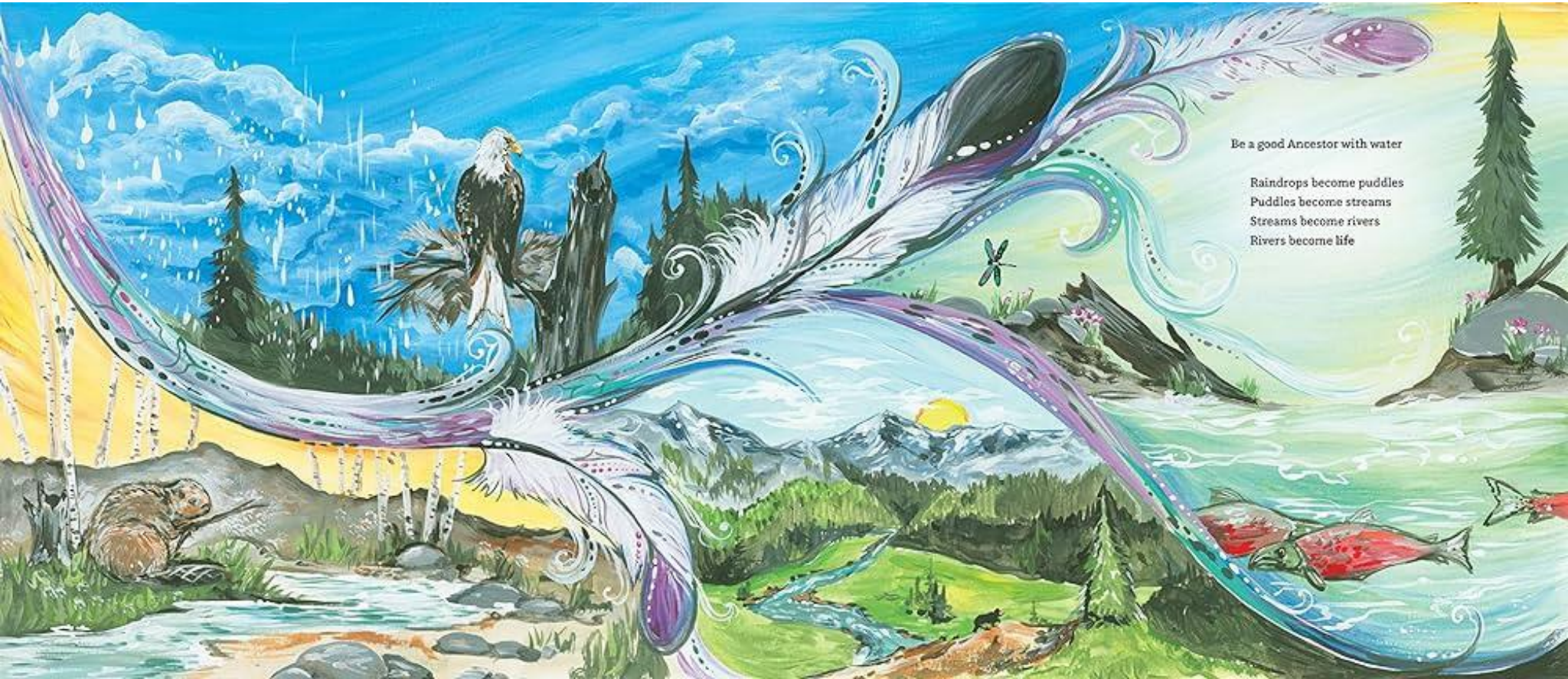
# 'Anuc niwh'it'en:

Witsuwit'en expression meaning "our laws"

"These laws helped everyone to work together, prosper  
and protect the land."

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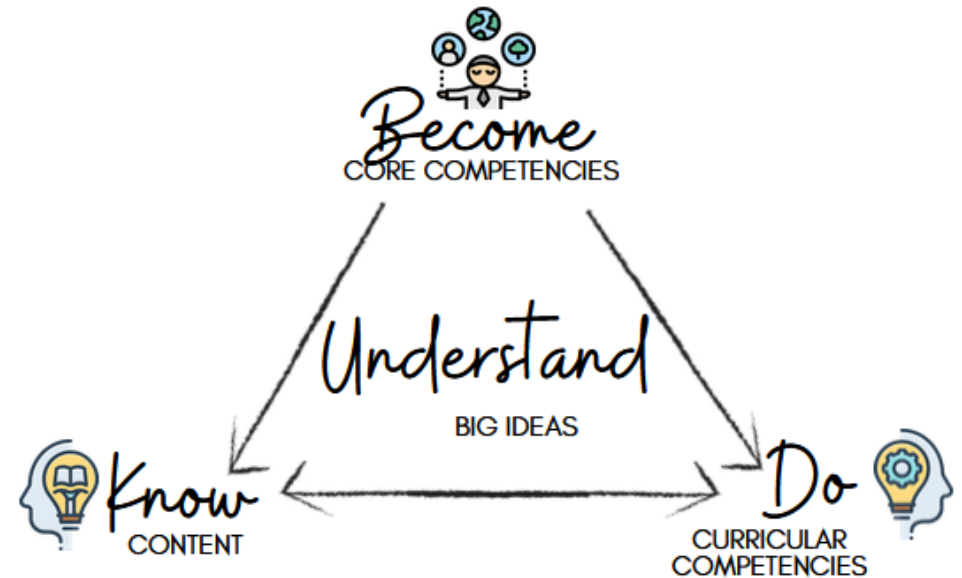
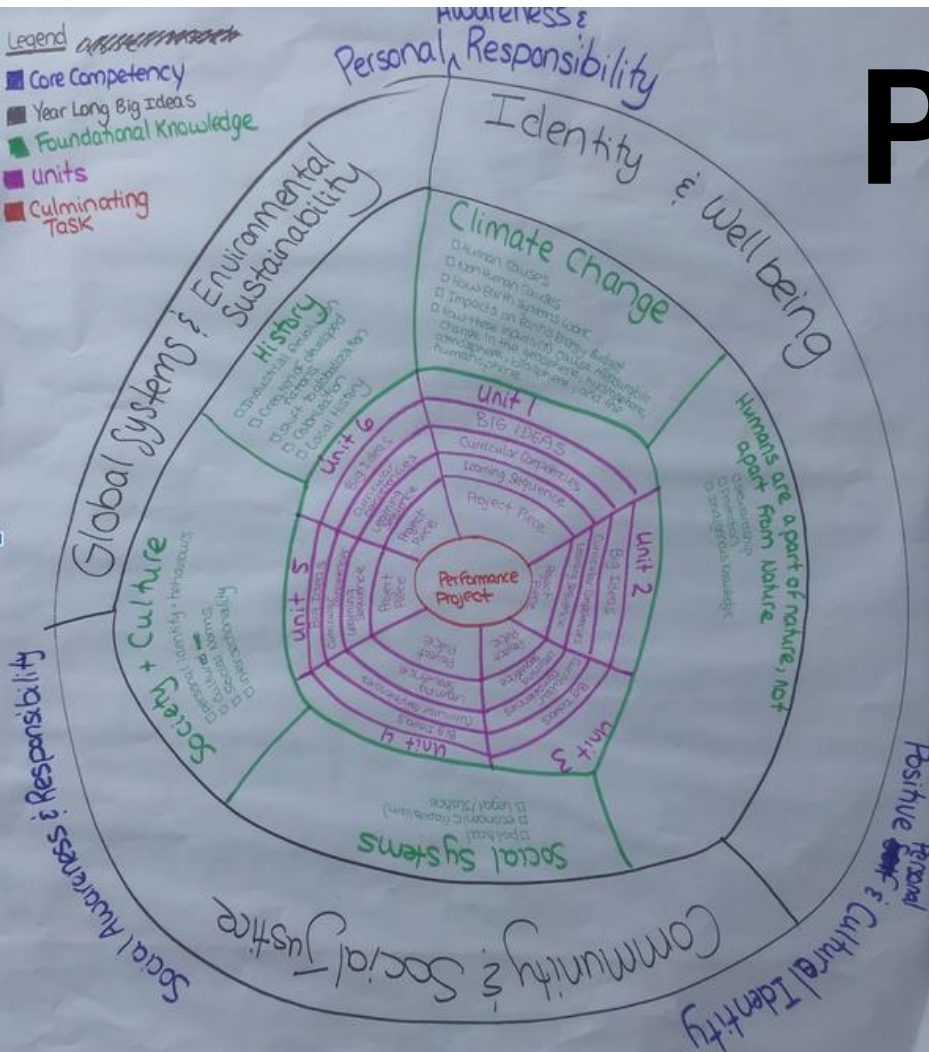
# Year Two...





