Gikinoo’wizhiwe Onji Waaban (Guiding for Tomorrow) or “G-WOW”
Changing Climate, Changing Culture Initiative

Integrating Place-Based and Scientific Evidence for Climate Change Literacy & Action

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NOAA Climate Steward
Located in the heart of the Lake Superior Region. This area includes 11 Ojibwe Tribal Nations living within the “Ceded Territory” of MN, WI and MI.

Based at the Northern Great Lakes Visitor Center
Ashland, WI
TARGET AUDIENCES

Learners (middle school students to adult audiences)

Teachers, Informal Educators, Community Leaders

General Public
G-WOW Roots

- Increasing evidence that climate change is affecting the sustainability of Lake Superior coastal resources, communities, and culture, including public safety.

- Concern about how climate change impacts Ojibwe treaty rights and traditional cultural practices within the Ceded Territory.

2016 NW Wisconsin Flood

Duluth flooding 2014, 2015

Loss of wild rice, Kakagon Sloughs
“Traditional” climate literacy models based on “tech transfer” of scientific information were not resonating with audiences.
Our Goal through G-WOW

Make the issue of climate change “come alive” to audiences by engaging them in investigating how climate change affects what they value in their culture, economy, and community.

Provoke action to address climate change through mitigation and/or adaptation.
Freeman Tilden originally developed these principles to communicate the nature, origin, and appreciation for cultural and historic sites, particularly in National Parks.
Interpretation is an effective communication tool that incorporates these elements:

1. **Relates** to a person’s experience—sparks their interest.

2. Is the **revelation** of information, not “tech transfer”

3. Presents a “**whole**” story—not just the parts (the BIG “SO-WHAT”)
4. Chief goal is not to instruct, but to provoke

5. Is an art that combines many arts & is teachable

Freeman Tilden’s Principles of Interpretation, 1957
Research Basis for the G-WOW Model

“...local, place-based evidence of climate change gained through experiential learning is as, or more effective than, simply studying analytical climate change data to increasing climate change literacy.”

“The Psychology of Climate Change Communication”, Columbia University
How does the G-WOW Model make climate change “come alive” to audiences?

By revealing how climate change is affecting the sustainability of species and habitats that support cultural practices people value based on place-based evidence they can observe integrated with climate science.
Benefits of the G-WOW Approach

Creates a culturally relevant climate change perspective

Links place-based evidence with scientific climate change research through the sustainability of species and the habitats that support cultural practices

Makes the model transferrable across different cultures
G-WOW Key Principles

CLIMATE CHANGE IS REAL

97% Consensus

NASA
Ojibwe cultural practice of harvesting birch bark.

Paper birch is a boreal species that relies on a cool climate.
WEATHER AND CLIMATE ARE DIFFERENT

GLOBAL WARMING IS A HOAX

BECAUSE IT IS COLD TODAY. WHERE I LIVE.
HUMANS CONTRIBUTE TO CLIMATE CHANGE

Source: EPA
Therefore, WE CAN MAKE A DIFFERENCE

Tackling climate change is one of America's greatest economic opportunities of the 21st century (and it's simply the right thing to do).

What made America great was taking a stand. Doing the things that are hard. And seizing opportunities. The very foundation of our country is based on fighting for our freedoms and ensuring the health and prosperity of our state, our community, and our families. Today those things are threatened by climate change. Most scientists agree it is being caused by air pollution. We cannot risk our future on the false hope that the vast majority of scientists are wrong. But just as America rose to the great challenges of the past and came out stronger than ever, we have to confront this challenge, and we have to win.

And in doing this right, by saving money when we use less electricity, by driving a more efficient car, by choosing clean energy, by inventing new technologies that other countries buy, and creating jobs here at home, we will maintain our way of life and remain a true superpower in a competitive world. In order to make this happen, however, there must be a coordinated effort to combat climate change— with America taking the lead here at home. Leading is what we've always done. And by working together, regardless of politics, we'll do it again.

www.climatedeclaration.us
Place-based Evidence = Evidence we can observe

Unprecedented cancellation/disruption of tribal wild rice harvests for the Lake Superior Ojibwe

Ice cover on Lake Superior at Bayfield, Wisconsin has decreased approximately 3 days/decade or 45 days over the past 150 years.

