



Ohneganos: Water is Life

Spring 2021 Newsletter #4

S21 – A message from Ohneganos lead, *Dawn Martin-Hill*

The two main projects supporting this work, collectively rebranded as 'Ohneganos Ohnegahde:gyo', have been designed by and for the Six Nations of the Grand River community. Through extensive and ongoing consultation with our long list of partners, the community has directed the research program every step of the way. This means that our academic researchers worked with community stakeholders to co-create research questions, methodologies, and implementation strategies. We created a common vision to identify the water and environmental 'problems' and have been researching sustainable solutions together. This, along with our Guiding Principles grounded in Haudenosaunee philosophy, has been fundamental to our success as a research program.

While we've had our share of challenges in external events - the latest being COVID-19 - we've adapted and moved forward together to achieve our stated goals; slowed but not stopped, thanks to the dedication of all involved. Please enjoy the latest version of our project newsletter and nia:wen for supporting Ohneganos - Water is Life.

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Ohneganos: Let's Talk Water

Ohneganos youth lead continues YouTube series to inspire young water advocates

After a successful first three seasons, the Indigenous-led video series “**Ohneganos: Let's Talk Water**” is excited to be continuing with **Season 4**. Keep an eye out for more information on Season 4 premiering on **June 10th 2021!**

About Ohneganos Let's Talk Water & Season 4:

This interactive series features discussions regarding climate change and water security with Indigenous youth leaders from around the globe, along with scientists, community members, artists and knowledge holders from within and outside of Six Nations of the Grand River. Hosted by McMaster University student Makasa Looking Horse, Season 4 will focus on creative and innovative projects being done by students and Indigenous youth, as well as will feature Ohneganos project highlights and research activities. Once Season 4 begins on June 10, the episodes will be streamed weekly on [Facebook Live](#).



About Ohneganos: Ohneganos is a McMaster University and Six Nations Global Water Futures research project with a focus on Indigenous knowledge, training and capacity building, governance, water quality and monitoring.

About the host: Makasa Looking Horse is a McMaster University Honours Indigenous Studies student, Ohneganos youth leader, speaker and advocate for water protection. She is Mohawk from Six Nations and Lakota, Cheyenne River Reservation, SD.



Visit our [YouTube Channel](#) or [Facebook Page](#) to view our past episodes!

Get Involved!

Do you live in Six Nations of the Grand River and want to participate in our research? See below for more information. Also, you can stay in the loop by joining our Facebook Group – [Six Nations Water Caretakers](#).



Water Testing

Our researchers are investigating the presence of heavy metal contamination in drinking water. We just need a small water sample (500mL) and we perform the analysis.

Refer to page 22 for more information.



Health Survey

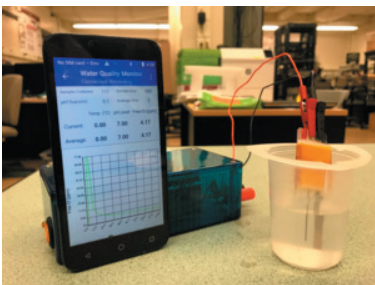
In partnership with Six Nations Health Services, our team is working on a health survey to look at the connections between holistic health, the environment, and water.

Refer to page 24 for more information.



Well Sensors

Our team is developing low-cost sensors that can monitor the water quality in creeks and in water wells. We are looking for a few community volunteers to partner with.



Chlorine Sensors

Concerned about the levels of chlorine in your tap water (high or low)? Our scientists are designing low-cost sensors that can be built right at home and attach to your tap.

To participate in these research activities, please visit our website at <https://www.ohneganos.com/participate>

Events and Activities

Summer 2020 – Art Contest

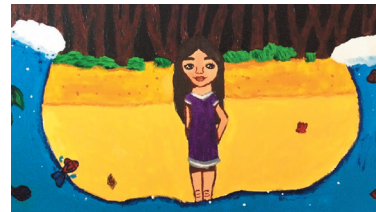
10-13 Age Group



1st prize: **Unity in Flow** by Adriana Johnson



2nd: **Evening Sunset**
by Kianna Powless

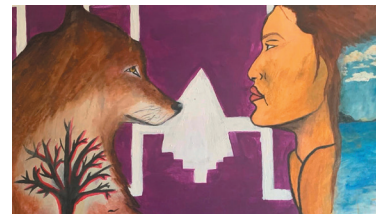


3rd: **Goddess of the Ocean**
by Peyton Squire

14-19 Age Group



1st prize: **What Water Gives Us** by Jaden Squire



2nd: **Sustenance**
by Ricky Michelle Miller



3rd: **Ohneganos - Ohne:ganohs**
by Emmalea Thomas

To see all amazing art submissions, please visit our website at <https://www.ohneganos.com/youth-art-exhibit>

Spring 2020 – COVID Water Stories Competition

Thanks to all who shared stories related to water during the time of COVID!

- The grand prize was awarded to Abri John for his digital story called “Aubri’s Water Story”, along with the opportunity to create another for Ohneganos!
- 2nd place was awarded to Stephen Demchak for his piece, “Wendiyo versus the Pipeline”
- 3rd place was awarded to Aleena Skye for her “Two Row Paddle Experience”
- 4th place is awarded to Norma Jacobs for her story which we are calling “Respect, Reciprocity, and Gratitude for the Water”

Visit our [Facebook page](#) and [#SNwatercovidimpact](#) to see stories.



Guiding Principles

As Rotinonshonni or Haudenosaunee (People of the Longhouse), our perspective on the river and the relationships of respect and responsibility that should exist among all parts of creation are contained in the words of our **Oheniton Karihwaterkwén** (Thanksgiving Address). This teaching instructs us to believe in the interrelatedness and interdependency of all parts of the natural world. We believe that in order to gain a true understanding of any aspect of the natural world, respect must be shown for the entire web of relationships that exist and form our natural environment.

The environmental philosophy as instructed by the Oheniton Karihwaterkwén and the political philosophy as governed by the **Kahswenhtha** (Two Row Wampum) would establish a relationship based upon peace, power and righteousness and would restore harmony, strength and balance to our natural world...