# Unit Plan to a Year Long Plan

# Plan



# Who am I?

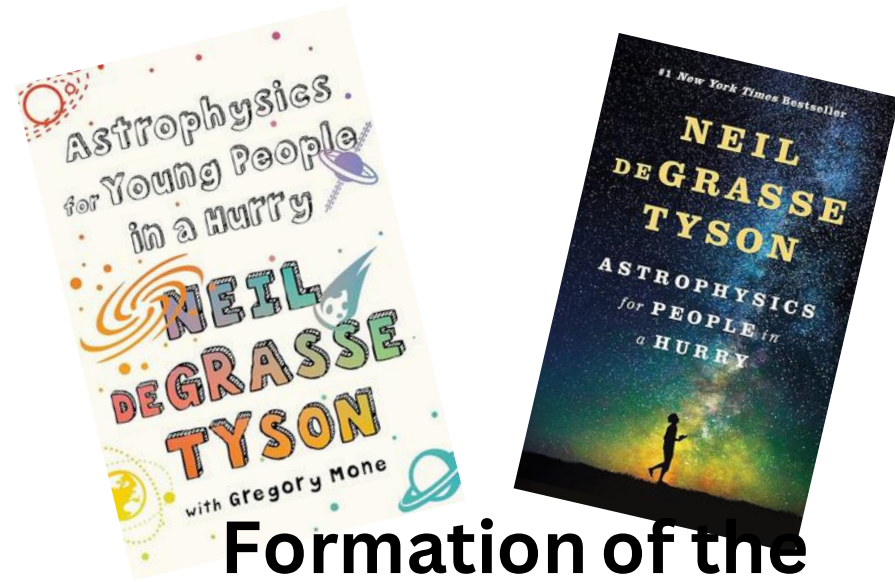
Who am I? and



Year Long Inquiry Questions

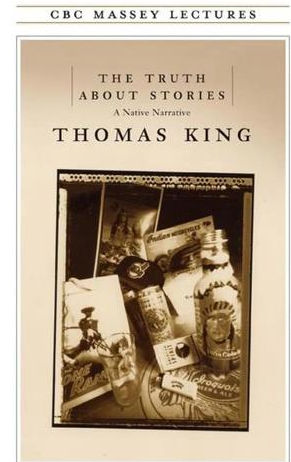
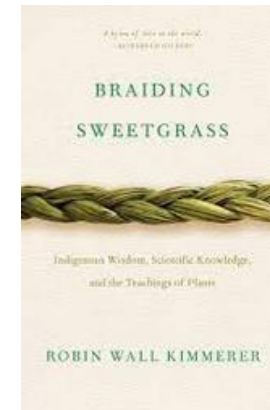
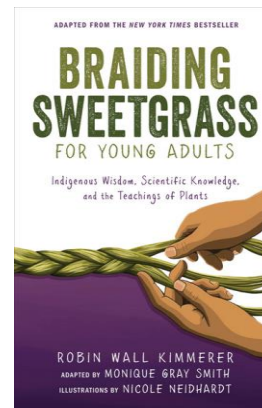
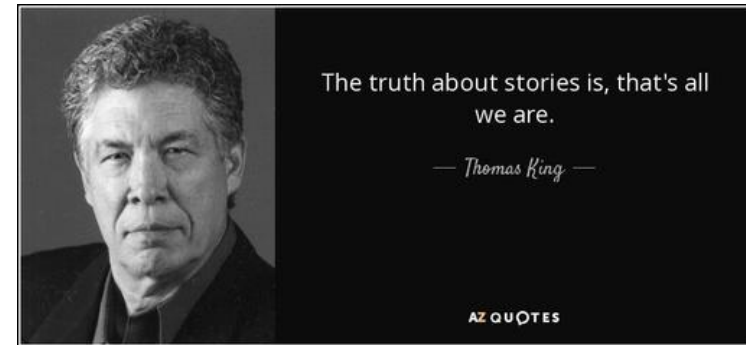
# Who are we?