Phenological Evidence in Wisconsin during the past 60 Years...

<table>
<thead>
<tr>
<th>Bird migration</th>
<th>Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geese Arrival</td>
<td>Baptista (Wild Indigo) first bloom</td>
</tr>
<tr>
<td>29 days earlier</td>
<td>18 days earlier</td>
</tr>
<tr>
<td>Cardinal</td>
<td>Butterfly weed first bloom</td>
</tr>
<tr>
<td>first song</td>
<td>18 days earlier</td>
</tr>
<tr>
<td>22 days earlier</td>
<td>Marsh milkweed first bloom</td>
</tr>
<tr>
<td>Robin arrival</td>
<td>13 days earlier</td>
</tr>
<tr>
<td>9 days earlier</td>
<td></td>
</tr>
</tbody>
</table>

From 1950-2014, on average spring has occurred 12 days sooner than expected--fall has started 12 days later.

Growing season lengthened by 5-20 days across the state, with greatest change in NW Wisconsin.
The Lake Superior Ojibwe have relied on the sustainability of plant and animal species for generations to support subsistence, cultural, and spiritual practices or “lifeways.”

Traditional or “tribal” ecological knowledge (TEK) of natural systems provides long term place-based indicators of change that can reduce the influence of weather variability when evaluating place-based evidence.
How is Wisconsin’s **CLIMATE CHANGING?**

**Scientific evidence** = Evidence from measurements & models

- **From 1950-2006**
  - \(+1^\circ F\) over all temperature increase
  - \(+2 - 2.5^\circ F\) increase in NW Wisconsin

**HISTORIC EVIDENCE**

*Image of temperature graph*
CLIMATE PROJECTIONS based on computer modelling

Source: IPCC AR4
WHAT’S IN THE FUTURE?
CLIMATE PROJECTIONS (1980-2055)

Based on A1B “middle of the road” scenario

OVERALL WARMING
Change in Average Annual Temps +4-9°F

WARMER WINTERS
Decrease in Frequency of Cold Nights- esp. Northern Wisconsin

MORE EXTREME WEATHER
Up to 4.5 inch annual mean increase in precip

25% increase in the frequency of 2-inch or greater rainfall events
WHERE’S MY CLIMATE? - Sandstone, MN (2046-2065)

Blue line = B1 scenario (low emissions). Red line = A2 scenario (high emissions)

http://www.wicci.wisc.edu/climate-map.php
CLIMATE WINNERS & LOSERS

Climate change will affect the habitat conditions that species depend on to thrive and survive.

We depend on the sustainability of these species for supporting our cultures and economies.
Cultural Practice: What cultural practice is important to you?

Key Species: What species is needed to support this practice?

Place-based & Scientific Evidence: What changes are you seeing in the key species or in the habitat it requires? What changes does science project will occur in environmental variables critical to supporting these habitat conditions?

What habitat conditions are required for species sustainability or are required for this practice?

The G-WOW model links culture & science through the sustainability of species and habitat conditions.
Wild rice harvesting is important to the Lake Superior Ojibwe Indians for subsistence, spiritual, and ceremonial purposes.

Wild rice harvesting depends on the sustainability of manoomin (wild rice).

The sustainability of manoomin depends on habitats with:

- shallow water
- moderate water level fluctuations
- cool growing season temperatures
Do culture and science agree that climate change is affecting the sustainability of manoomin?