Mary Arquette, Maxine Cole, and the Akwesasne Task Force on the Environment
Restoring Our Relationships for the Future in Blaser, Feit, and McRae (2004)

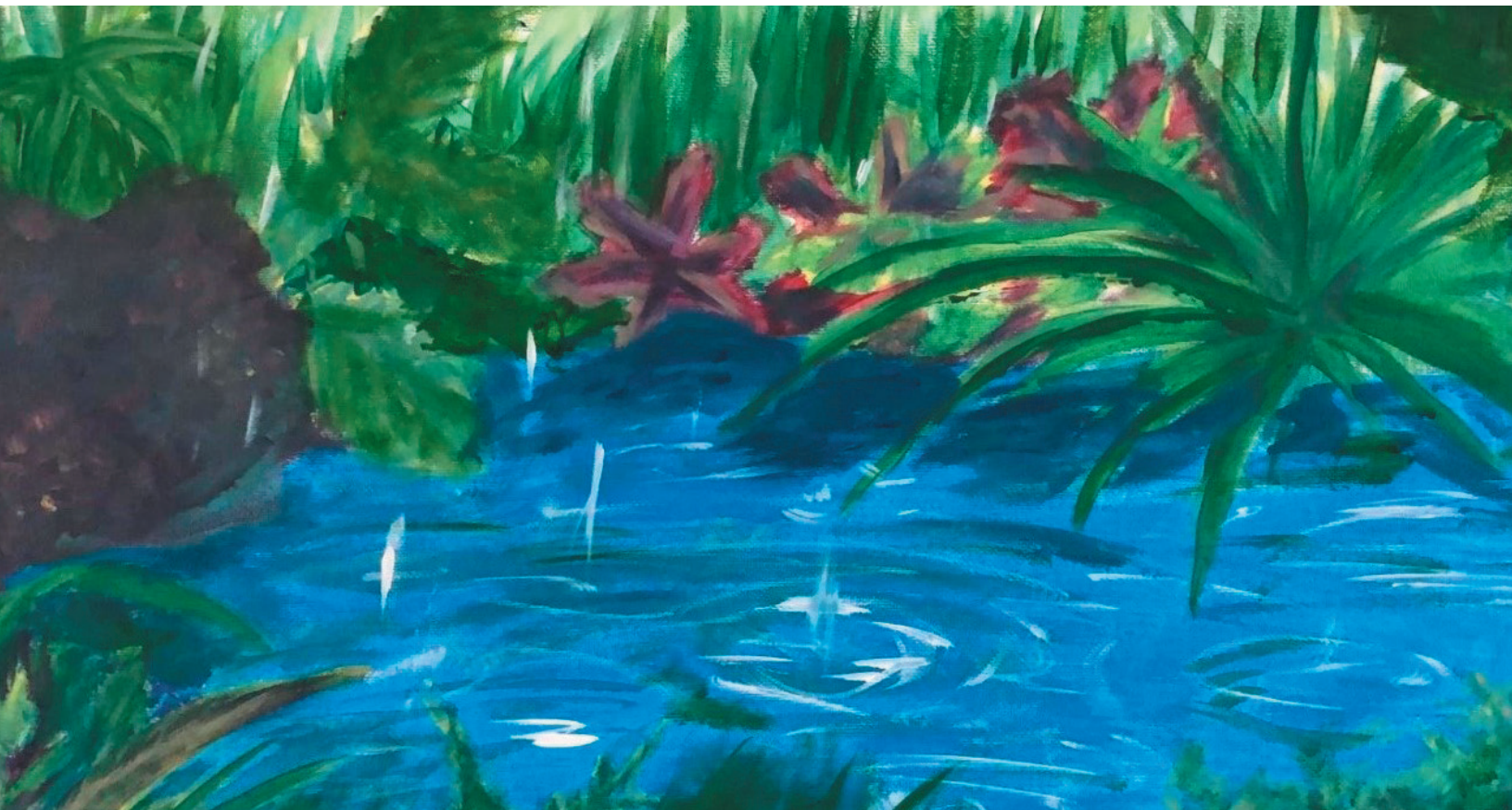
Ohenton Kariwatehkwen

Thanksgiving Address

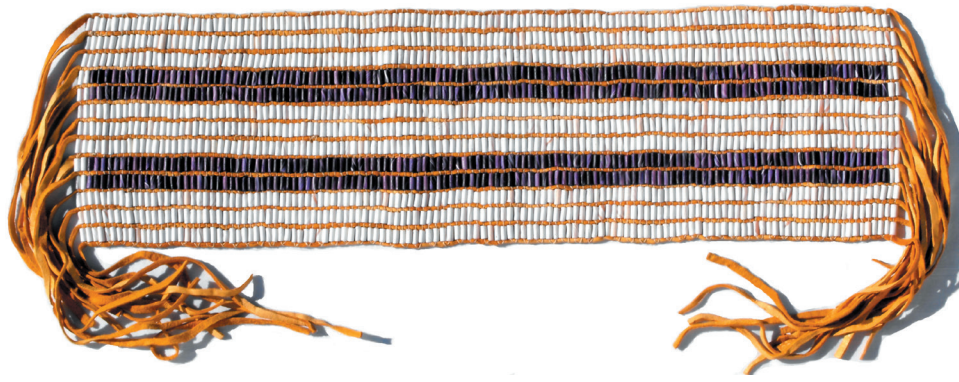
Within the Creation Story, Original Instructions were given to the people of this land. They include the Ohenton Kariwatehkwen: "the words before all else." We also call this the Thanksgiving Address and recite our thanks to all of Creation to "open the day" (in other words, to welcome, greet and thank the beginning of the day). The Ohenton Kariwatehkwen is recited before any issues are talked about when a gathering of the people takes place or to quote a Mohawk expression, "to open the door" (a comparable expression might be "to open the meeting") and serves as a reminder to the people that everything on this land was provided for human existence and in return, we are to be thankful. Indeed, it is a solemn responsibility. The consequence of forgetting the human responsibility to give thanks to Creation, to water, is that one day, if a particular part of Creation is not addressed, and we fail to give thanks, we are told this part of Creation will disappear.