# Where do we come from?

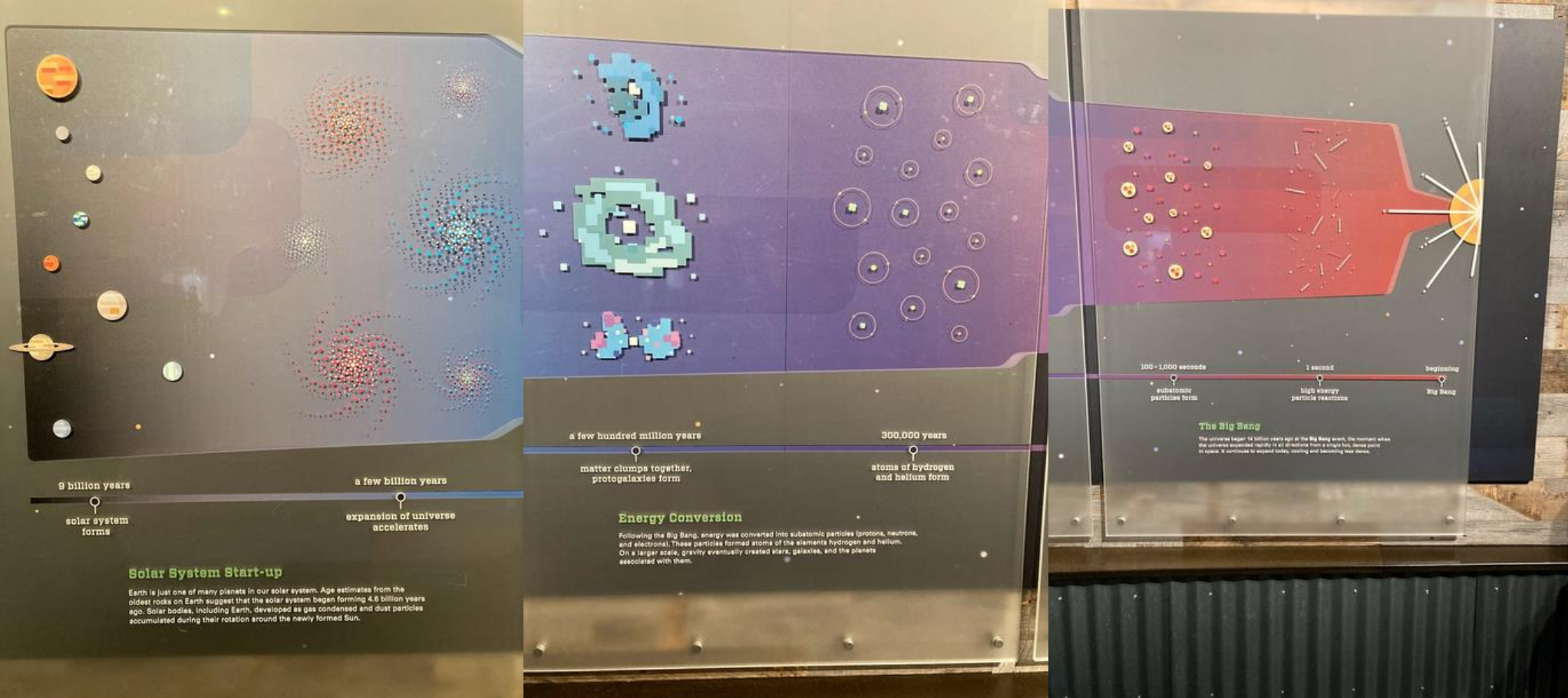


Formation of the  
Universe

and



Creation



# Class Collaborative Project: Illustrated Time Line

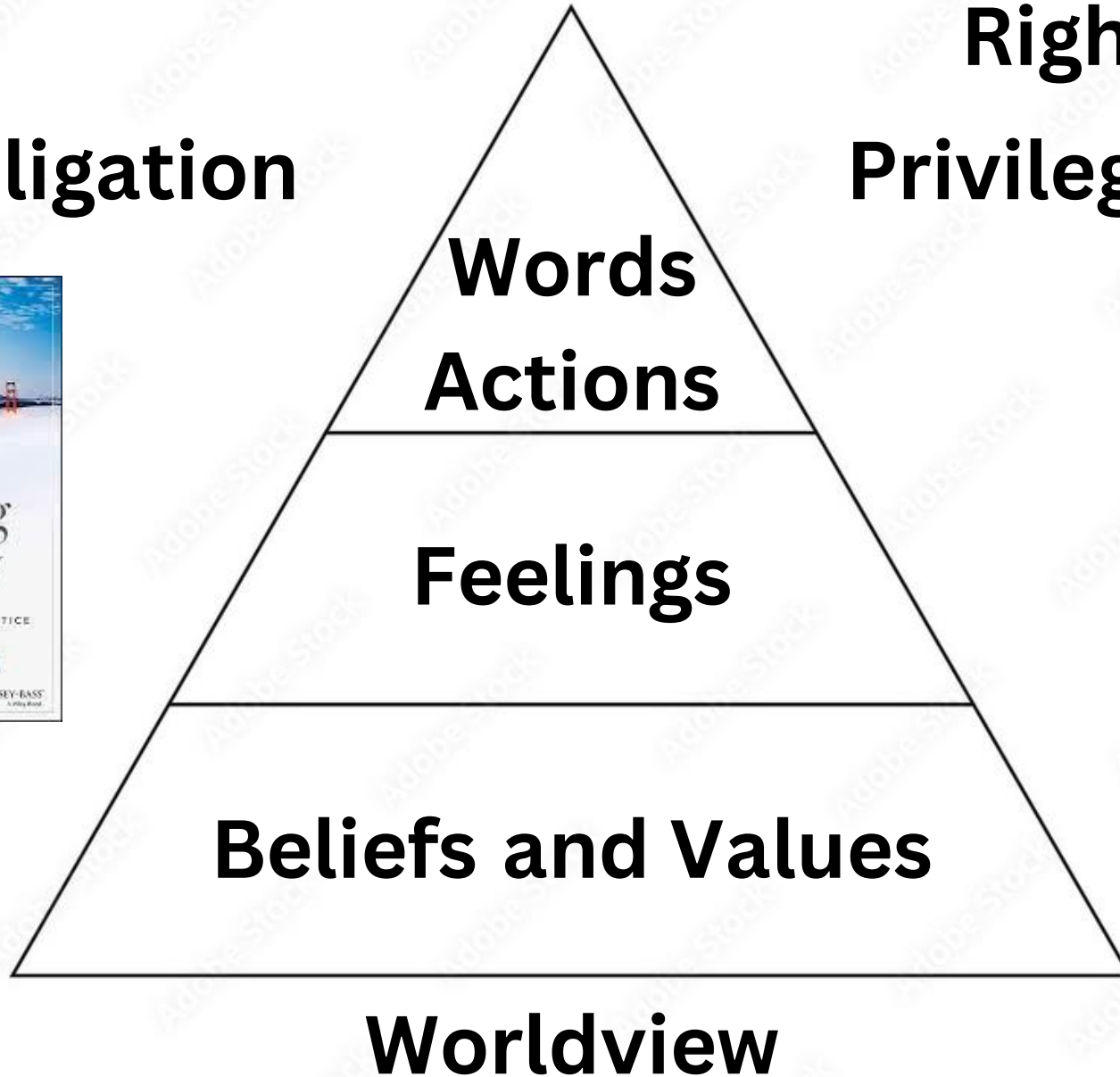
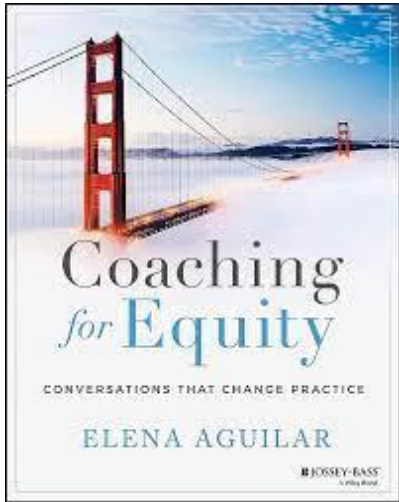
**Responsibility**

**Hereditary**

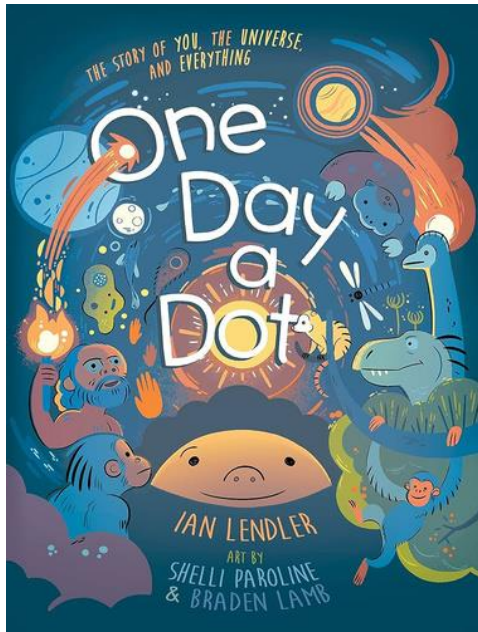
**Obligation**

**Rights**

**Privileges**

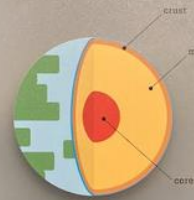


# How did we get here?



## Early Earth

As the early planet Earth cooled, distinct layers formed a solid crust. The intense heat and pressure of submerging rocks sends them back up part of the way into the mantle. A very sticky crust surrounds the mantle and constitutes ocean floors and the continents we live on.

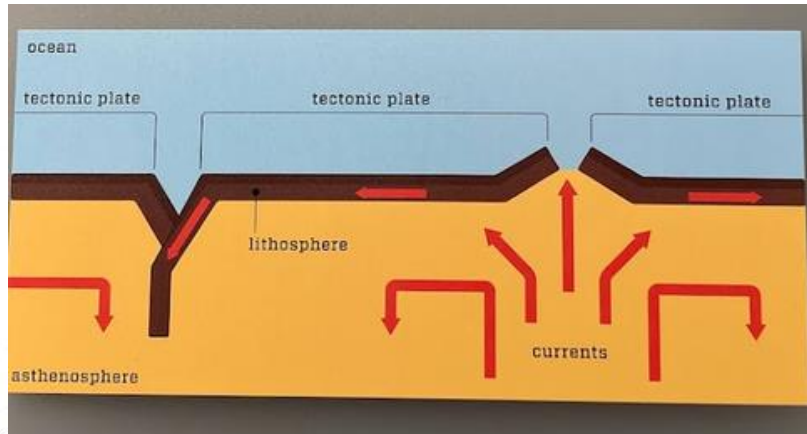
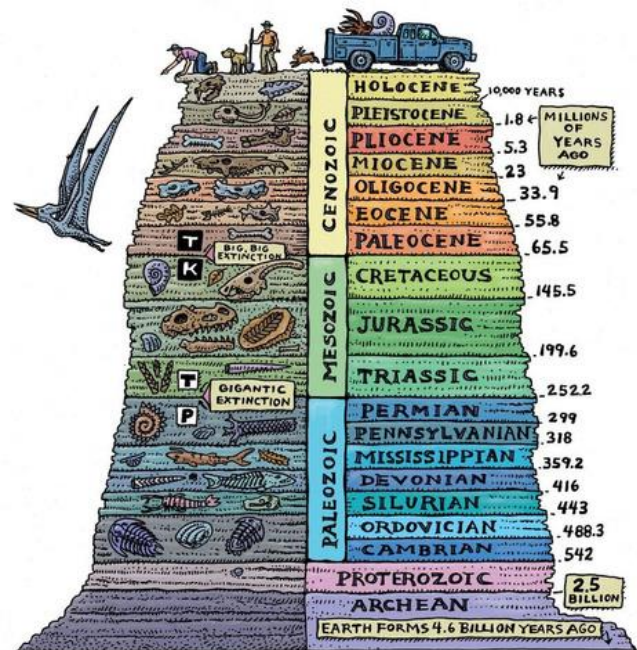


Earth's first landscapes were barren and waterless, but were quickly modified by volcanoes, lightning, and impacts with astronomical objects. Water vapour from volcanoes condensed as rain and accumulated as Earth's first oceans. Evaporation and precipitation recycled water in a process that continues today. Over time, the early oxygen-poor atmosphere was replaced by one that was oxygen-rich.