PLACE-BASED EVIDENCE
Historic cancellations/disruptions in wild rice harvests (2007-2012, 2016 flood damage) based on TEK

SCIENCE-BASED EVIDENCE:
Projected change in climate variables affecting habitat conditions for wild rice survival

Annual average temperatures in °F,

Frequency of 90-degree days

Change in frequency of 2”+ precip

Projected changes in climate variables 1980-2055 (A1B scenario)
Cultural Practice

Requires shallow water, moderate water level changes, cool growing season

Key Species

Place-based & Scientific Evidence

Flooded Rice Beds

Projected Frequency of 2"+ Rain Events, 1980-2055

What does this mean for sustainability of manoomin?
What does this mean for cultural practices that rely on manoomin?
What does this mean for sustainability of sugar maple, the future of businesses the rely on sugar maple?
Climate models predict up to 95% of brook trout habitat across Wisconsin could be lost if the average annual summer air temperature increased just over 5 °F.
Cultural Practice

Requires cool water. Warmer water also favors invasives that compete with Yellow Perch

Key Species

Place-based & Scientific Evidence

Friday Night Perch fish fry

Using the G-WOW model to engage South Milwaukee high school students

Credit: GLERL. 10/2014
Cultural Practice

Invasive Burmese python: requires very warm, moist "tropical" habitats

Key Species

Place-based & Scientific Evidence

What does a changing climate mean for the sustainability of this invasive species? How could this affect recreation, nature-based tourism economies?
Applying the G-WOW model to a “non-species” dependent cultural practice

Projecting change in Wisconsin’s winter average temperatures in °F, 1980-2055

What do these changes mean for species, businesses, and cultural practices that depend on cold and snow?
"38 days of frozen ground lost since 1949. That's only 60 years and we've lost ... five weeks, almost six weeks. What does that mean for forest operations?"

Eau Claire, WI Logger  From: “Shorter winters chip away at northern logging season”, The Daily Climate, 2013
“Northern Wisconsin agriculture, for example, is likely to benefit from climate change further into the future, due to its more northern location.” - NOAA/ U of Iowa
The G-WOW model builds awareness... (the set up)

✓ Do culture and science agree... is climate change affecting the sustainability of the key species that supports a cultural practice you value?

✓ What is the future for this cultural practice based on place-based climate change projections?

✓ What do these changes mean for the environment, community, economy?

✓ What can we do to mitigate or adapt to climate change impacts?

goal is to provoke learners to ACT (the spike)
The BIG "SO WHAT"... WHAT CAN WE DO?

The G-WOW model provides ideas and templates for creating a climate service project and a blog where projects and results can be shared.
Mitigation

Reducing, stabilizing, or eliminating CO2 emissions from primarily human caused sources

What can we do to reduce greenhouse gases?

Reduce Our Carbon Footprint

Enhancing “sinks” that accumulate/store CO2
Adaptation

Recognize that climate change is occurring and make adjustments to reduce vulnerability & harmful impacts

What could we do to adapt to climate change?

Increase resiliency, habitat conservation and restoration, establish “refuge” areas for vulnerable species, manage for species that will be tolerant of climate change
Even if we manage to stop the rise in greenhouse gas emissions, global temperatures will continue to rise.

<table>
<thead>
<tr>
<th>Greenhouse Gas</th>
<th>% of warming</th>
<th>Atmospheric Lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide CO₂</td>
<td>60%</td>
<td>5-200 Years</td>
</tr>
<tr>
<td>Methane CH₄</td>
<td>20%</td>
<td>8-12 Years</td>
</tr>
<tr>
<td>Nitrous Oxide N₂O</td>
<td>6%</td>
<td>120 Years</td>
</tr>
</tbody>
</table>

We need to do both adaptation AND mitigation!
G-WOW Outreach Tools

Web Curriculum
www.g-wow.org

Climate Change Discovery Center

Professional Development Institutes

Experiential learning

Ojibwe language, TEK, and cultural elements infused

Multi-cultural perspectives

All apply interpretive principles
G-WOW Changing Climate, Changing Culture Discovery Center
Northern Great Lakes Visitor Center, Ashland WI

Major teaching exhibit and interactive kiosk located at the Northern Great Lakes Visitor Center, Ashland, WI

Guided programs & “Coastal Climate Camps” are available

100,000 visitors, students, community members annually
"When I saw that we would be teaching about climate change..., I thought Ugghhh!!! Now I see that the cultural impact of climate change is how to approach middle school kids with this topic."