Joyce Tekahnawiaqs King (2007)

The Value of Water and the Meaning of Water Law for the Native Americans Known as the Haudenosaunee



Raindrops Hitting the Puddle - Six Nations Summer 2020 Art Competition



[\(Wampum Chronicles, 2005\)](#)

Kaswentha: Two Row Wampum

The Kaswentha (pronounced Gus-we'n-ta) is a treaty belt created in the 17th century to record an agreement between the Haudenosaunee Confederacy and Dutch settlers in eastern New York. Also known as the Two-Row Wampum, the belt consists of alternating rows of purple and white wampum running the length of the belt. The two purple rows symbolize two vessels traveling the river of life together, side-by-side. One vessel, a ship, is for the Dutch. The other vessel, a birch bark canoe, is for the Haudenosaunee. Inside each vessel is what defines it as a society – its customs, laws and way of life. The three white rows, which both separate and surround the vessels, symbolize the Haudenosaunee principles of skennen (peace), kariwio (good mind), and kasastensera (strength).

The Two-Row Wampum Treaty, which the Kaswentha documents, is a mutual recognition by the treaty signatories that their two societies are distinct and should remain so, as symbolized by the ship and the canoe. These vessels are meant to travel the river of life together, side-by-side, but with each people in their own vessel. Native and non-Native peoples are to help each other from time to time, as people are meant to do, and their respective knowledge systems, or sciences, are tools to be used in this partnership. The Two-Row Wampum Treaty therefore calls for cooperation to serve common interests even as it recognizes the vast differences between the two parties in the treaty, and their inherent right to sovereignty in their own affairs.

[James W. Random and Kreg T. Ettenger \(2001\)](#)

'Polishing the Kaswentha': a Haudenosaunee view of environmental cooperation

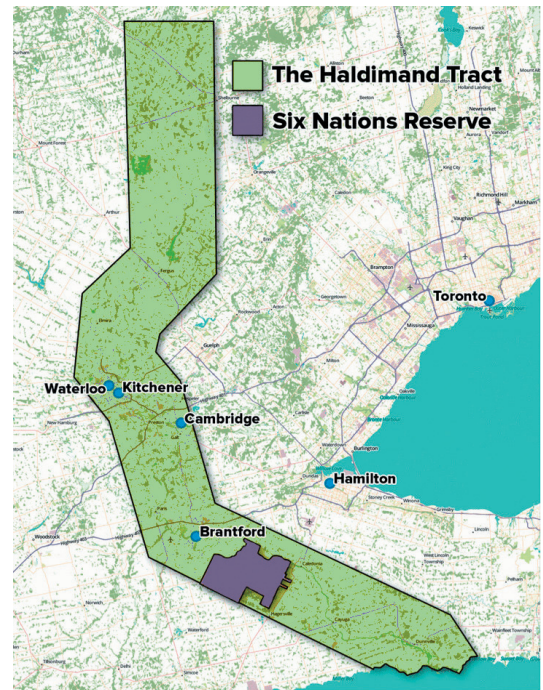
Community Partners

Six Nations of the Grand River

Six Nations of the Grand River is Canada's most densely populated First Nations community, located in the Golden Horseshoe region of Southern Ontario.

The land title granted to Six Nations on October 25 1784 was approximately 950,000 acres. However, today's current land boundary only spans about 46,500 acres (4.9% remaining) as of April 2001.

Six Nations of the Grand River refers to the six First Nations comprising the Haudenosaunee Confederacy: Cayuga, Oneida, Onondaga, Seneca, Mohawk, and Tuscarora. Haudenosaunee means 'people of the longhouse' and is synonymous with the terms Iroquois or Rotinonshonni.



Governance

Haudenosaunee Confederacy Council

- Traditional governance system for Six Nations people since time immemorial.
- Grand Council has 50 Hereditary chiefs and clan mothers

Six Nations Elected Council

- Elected Band Council is the political structure introduced by the Government of Canada through the Indian Act (1920s).
- Has an Elected Chief and Council members.



The Great Law of Peace

The Peacemaker introduced a law referred to in the Mohawk language as the Kaianerekowa (Ga-yawn-ne-lit-goe-wa) or the Great Law of Peace. This law reestablished a clan system headed by a matriarch or clan mother through matrilineal family ties.



Dish With One Spoon

One Dish/One Spoon principle represents a tenet of the Great Law of Peace and is a succinct expression of our ongoing responsibilities to conserve what sustains us

1. Offer thanks;
2. Don't take the first "catch" you encounter;
3. Take only what you need in life to sustain yourself and your family;
4. Leave some of the "catch" for the future, ensuring the future of seven generations for your family and the species' survival.

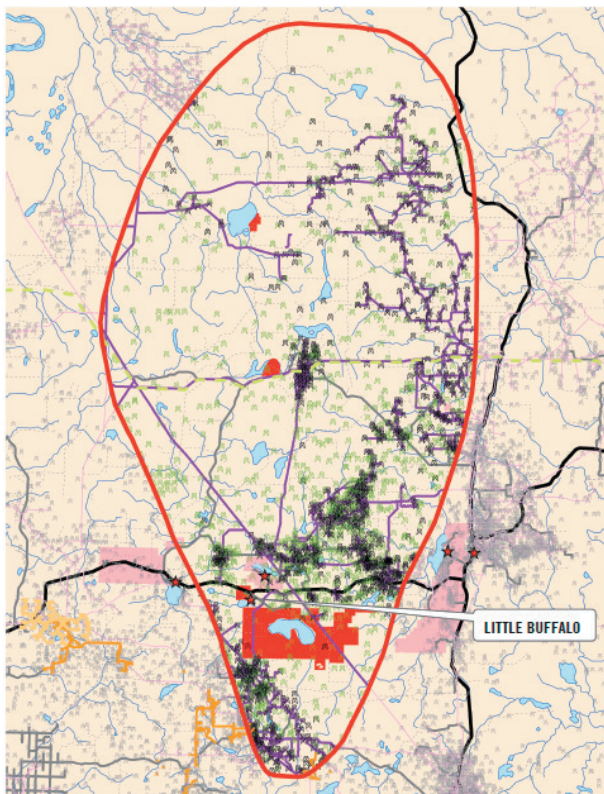
Lubicon Lake Cree Nation

Lubicon Lake Cree Nation is located in Alberta, by Lubicon Lake and Little Buffalo. Little Buffalo is the hamlet where the local school, nursing station and council offices are located.