The Earth changes constantly; sometimes fast, sometimes slow. Volcanic eruptions can change landscapes overnight, whereas tectonic plates, moving as slowly as your fingernails grow, alter the landscape over millions of years. Drought, severe weather, volcanoes, earthquakes, tsunamis, fires, floods, and landslides are all part of a dynamic planet.

Earth is a dynamic and changing planet.

“It has changed, it is changing, it will change.”



No longer is the Earth's interior seen as a series of concentric shells separated by featureless expanses. Instead, there are great slabs of ancient rock that are torn and warped, and that lie deep beneath our feet. There are giant plumes of hot material rising from deep inside the Earth. And there are great cold chunks on the bottom of the continents that are slowly settling down into the Earth.

Of particular interest is the remnant of an ancient tectonic plate—the Farallon Plate—that now lies deep beneath North America. That ancient plate—now regarded as a slab—is slowly sliding west-to-east beneath the continent. It is highly contorted—and it is those contortions and the movement of this slab that have made it one of the most important factors in the history of North America, giving rise to a variety of features, including the Rocky Mountains—and the Black Hills. AHA!!

There is one more important point. Geology and biology are no longer considered separate sciences. The geological evolution of the Earth—creation of ocean basins, growth of mountain ranges, and so forth—has had an undeniable influence on biological evolution. And biological evolution—the development of photosynthesis, the first forest, the expansion of grasslands, and so forth—has been a major factor in determining how the rocky parts of the Earth have evolved.

This intertwining of geology and its various components—glaciology, volcanology, seismology, geochemistry, geochronology, and more—and of biology and its components—genetics, biochemistry, population dynamics, paleontology, and more—is known, rather dryly, as Earth System Science.

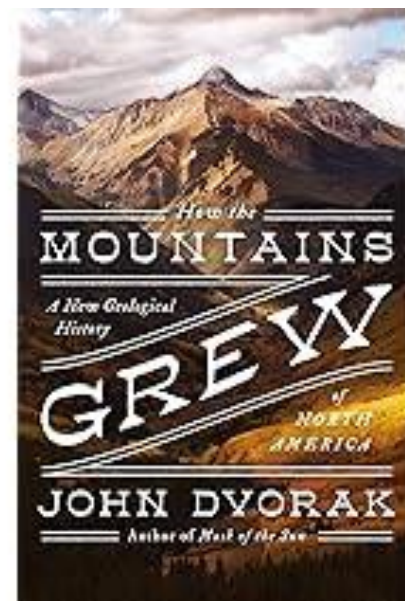
INTERDISCIPLINARY STUDIES!

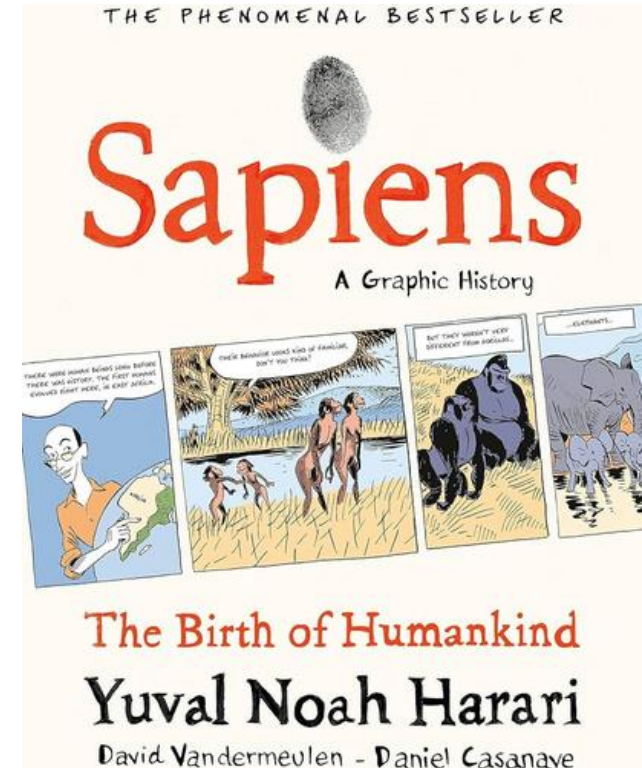
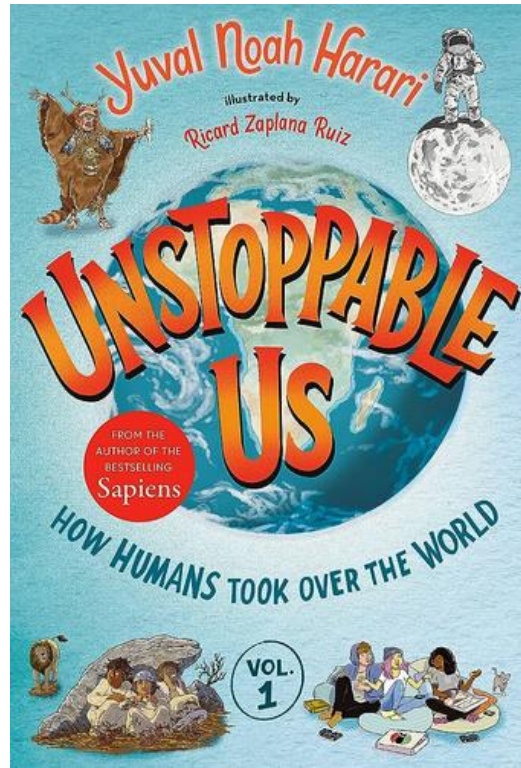
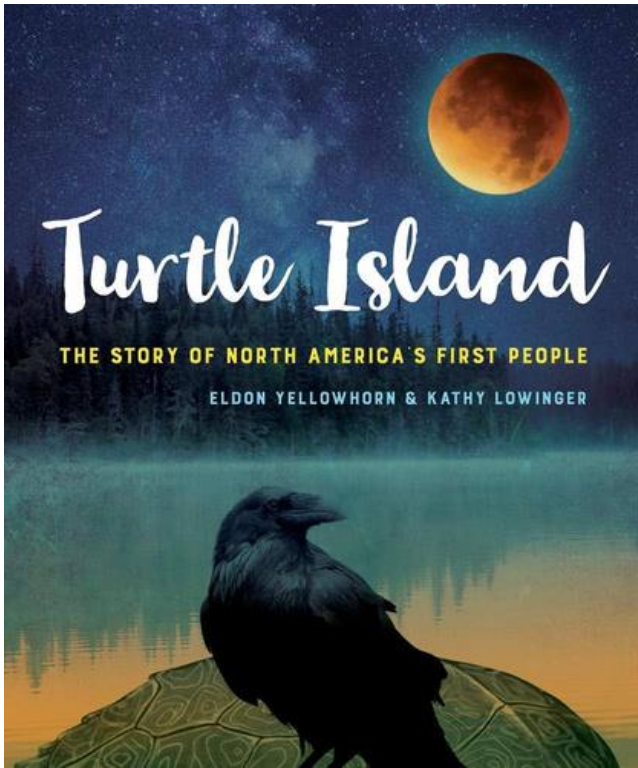


xx Connectedness of the evolution of the planet + Humans

PROLOGUE

But it is not dry in content. For example, mass extinctions were once considered incidental in planetary evolution, merely blips in the long evolution of life. They are now known to be important parts of the geological evolution of the planet. So, too, are the activities of human beings, which, when viewed from the perspective of the long history of the planet, have clearly become—and continue to be—a major geologic force.