- Tara Fiera, Marathon Venture Academy, G-WOW Institute Alumni
G-WOW Curriculum
www.g-wow.org
On-line climate change service learning curriculum
Represents application of the 4-season G-WOW model

**Talking Circle**
Sharing service learning projects via an interactive blog

**Ojibwe Lifeways**
Place-based evidence of climate impacts on the sustainability of key species supporting a seasonal Ojibwe cultural practice

**What Can We Do?**
Taking action through climate service learning projects

**Investigate the Science**
Climate science from federal, state, and tribal sources
Each Ojibwe Lifeway unit includes:

Intro to the cultural practice and the species supporting it

Coming in 2017: A new curriculum unit on water & climate

Learning objectives

Baseline ecological information explaining habitat conditions needed for sustainability of the key species(s), possible climate stressors & impacts

Cultural connection: Cultural importance of the key species to maintaining an Ojibwe lifeway

Menu of place-based resources to evaluate impacts on the key species.

➤ Students investigate place-based climate observations within their culture/community

➤ Activity Guides focus investigations
Investigate the Science

Customized for each Ojibwe Lifeway unit.

A toolbox to investigate and evaluate scientific climate change research via interactive maps. *Coming Soon: Animated NASA climate maps for Ojibwe Ceded Territory of Minnesota, Wisconsin, and Michigan*

Research climate trends and projections & evaluate impacts on the sustainability of key species.

➢ “Test It”: students test their own climate change hypothesis through self-designed investigations.

➢ Activity Guides focus student investigations.
What Can We Do?

• Act on knowledge gained by developing a service learning project to address climate change impacts.

• Provides service learning project templates and ideas.

• Tools for customizing service learning projects to meet learner’s interests and learning style.

Provides ready-made project templates such as Project Budburst, climate phenology wheels, climate collages provide fun, service learning options.
TALKING CIRCLE

• Post & share results of service learning projects
  See projects from other participants.

• Projects are searchable by location and type

• Variety of project uploads possible: pdfs, images, YouTube & web links

• After posting use simple tool to evaluate project impacts
Other On-line G-WOW Resources

**About**
- Project background
- Partner acknowledgements

**Educator Resources**
- G-WOW Curriculum Guide
- Lesson Plans, Resources, News, Training Vignettes

**Climate Change**
- Climate 101 literacy basics

**Games**
- Interactive climate games

**Contact**
- For more information

**Take a Test**
Does G-WOW as an interpretive model for climate education work?

Based on survey of educators who attended the 2015 G-WOW Institute and trained in using the G-WOW model

• Agree to strongly agree in increase in personal climate literacy and skills for teaching about climate change

• Agree to strongly agree in being more confident in teaching about climate change using the model

• Agreement See the model as transferable to their student populations despite location

• All respondents use the G-WOW model in some form

Source: Patty Carpenter, 2016 UMD Master Degree Thesis: “G-WOW Changing Climate, Changing Culture Professional Development’s Influence on Classroom Teachers”
Create A G-WOW model

Cultural Practice
What cultural practice do you enjoy?

Key Species
What species is needed to support this practice?

Place-based & Scientific Evidence
What changes are you seeing in the key species or in the habitats it needs?

What changes in environmental variables critical to supporting these habitat conditions are projected by climate science? Variables may include: temperature, precipitation, drought, intense rain/storms, humidity, etc.

Do culture and science agree? Is climate change affecting this cultural practice?

What implications does this have for you, your community or economy?
What can you do to fight climate change—with change?
We invite you to use the G-WOW model to increase climate change literacy based on the unique lifeways of your culture.

www.g-wow.org

The Ojibwe believe that we must think seven generations ahead when making decisions today. All cultures share responsibility for protecting their home, the Earth. We cannot eliminate all the risks that climate change presents, but we can make a difference in slowing its impacts. The culture and lifeways of future generations will be affected by the choices we make.
Miigwech !
(Thank you)

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