Lubicon Lake Cree Nation is not a reserve. There was no legal recognition of Lubicon lands as Britain did not meet with Lubicon chiefs when they negotiated for Treaty 8 in 1899. On October 24th, 2018, Alberta, Canada and Lubicon Lake Band finalized a 'Treaty 8 Lands and Benefits Claim Settlement Agreement'. The settlement includes more than 346 square kilometers and \$113 million.



OIL AND GAS DEVELOPMENT ON LUBICON LAND



Governance



Lubicon Lake Nation

- Traditional governance system for Lubicon.
- Bernard Ominayak is Chief



Lubicon Lake Band

- Elected Band Council political body for Lubicon.
- Billy Joe Laboucan is the Chief

Present Day

People have always lived off of the land at Lubicon Lake Cree Nation. However, in 1975, the government of Alberta granted oil and gas exploration on traditional lands which has resulted in the destruction of the local economy, culture, health and ecosystem.

There is currently no running water and poor sanitation in Little Buffalo. Water is delivered by truck to community cisterns and carried by bucket into individual homes. Drinking water is bottled and large jugs are purchased from the nearby town of Peace River. The oil-sands, pipeline projects, and wells all pose as threats to the environment, with 70% of Lubicon traditional territory being leased for future exploitation. In April of 2011, a pipeline released 44 million litres of crude oil into a wetland 12 kilometers away from Lubicon territory.

A lack of access to water along with environmental degradation from the oil projects has adversely impacted the people of Lubicon. Skin rashes cause residents to suspect overly high chlorine levels in the water, cancer has been found in the moose hunted, and there are respiratory problems, cancers, stillbirths and tuberculosis.

Project Collaborators

Community leaders and professionals from our partner communities contribute to our project in addition to the amazing work they are already doing.

See below for some partner spotlights!

Six Nations Grandmothers Council

Our Global Water Futures research projects have the support of community grandmothers and clanmothers. Our Grandmothers Council is integral to the research as women are the keepers of water. An Indigenous water ethics states it is the responsibility of women to take care of water. Our research progresses with their wisdom and direction. Their time is valuable, so our team makes sure to always approach the Grandmothers Council with respect and gratitude.

Six Nations Water Committee

To ensure the Global Water Futures research projects have the ongoing support of the Haudenosaunee Confederacy Council, four Hereditary Chiefs have formed a Water Committee. The Water Committee helps direct the research through consultations and feedback, but they also are critical to the co-creation as they contribute their knowledge. Our relationship with the Chiefs is rooted in respect for their wisdom and leadership. With many duties from within community, the team is gracious for the support that has been provided by the Water Committee.

Six Nations Birthing Centre

Julie Wilson

Tsi Non:we lonnakeratstha/Ona:grahsta' is a Maternal and Child Centre located on Six Nations which has been in operation since 1995. Tsi Non:we lonnakeratstha/Ona:grahsta' provides a balance of traditional and Contemporary Midwifery services and programs. The expectant mother and her family are offered a choice of services and programs that will compliment and support their personal beliefs and customs. Ohnkewhon:we midwifery care is based on respect for all life and enables women to reclaim control of birth for themselves.

Cultural Practice As Foundation

We rely on our Grandparents Group, a group of culturally knowledgeable Six Nations Elders for spiritual/cultural direction and guidance. This helps ensure that our programs and services maintain a Haudenosaunee cultural foundation.

Six Nations Health Services

Lori Davis Hill

Six Nations Health Services is the community health system which provides culturally appropriate support and care for community members on their wellness journey. Health Services offers services for community members from birth to death. The goal of Health Services is to meet people where they are at and work together with community members with a good mind, respect and compassion.

Kawenní:io/Gawení:yo Private School

Jeremy Green

Kawenní:io/Gawení:yo Private School is a K-12 Mohawk and Cayuga language immersion school located at Six Nations of the Grand River Territory (www.kgpps.ca). To date, our partnership with Global Water Futures, has provided diverse learning experiences for our Grades 7-12 students including: a trip to the Smithsonian Institute's museums, archives and libraries to examine Haudenosaunee collections; a digital storytelling workshop, and participation in 'easing their minds' teachings – bringing in Haudenosaunee leaders to share teachings about water.

Indigenous Elders and Youth Council (IEYC)

James Knibb-Lamouche

IEYC is committed to the protection of Indigenous Knowledge, Traditional Medicines, and Cultures. We are a group of Elders, Youth, academics, advocates and community members from Indigenous Nations from across Turtle Island. Our previous partnerships and initiatives have included Indigenous Nations from North and South America, such as the Haudenosaunee, Nehiyawak, Lakota, Anishinaabek, Nakota, Ingano, Kofane, Dine, Waura, Trio and Siona, among others. We have also worked with many environmental, health, and research organizations and institutions such as McMaster University, Amazon Conservation Team, National Aboriginal Health Organization, and the University of Victoria.

Haudenosaunee Resource Centre

Jock Leroy Hill

The primary focus of the Haudenosaunee Resource Centre is to strengthen and preserve resources of the Haudenosaunee through language, ceremonies, oral teachings, recordings, fundamentals of protocols, ethics and morals so that our future generations may understand the importance of what our ancestors have passed along.

Six Nations Ogowanohgwatrae: Tseh Niyogwai:ho'de: Traditional Medicine Program

Cam Hill

The traditional medicine program addresses holistic health needs and improves community access to traditional Hodi:noshoni medicine through a variety of health services and supports. Some services offered include: traditional medicines, traditional practices, education, community outreach and workshops and training activities

Woodland Cultural Centre

Woodland cultural centre was established in October 1972 upon the closure of the Mohawk Institute Residential School. The centre serves to preserve and promote Indigenous history, art, language, and culture and creates the opportunity to bring the story of Haudenosaunee people of the Eastern Woodlands to life through exhibitions and programs.



GLOBAL WATER FUTURES

Project Updates

Research Funding

The two research projects that are highlighted in this book are funded by a Canadian research program called Global Water Futures (GWF). Led by the University of Saskatchewan, the goal of GWF is to “deliver risk management solutions - informed by leading-edge water science and supported by innovative decision-making tools - to manage water futures in Canada and other cold regions where global warming is changing landscapes, ecosystems, and the water environment”.

Our research projects follow this mandate by harmonizing Western Science and Indigenous Knowledge with the goal of better understanding the water problems that disproportionately impact Indigenous communities. This innovative research methodology will ensure that the Indigenous perspectives and governing wisdom of the community are integrated into the research and the solutions that are developed. This research is led by community, for community.