**We have had an  
impact.**

**We are impacting.**

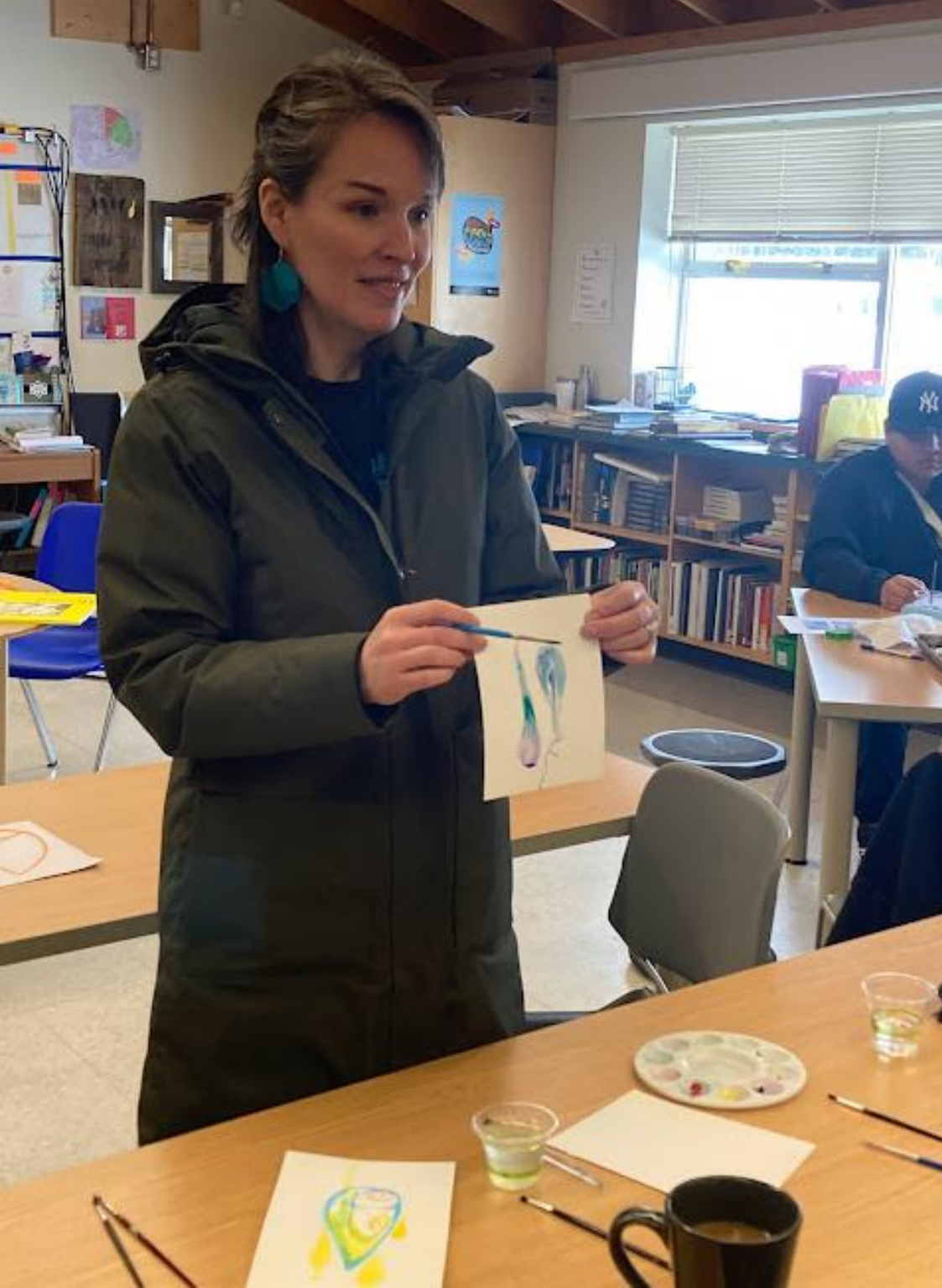
**We will impact...**

**Obligation Privileges**

**Responsibility**

**Hereditary**





# Waterlution

Art Collaboration  
with Jolene  
Andrews





Protecting the Widzin Kwah for future generations...

“Water has a spirit. Treat it that way,  
nurture it, and it will take care of you.”

- Mike Ridsdale, Office of the Wet'suwet'en



## Watershed Model Activity:

How does human activity impact watersheds?

What is the connection between Yin tah (land) and T'oh (water)?



**Watershed:** An area of land where water flows to a common point.

### Examples:



Source: flickr.com/photos/3beebe/3711478599/



### Examples of Watersheds on Witsuwit'en Territory?



Yintah



Widzin Bin



(upper) Widzin Kwah



(lower) Widzin Kwah

### Part Two: Human Activity in a Watershed Model – Procedure:

Step 1: Create a watershed model like you did in part one. This time, add human activity to your watershed such as:

- Agriculture / Farming
- Industry (such as logging)
- Residential areas
- Roads
- Leisure and recreation



Step 2: Make it Rain! Use the spray bottle to add water to your model.