 Co-Creation of Indigenous Water Quality Tools

Community-Led Research During a Global Pandemic

Although COVID-19 has adversely impacted our projects this year, the team is working hard to restart research activities while maintaining the safety of the community. Due to the pandemic we have been adapting our methodologies and outputs accordingly.

Brief Summary of Impacts of COVID-19:

- Water collection and water quality testing from taps, wells, and cisterns was halted since both Six Nations of the Grand River and Lubicon Lake Cree Nation were both on lockdown.
 - Hydrologic modelling analysis was delayed due to closure of labs, limitations on computational resources and limitations on the interaction between team members. Labs have since reopened and research has restarted.
 - The long form health survey which was originally planned to launch in the spring was halted due to the reserve closure and the prioritization of community crisis over non-essential work.
 - Both the language committee meetings (for bilingual translations), as well as production of content from the Traditional Ecological Knowledge team, have been slowed due to the limited interactions with key community partners.
 - While Phase 1 of the virtual reality experience was completed, several aspects of the production, such as song-making and 360-degree filming of ceremonial dances in traditional clothing, had to be postponed. We are now restarting these efforts as well.
 - The Water Governance team has two publications underway; however, the Grandmother's Council and Water Committee meetings to develop policy had to be halted until Winter 2021.
 - Due to the travel restrictions, the research team has been unable to visit our Lubicon partners. We will schedule a trip as soon as we are able in order to resume research activities with Lubicon Lake Nation.
-

Examples of Project Adaptations:

- With the critical assistance of one of our research partners, Six Nations Health Services, we have been able to continue collecting water samples through their networks and community infrastructure. This has allowed water testing for metals to resume.
- The long form health survey is in the process of being moved into an online format, while interviews will likely be held over video conference. We've had to adapt our research methodology in order to accommodate for the switch to virtual platforms and the team is adding COVID-related questions to the focus group interviews in order to capture the impact of the pandemic on household water use. The survey should be ready by early 2021.
- The Mental Health team has also adapted their mental wellness application research methodology from in-person focus groups and workshops to online interviews and consultations.
- The team launched the 'Six Nations COVID Water Stories' contest on Facebook, where community members had the opportunity to submit teachings, stories, poems, or art about water for cash prizes. Examples include experiences and concerns about water along with anecdotes about how the pandemic has impacted their water situation.
- The Six Nations 'Water is Life' Art Contest launched through Facebook, engaging youth from grade 6-12 at Six Nations to create meaningful artwork about what water means to them. In collaboration with Six Nations Social Services, Ohneganos provided the youth with art supplies and gave the youth a chance to compete for cash prizes and the chance to be featured as the Ohneganos Facebook page cover photo.
- To maintain community engagement and have the ability to conduct some of our research online, youth lead Makasa Looking Horse launched a new vodcast series - Ohneganos: Let's Talk Water on our social media. This project has been well received and is a key highlight of our project team's adaptive response to the COVID-19 pandemic.

Co-Creation of Indigenous Water Quality Tools

'Co-Creation'

DIAGNOSING CHANGE, DEVELOPING DATA, AND CREATING SOLUTIONS

Co-Creation was developed by combining the Global Water Futures mandate, the goals outlined in UNDRIP, and the Sustainable Development Goals to ultimately empower our community partners to exchange knowledge and tools in order to manage water futures.

This will ensure holistic health and well-being, and deliver unprecedented scientific understanding, monitoring technologies, and modelling tools in response to water quality threats, especially to the under-served Indigenous communities. Co-Creation has **three main subteams** and several different **research activities**, listed below.



**Traditional Ecological
Knowledge**



Ecosystem Health



**Sensor Systems &
Data Synthesis**

Research activities include:

- Investigate health issues related to water using health surveys.
- Develop a transdisciplinary risk assessment framework using a multi-stakeholder approach.
- Develop local-scale climate change models to forecast and predict temperature and precipitation changes
- Co-develop youth training certificate programs for research methodologies and environmental monitoring.
- Develop water governance structures based on Indigenous Knowledge and local laws.
- Construct youth medicine gardens for traditional medicine and healing practices.
- Conduct tap water testing to determine assess the presence of bacteria and heavy metals.
- Investigate the health of the local creeks and create GIS maps of natural features in the communities.

...and more!

Co-Creation of Indigenous Water Quality Tools Overview

To carry out the work of Co-Creation deliverables, two teams have been established: **Traditional Ecological Knowledge Team** and **Ecosystem Health team**.

These teams work in collaboration with committees which are comprised of academic and community stakeholders/knowledge holders

Health Committee:
Academic and community health professionals

Grandmother's council:
Community clanmothers

Ecological/ Water Training:
Academic training and SN wildlife

Indigenous Knowledge Committee:
IK holders

Community Youth Council:
Six Nations youth

Water Council: HCC Chiefs

Traditional Ecological Knowledge Team <i>Dawn Martin-Hill</i>	Ecosystem Health Team <i>Patricia Chow-Fraser</i>
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Deliverables

Health Assessment	Indigenous Knowledge and Community	Water Governance	Environmental Contaminants	Climate Change and Flood Protection	Bacteriological and Creek Assessment
<ul style="list-style-type: none"> • Health and Water Use Survey • Youth Medicine Garden 	<ul style="list-style-type: none"> • Youth Training Programs • Citizen Science • Online Data Portal with Teaching Tools 	<ul style="list-style-type: none"> • Water Governance Frameworks • Decision-making Models 	<ul style="list-style-type: none"> • Tap Water Testing (Metals) • Low-cost Field Sensors and Apps 	<ul style="list-style-type: none"> • Climate Modelling and Projections • Hydrological Analysis and Mapping 	<ul style="list-style-type: none"> • GIS Mapping • Tap Water Testing (Bacteriological) • Stream Health Assessment

Please visit the links below to learn more about the project and the project team.

<https://www.ohneganos.com/our-projects>

<https://www.ohneganos.com/our-team>

Ohneganos – Indigenous Ecological Knowledge, Training, and Co-Creation of Mixed-Method Tools

‘Ohneganos’

DEVELOPING TOOLS, BUILDING RESILIENCE, AND YOUTH EMPOWERMENT

Ohneganos is a response to the findings from the Co-Creation project indicating that there are alarming levels of water anxiety in our partner communities.