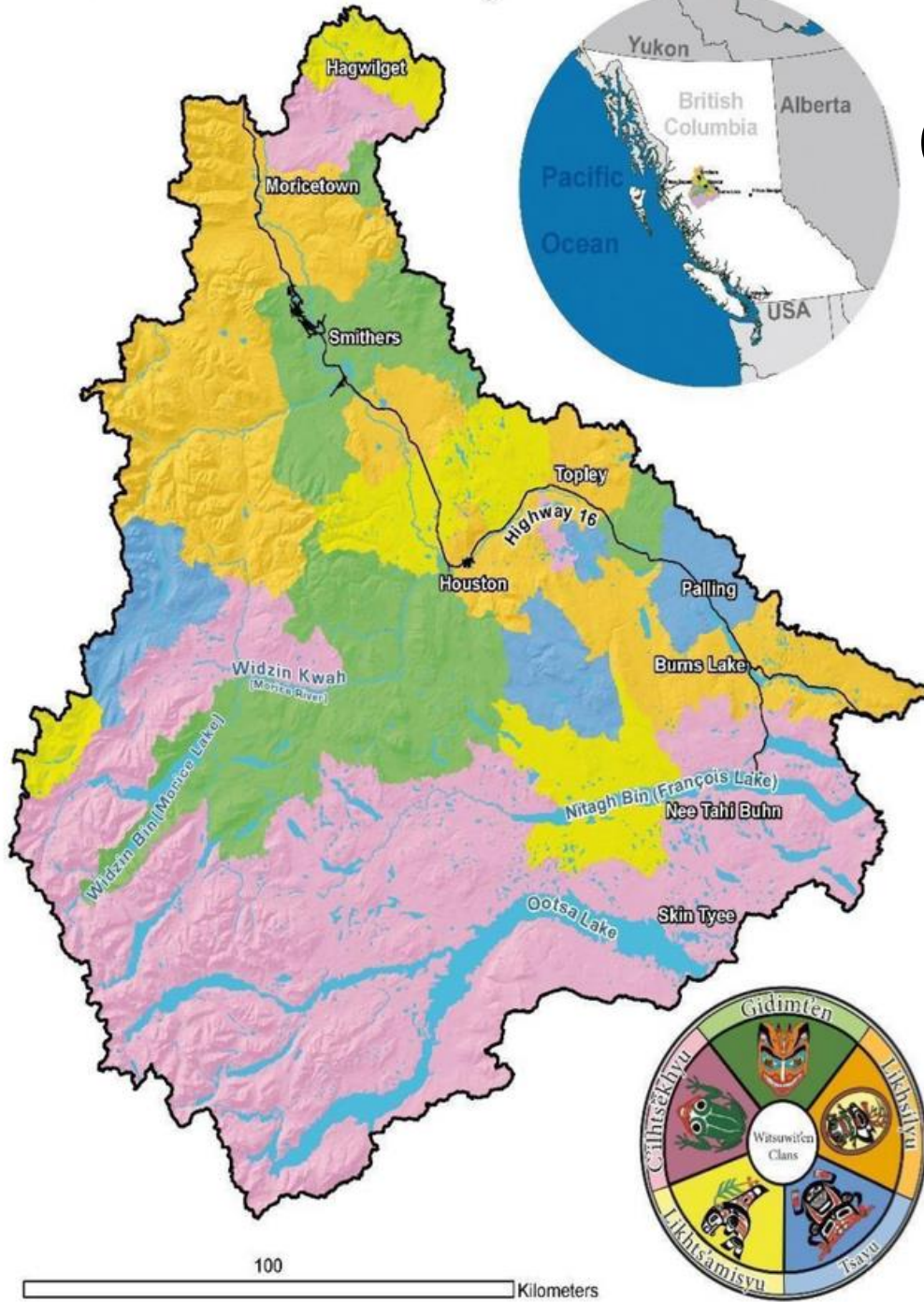


Can you identify watersheds in your model that could be sources of clean drinking water?

How would you describe the impact of human activity on your watershed?



# Witsuwit'en Territory



**Obligation**

**Responsibility**

**Privileges**

**Hereditary**

**Rights**

**Sensitivity and  
Importance of  
Headwaters**





**Helped deepen  
understanding of local  
issues**

# Elders and Knowledge Keepers







# Cultural Narratives



# Nisga'a Museum

# CELEBRATING HOOBIYEE!

Learn about a sacred Nisga'a tradition.

BY ALIX GOETZINGER



A song leader holds a carved Eagle staff.



Down feathers are released at the end of a dance.

## THE START OF THE CELEBRATION

Nisga'a communities across the Nass Valley and Vancouver in British Columbia come together after the full moon to share songs and dances and eat traditional food. Dancers from all over the northwest coast join in. Some even travel from eastern Canada and the United States. When everyone arrives, a grand entrance begins, and all the dancers enter the hall to represent their Nations and various dance groups. Incredible headdresses, masks, and drums funnel through the door, and the room becomes so full, there isn't any standing room left! "Hoooooobiiieeeee!" shouts the master of ceremonies. The guests all return this phrase back, looking up at the crescent moon symbol hanging from the ceiling as the first day of celebrations begins.

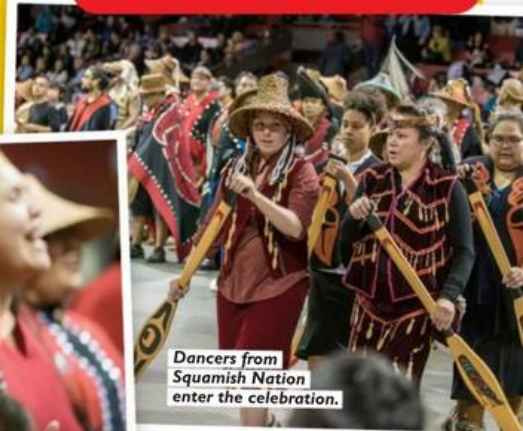
## A FEAST FOR THE EYES AND STOMACH!

During the next few days, booths are set up, with local artisans selling items like jewellery, clothing, and more. Delicious meals of oolichan (a type of fish), salmon, seal, and fry bread are prepared from dawn until dusk as people come and go throughout the day.



## What Is Oolichan?

Oolichan grease is valuable to many Nations in the Northwest. Nicknamed "liquid gold," this grease comes from the oolichan fish, a small but mighty part of the aquatic kingdom that runs through coastal waters. To extract oil from the fish, you have to ferment it and smoke it first. It takes days to make just one jar of oolichan grease. But it's worth it! Oolichan grease contains important A, E, and K vitamins, which helps to build a strong immune system!



Dancers from Squamish Nation enter the celebration.

PHOTOS: WIKICOMMONS (OOLICHAN); DOUBLE EXPOSURE PHOTOGRAPHY (ALL OTHERS); ILLUSTRATION: CHATELLE TRAINOR/MATTIES (PRETTYSHANNIGOS.COM)

Imagine walking towards a big longhouse with monumental poles standing in front. The sound of drums gets louder and louder as you get closer to the entrance. Inside, the low and high sounds of singing echo off the walls and fill the room. Strong, aromatic smells of salmon and seal meat waft through the doors and stick to your clothes. This is Hoobiyee.

**The Nisga'a Nation** is a powerful group of Indigenous Peoples in northern British Columbia. They are a Nation sustained by the natural abundance gifted from the land and ocean.

**A BOUNTIFUL MEANING**  
Hoobiyee (pronounced ho-bee-yay), also known as the Nisga'a New Year, is celebrated after the full moon in February, as it turns to a crescent moon. The name Hoobiyee is a combination of the Nisga'a words hoobix (spoon) and hee (a form of greeting). It symbolizes the alignment of the crescent moon and the stars in the shape of a full spoon, representing a bountiful harvest year!

ARTICLE

TURN THE PAGE FOR MORE ON HOOBIYEE AND THE NISGA'A NATION. ➔



Tea Creek is an award-winning Indigenous-led, culturally-safe, land-based Indigenous food sovereignty and trades training initiative.





## Indigenous traditional knowledge

Long before European explorers and traders arrived in the late 1700s, Indigenous people in BC told stories and practiced traditions to share important knowledge about natural hazards. By repeating these stories, Indigenous people passed on valuable information about how to prepare for and survive disasters across time and across generations.

The examples recorded here were shared by Elders and Knowledge Keepers from different communities. These stories and traditional practices can help all of us understand past and present natural hazards in BC. They can also help us recognize and respect the long history and rich traditions of First Nations communities on this land.