Following extensive engagement with our partners, we developed a plan – Ohneganos. This project has three main objectives:

a) the co-creation of **bilingual educational resources** to build communities’ capacity to manage future environmental challenges; b) the strengthening youth **mental health resilience** related to water security, c) the training of youth in **water rights and governance** strategies inclusive of Indigenous laws.



Indigenous Knowledge Training



Youth Mental Wellness



Water Governance

Research activities include:

- Production of digital stories demonstrating how water quality shapes and informs mental well-being.
- Adapting a mental wellness mobile application to provide tools for youth struggling with water anxiety.
- Investigate the impact of water insecurity on youth by delivering a mental wellness survey.
- Identifying water protection measures and developing a citizen’s guide to ecocentric protection.
- Developing a website to make educational resources publicly available.
- Archival mapping of waterways, including place-naming in local languages and describing traditional uses.
- Turtle tracking and monitoring to gather information on water geographies, environmental health, nesting sites.
- Youth training in UNDRIP and attending the UNPFII for training in legal water governance frameworks.
- Creating new pathways into post-secondary STEM programs for Indigenous Youth.
- Creation of a new Traditional Ecological Knowledge program at local post-secondary institutions.

...and more!

Ohneganos Water is Life Overview

To carry out the work of Ohneganos deliverables, 3 teams have been established: Indigenous Knowledge Training, Mental Wellness, Water Governance

These teams work in collaboration with committees which are comprised of academic and community stakeholders/knowledge holders

Indigenous Knowledge Training

Dawn Martin-Hill

Mental Wellness

Lori Davis Hill

Water Governance

Beverly Jacobs

Deliverables

Grandmother's council:
Community clanmothers

Water Council: HCC
Chiefs

Community youth council:
Six Nations youth

Indigenous Knowledge Committee:
community IK holders

Indigenous knowledge committee:
IK holders

Language Consultants:
Language translators

Youth mental health advisory:
Mental wellness stakeholders

Ecological/ Water Training:
Academic training, SN wildlife

- Archival Research and Mapping
- Bilingual Education material
- Turtle Tagging and Monitoring
- Environmental Monitoring Training
- Post-secondary Pathways
- Creation of TEK/WS Program
- Website with TEK mixed methods

- Review: Indigenous youth anxiety apps
- Mental Health Survey
- Online art exhibit
- Digital Stories Water/Mental Wellness
- Workshops on Water
- Mental Wellness Mobile App
- Water anxiety guidebook

- Position papers
- Youth UNDRIP and Governance Training
- Legal Water Governance Framework
- Water Management Measures
- Citizen Guide to Eco-Centric Protection

Please visit the links below to learn more about the project and the project team.

<https://www.ohneganos.com/our-projects>

<https://www.ohneganos.com/our-team>

Six Nations Project Highlights

Indigenizing Research

A Resource Guide for Indigenous Peoples, Academics & Policy Makers

This living resource guide was developed by members of the Co-Creation team with the purpose of sparking dialogue between Indigenous researchers, community members, activists, academics, and policy-makers to better improve research practices involving Indigenous communities. Indigenizing research involves weaving Indigenous research methodologies, knowledges, experiences, and worldviews into scientific research – that which currently privileges Western Science and Euro-Western human-centered perspectives.


The content of the current version includes:

1. Indigenizing Research
2. Traditional Ecological Knowledge
3. Research Ethics
4. Intellectual Property
5. The Doctrine of Discovery

INDIGENIZING RESEARCH




A RESOURCE GUIDE FOR INDIGENOUS PEOPLES, ACADEMICS AND POLICY MAKERS

A Living Document



“What water gives us” by Jaden Squire

Version 3 (August 2020)
Prepared by the Research Team
Co-Creation of Indigenous Water Quality Tools



Click [here](#) to download the research guide from our website!

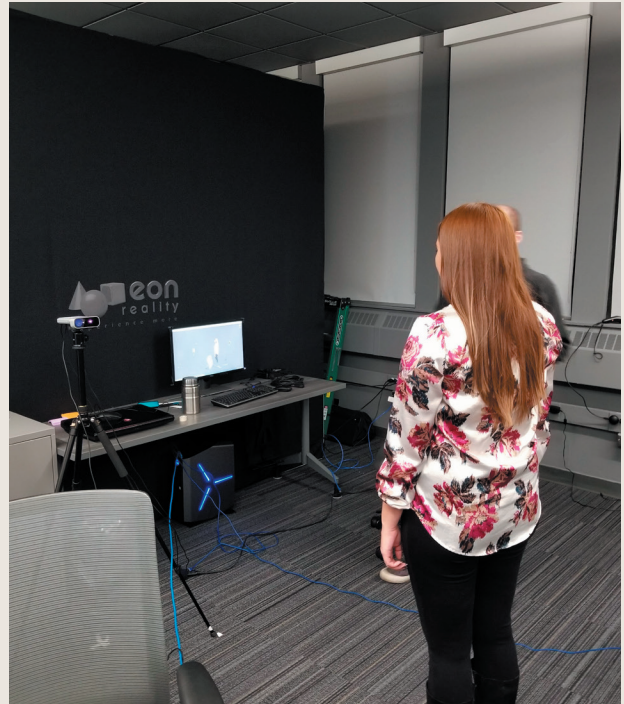
Traditional Ecological Knowledge

Digital Mapping and Virtual Reality Tools



Kawenní:io/Gawení:yo students create their own map of Six Nations during a traditional mapping workshop.

In collaboration with Mohawk College, the team has completed the first phase of a Virtual Reality (VR) experience of the Grand River. The experience takes the user on a journey through time and space along the Grand River. The VR project is an interactive teaching tool about the history, culture, and knowledge surrounding the Grand River and includes traditional teachings along with a water testing station among other features.



Ohneganos youth lead, Makasa Looking Horse, participating in volumetric capture to create a hologram. Holograms can be embedded into augmented and virtual reality experiences to improve their immersion and digital storytelling.



Ohneganos project lead, Dr. Dawn Martin-Hill, presenting at a traditional mapping workshop.