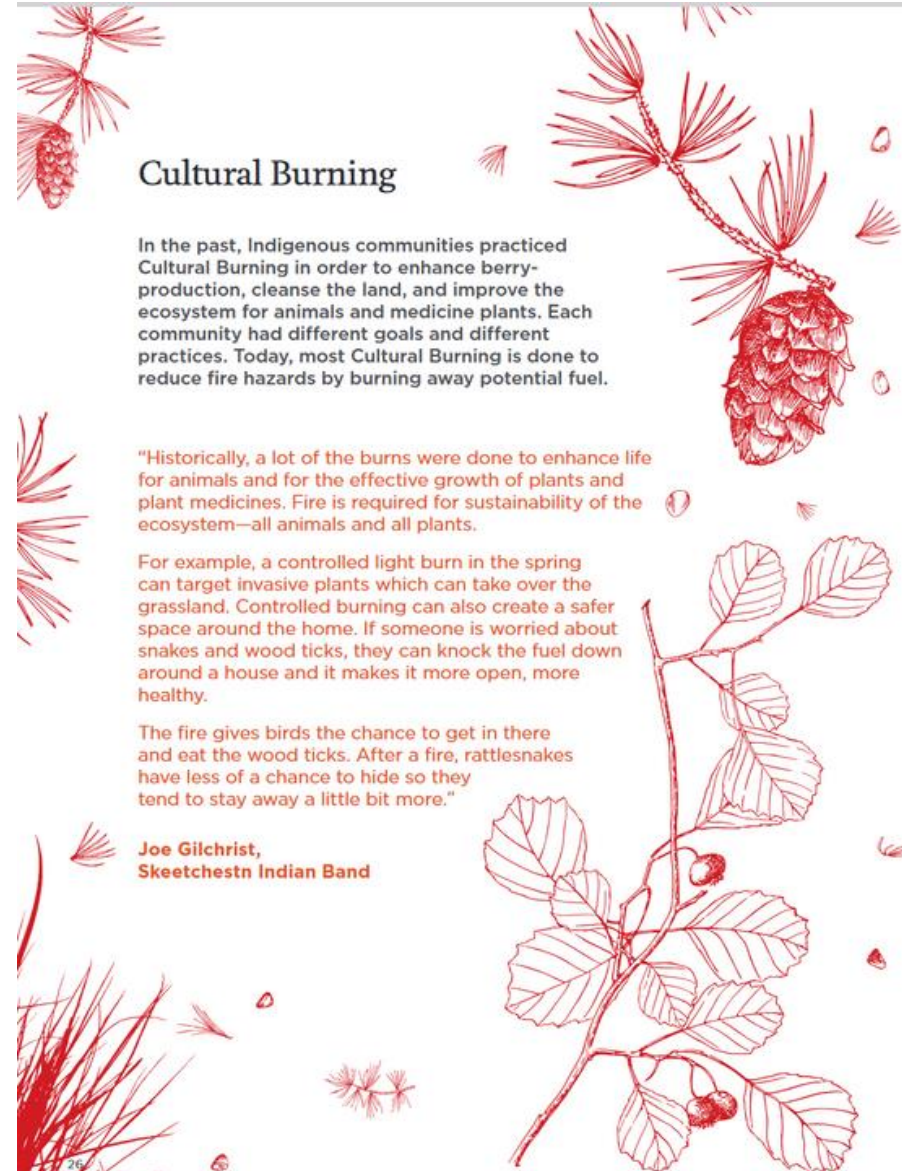
## The Story of the Great Tsunami

"On January 26, 1700 at about 9 pm, a powerful magnitude 9 earthquake struck off the coast of BC, and without warning was followed by a catastrophic tsunami that devastated the village of Loht'a. With no time to respond, all 5,000 residents of Loht'a were lost to this devastating event.

Today, our people call Anacla (Pachena Bay) home and this oral history plays a central role in how we understand tsunami risks in our community. We are able to use our history to learn from the past and prepare for future tsunamis."

**Robb Johnson,**  
Huu-ay-aht First Nation

This is the story of the Great Tsunami that was told to me by my grandparents, George and Louisa Johnson. For generations, Elders in our community as well as other First Nations along the coast have maintained this legend, and others like it, as an oral history of our people.



## Cultural Burning

In the past, Indigenous communities practiced Cultural Burning in order to enhance berry-production, cleanse the land, and improve the ecosystem for animals and medicine plants. Each community had different goals and different practices. Today, most Cultural Burning is done to reduce fire hazards by burning away potential fuel.

"Historically, a lot of the burns were done to enhance life for animals and for the effective growth of plants and plant medicines. Fire is required for sustainability of the ecosystem—all animals and all plants.

For example, a controlled light burn in the spring can target invasive plants which can take over the grassland. Controlled burning can also create a safer space around the home. If someone is worried about snakes and wood ticks, they can knock the fuel down around a house and it makes it more open, more healthy.

The fire gives birds the chance to get in there and eat the wood ticks. After a fire, rattlesnakes have less of a chance to hide so they tend to stay away a little bit more."

**Joe Gilchrist,**  
Skeetchestn Indian Band



Wil Ksi Baxhl Muhl - Where Fire Came

# Documentarie






# S



Tsunami 11th Relative: Trailer

 Ocean Networks Canada  
5.72K subscribers

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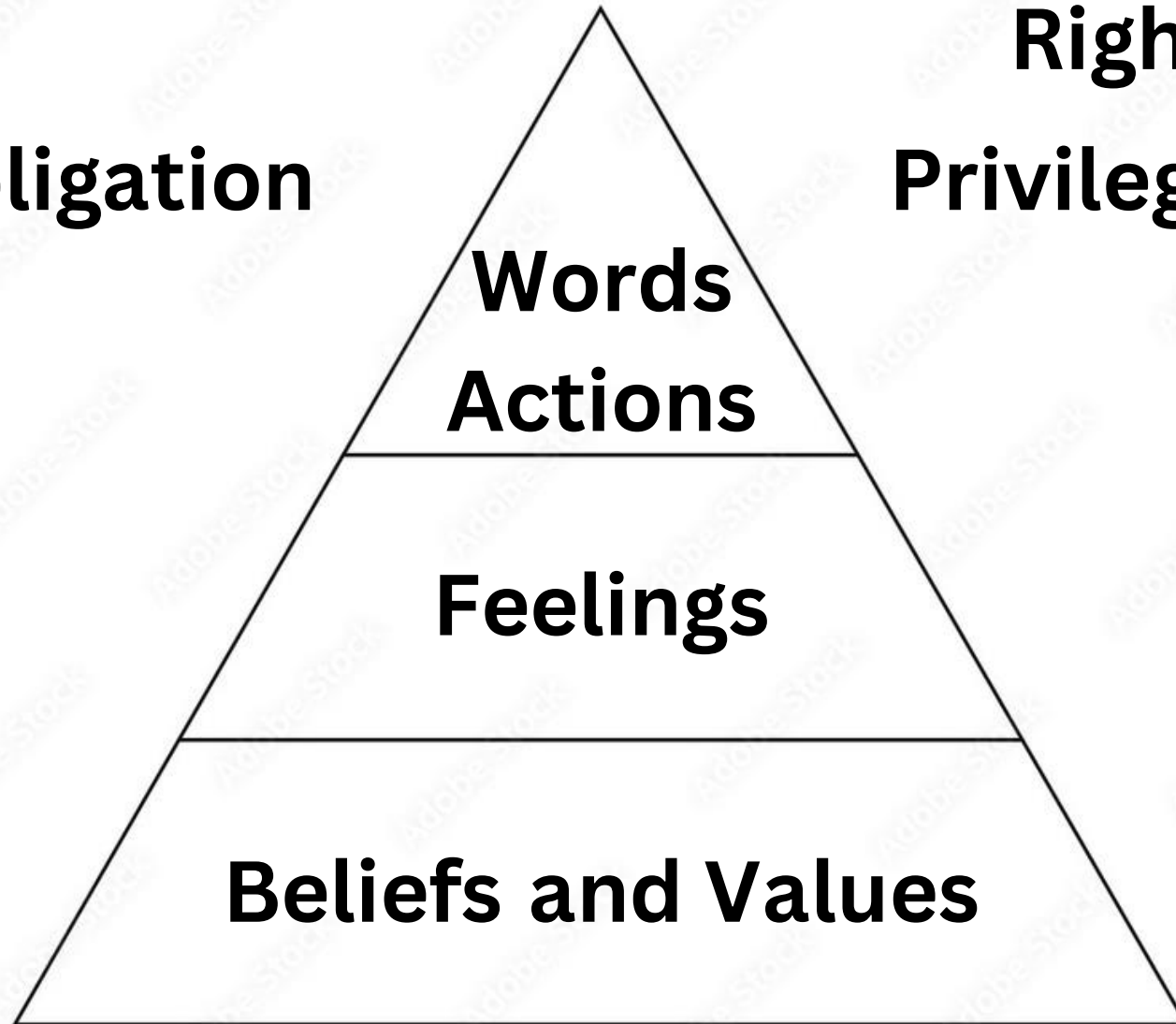
**Responsibility**