The Ohneganos team has been working to build educational tools centered around Traditional Ecological Knowledge (TEK) training. We are currently mapping Six Nations of the Grand River through an application called Terrastories, which allows communities to use traditional place names and oral storytelling to map their land. In collaboration with Rudo Kemper who has worked with Indigenous communities in the Amazon and around the globe to digitally map their land, the team is working to document botany, wildlife, and sacred sites specific to the community of Six Nations. A mapping workshop was held with Kawenní:io/Gawení:yo immersion school students in June of 2019 to begin training the community in the process of ancestral mapping.

Youth Empowerment, Capacity Building, and Water Governance

In 2019, the Indigenous Knowledge subteam provided community youth and students the opportunity to present their digital storytelling work at the United Nations Permanent Forum on Indigenous Issues (UNPFII). A side table event was accepted by the UNPFII organizing committee and resulted in a number of youths being sponsored to attend the event in New York City for two weeks. While there, Six Nations female youth forged connections with Indigenous peoples from all over the world strengthening their ability to address issues of water and food security, conservation, and climate change on the world stage.

Out of these connections, two Co-Creation youth attended a two-day workshop sponsored by Microsoft to learn about digital custodianship. Since then, the youth leader, Makasa Looking Horse, has been invited by numerous Indigenous organizations to present at conferences, including the honour of conducting the opening prayer and words for the inaugural Youth Climate Summit

in 2019 by the Indigenous Youth Caucus. Similarly, in 2019, impressed by her presentation at the UNPFII, the Co-Creation community outreach officer, Karissa John, was invited by Chiefs of the Haudenosaunee Confederacy Council to present with them in the United Nations proceedings for the 12th session of the United Nations Expert Mechanism on the Rights of Indigenous Peoples in Geneva, Switzerland.



Members of the Co-Creation team (students and faculty) in a digital storytelling workshop at a UNPFII side-table event.

Haudenosaunee Summit on Climate Change

Troubling water quality findings presented by the Ohneganos team prompted the Haudenosaunee Confederacy Chiefs Council to host a nation-wide conference regarding environmental health, climate change, and water research at Six Nations in May of 2019. Key findings from the summit are summarized below.



Climate Change Preparedness

Planning: Need strategies in place to mitigate intense flooding, snow/ice storms, and virus outbreaks.

Resources: Consider the impact of community resources from increased environmental migration.

Mental Preparedness: Raise collective awareness through education.

Emotional Preparedness: Supports need to address mental health threats resulting from climate change and water anxiety.

Physical Preparedness: Increased emphasis on land-based learning and self-sustainability (i.e. collecting and cleaning water, cooking on the land, community gardens, traditional medicines).

Spiritual Preparedness: Increased use of language, ceremony, connection, healthy relationships, living in balance and in harmony.

Environmental Health

Leadership: Increase community meetings regarding climate change. Promote viewing environmental health as a world issue and not solely as a Haudenosaunee issue.

Collaboration: The necessity to work together as Haudenosaunee first and then establish working groups for allies.

Direct-Action: Continue raising awareness for the No Nestle Campaign in Six Nations. Encourage community to clean the McKenzie Creek.

Sovereignty: Threats to Indigenous sovereignty (ranging from data sovereignty to food sovereignty) are important. Indigenous communities need to own the data. Encourage community members to plant and consume a traditional diet.



Water Security and Governance

Women: Governance system must involve teachings which emphasize women's relationship to water.

Education: Public education campaign was suggested to publicize the Haudenosaunee laws and value systems.

Empowerment: Traditional leadership is empowered by traditional teachings, historic agreements, nation-to-nation relationships.

Decision-Making: Need to set clear regulations that incorporate Haudenosaunee values and teachings while protecting Indigenous Knowledge.

Laws: Legislation must embody the Haudenosaunee's responsibility to and relationship with the land as one of interconnectedness.

Water Testing (Metals) at Six Nations

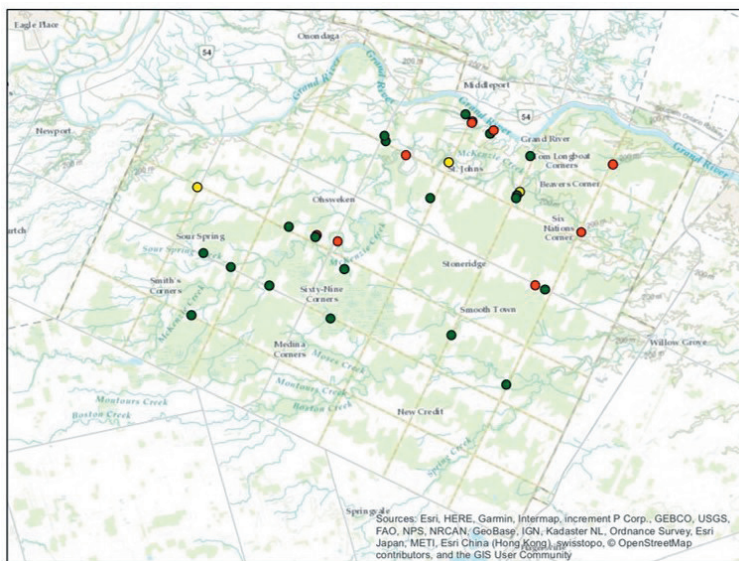
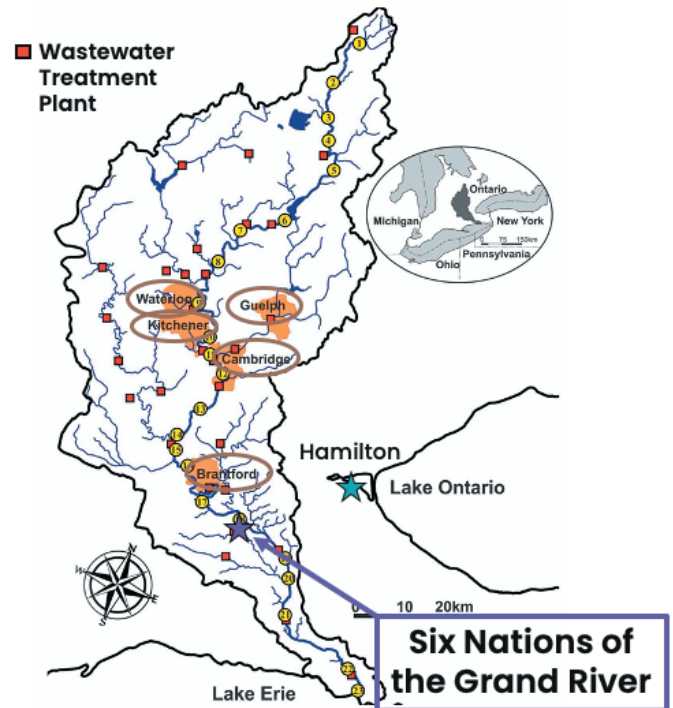
The research led by Dr. Charles de Lannoy involves testing water and investigating potential sources of contamination in Six Nations. Heavy metal analysis on 26 elements was conducted at 78 households, IL Thomas School, and the water treatment plant using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). In total, tap water from 68 wells and 42 cisterns were sampled.