**Hereditary**

**Obligation**

**Rights**

**Privileges**



**Words**

**Actions**

**Feelings**

**Beliefs and Values**

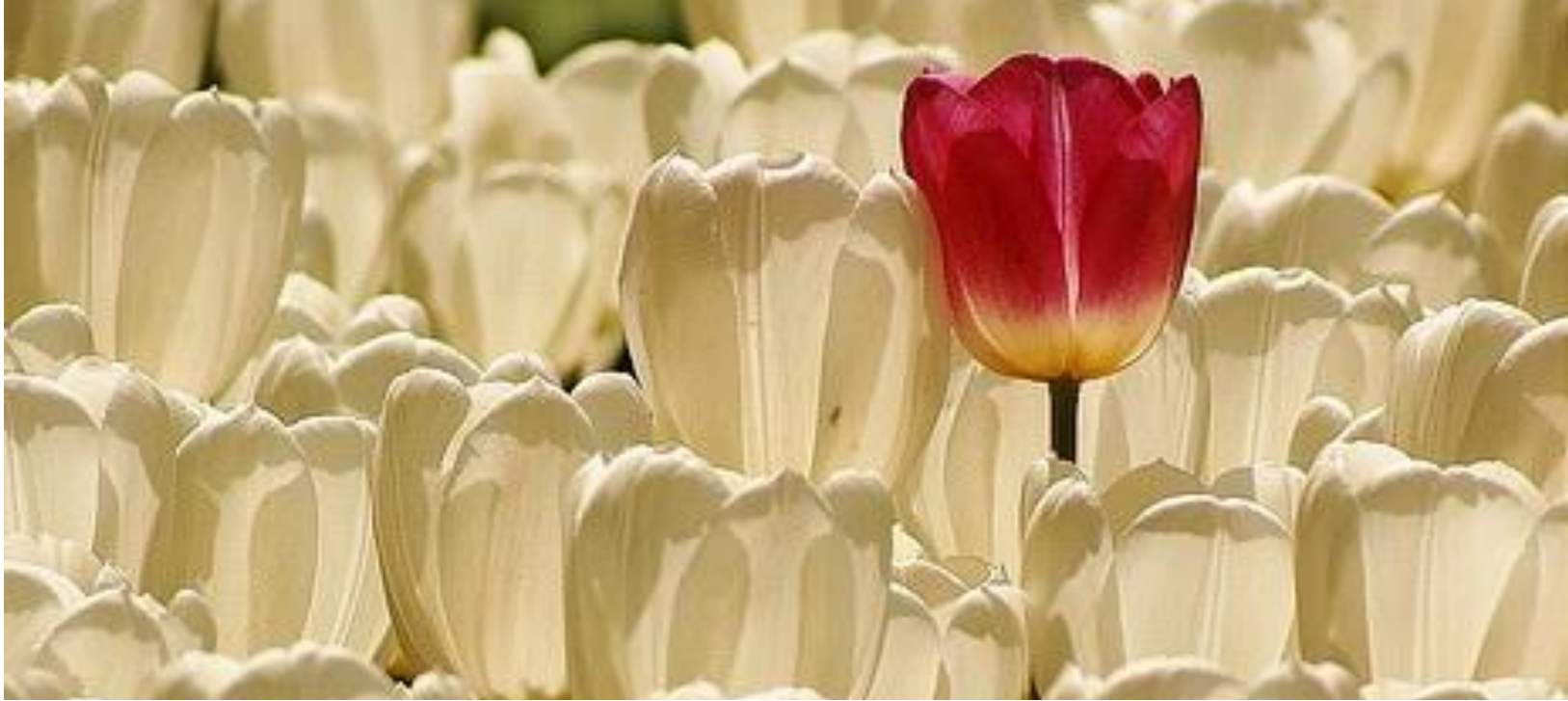
**Worldview**





# Student Capstone Presentations

**“Who am I? What influences and informs me?”**



**I value personal and cultural narratives.  
I understand how personal and cultural  
narratives shape my identity.  
I can interact with the natural world in a  
respectful and caring way.  
I can contribute positively to my family,  
community, and environment.**

Be a good Ancestor with yourself

Children become adults  
Adults become leaders  
Leaders become Elders  
Elders become Ancestors



# Year Three...

**How are we  
connected?**



**What might meaningful reconciliation look  
like?**

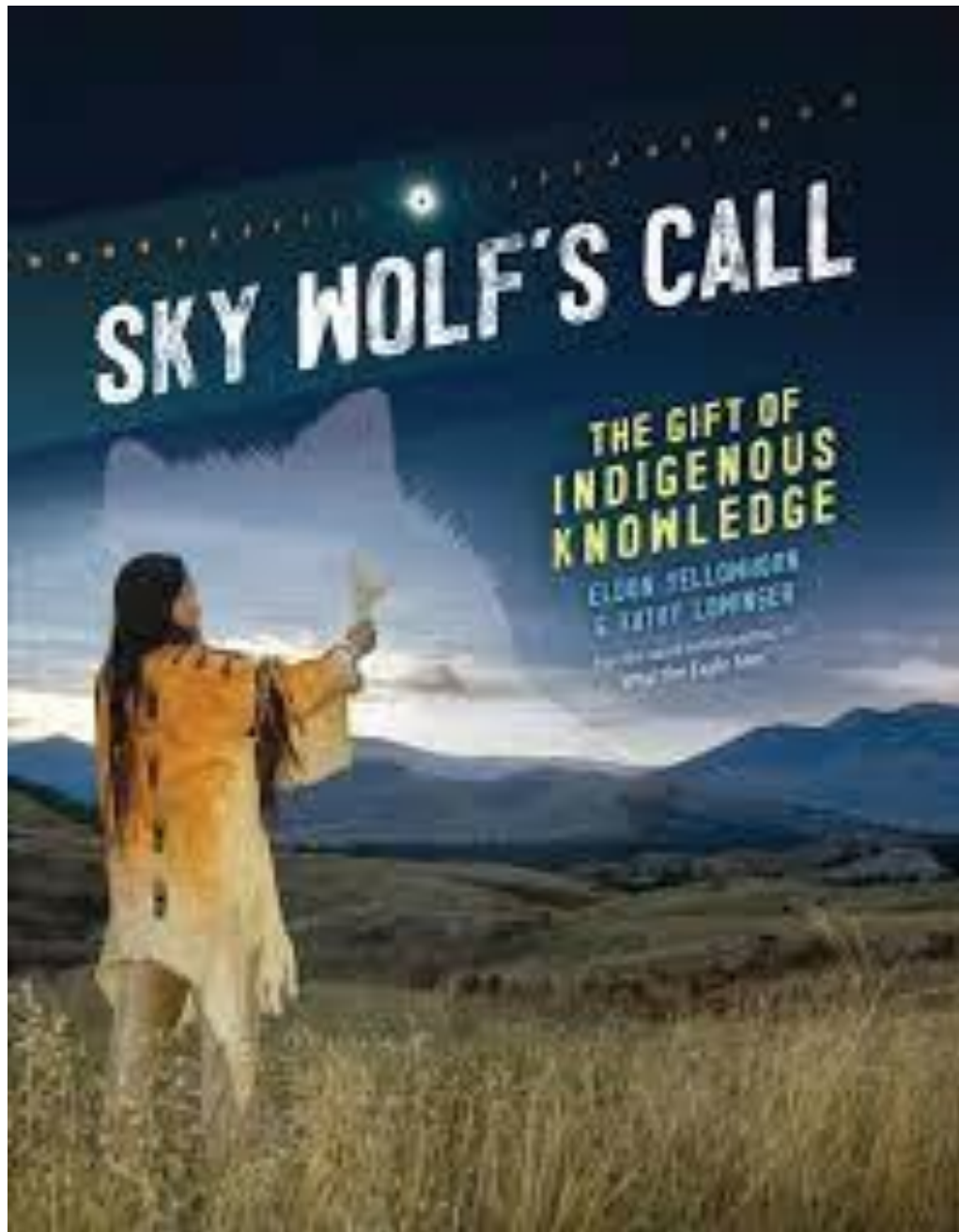




# Heredity & Inheritance

The Planet's Heirs: "...The open-ended power of cultural heredity, transferring knowledge across generations, gave humans the power to rework the land into its own ecological inheritance, which has now led to a climatic inheritance." (page 565)

"Global warming is a problem of cultural inheritance. To fix it, we need a social form of CRISPR - a means to alter the practices and the values that make their way from one generation to the next." (Page 570)



**How do knowledge systems get passed down over generations?**



# THE KLABONA KEEPERS FILM

*The Klabona Keepers* is a love letter to the land and a testament to the resilience of the Tahltan people. Overcoming forced displacement and residential school trauma, the Klabona Keepers show what is possible when a small but dedicated group takes a stand.



**Missiyh  
Thank you**