Elements Analyzed:

Hg, Pb, Cr, As, U, Mn, Li, Be, B, Al, Ti, V, Fe, Co, Ni, Cu, Zn, Se, Mo, Ag, Cd, Sn, Sb, Ba, Pt, Tl

Potential Sources of Contamination

- Upstream of the Grand River - 25 wastewater treatment effluent discharges, industrial emitters and agricultural runoff
- Septic systems, Mackenzie Creek & direct agricultural run off.
- Artificial sweeteners – a potential human-caused impact indicator (used in large quantities in food, beverages, drugs and sanitary products), found in the Grand River, upstream from Six Nations.



Elevated levels of mercury were found in several water samples (see Image to the left).

- Canadian Guideline Standard: 0.001 mg/L
- Households above Standard: 36 (46%)
- Households close to Standard: 20 (26%)
- Households safely below Standard: 22 (28%)

Legend

- $<DL - 0.75 \mu\text{g/L}$
- $0.75 \mu\text{g/L} - 1 \mu\text{g/L}$
- $>1 \mu\text{g/L}$

- Water testing: mercury, chromium, arsenic, uranium contamination found
- Sweeteners found in 79% of samples in preliminary analysis
 - Artificial sweeteners are a promising technique to identify wastewater or landfill leachate contamination in drinking water wells.
- The goal is to sustainably build capacity at Six Nations by eventually having households test their own water and by installing sensors in wells and in local surface waters to continuously monitor the water ecosystems.

Mercury is a metal that occurs naturally in rock, soil and water, and is higher in some types of rocks and soils than others. When it is naturally high in the environment, this can also lead to naturally high levels of mercury in fish. However, mercury also gets into the air, water, and land from human activities including municipal solid waste, medical waste, the burning of fossil fuels (coal, oil and natural gas), and forest fires. It also seeps into the environment during some manufacturing processes. Human activities can increase mercury levels in waters, soils, fish and wildlife above what is there naturally.

Consuming elemental, organic (methylmercury) and inorganic mercury compounds can negatively impact health depending on the type of mercury and the amount ingested over time. Mercury is toxic to the nervous system. Inhaling mercury vapour can produce harmful effects to the nervous, digestive, and immune systems, lungs, and kidneys. Neurological and behavioural disorders may be observed after inhalation, ingestion, or dermal (skin) contact with mercury.

Organic (methylmercury) and inorganic mercury are dangerous because they accumulate in the body, while ethylmercury, which can be found in vaccines, is safe as it is cleared from the body quickly. Those who consume water that contains a level of inorganic mercury that exceeds the maximum contaminant level risk experiencing kidney damage, especially if this water is consumed in a substantial amount over many years.

TYPES OF MERCURY

Elemental (Metallic) Mercury: This form is liquid at room temperature and released into the air when coal and other fossil fuels are burned. It is used in older thermometers, fluorescent light bulbs and some electrical switches. At room temperature, elemental mercury that is exposed to the air (i.e., not in a thermometer) can evaporate to become an invisible, odourless toxic vapour. If heated, it is a colourless, odourless gas. Elemental mercury is an element that has not reacted with another substance. When it reacts with another substance, it forms either an organic or inorganic mercury compound.

Inorganic Mercury: This form occurs when mercury combines with other elements such as sulphur or oxygen to form compounds or salts. It occurs naturally in the environment. Inorganic mercury can enter water or soil from the weathering of rocks that contain inorganic mercury salts or from the human activities mentioned above. Inorganic mercury is the most common form present in drinking water but is not considered to be very harmful to human health in terms of the levels found in drinking water. It can accumulate in the body but less so because it is easier to excrete than organic forms of mercury.

Organic Mercury (Methylmercury and Ethylmercury): Bacteria in water and soil can convert inorganic mercury into an organic mercury compound: methylmercury. This is the form of mercury that bioaccumulates more in fish and in our bodies as it is more difficult to excrete. Methylmercury is a highly neurotoxic organic mercury compound. High exposures can impact the nervous system at all ages, but it is most concerning for developing babies and young children.

Ethylmercury is another organic mercury compound that is uncommon in the environment and is mainly used as a preservative. Ethylmercury in low amounts is safe as it can be broken down and excreted from the body.

Mercury poisoning refers to a toxicity from mercury consumption. The most common cause of mercury poisoning is from consuming too much organic (methylmercury) mercury which is linked to eating fish known to be high in mercury and some types of seafood. Serious cases of mercury poisoning can involve neurological (nerve) and renal (kidney) disturbances. You cannot taste, smell, or see mercury in your water.

MERCURY FACT SHEET

Read our [FAQ sheet here](#).

There are some data for mercury in fish from [McKenzie Creek](#) (white crappie and white sucker), [Boston Creek](#) (rock bass) and the Grand River [above Caledonia Dam](#) and [below Caledonia Dam](#) (white sucker, walleye, smallmouth and largemouth bass, rainbow trout, yellow perch, rock bass, redbreast sucker, northern pike, common carp, channel catfish, brown bullhead and black crappie). The results have been used by Ontario to create [guidelines](#) recommending a maximum number of meals per month for each type of fish at different sizes.

Mercury accumulates in the body over time, and some types of mercury are more quickly absorbed into the body and remain in the body than others. Small amounts of mercury are commonly found in other living organisms, such as seafood and fish. Fish absorb mercury in the water as the water passes through their gills and from their diet and the mercury 'bioaccumulates' in their body. This means the amount of mercury in their body builds up over time at higher levels than what was in their diet since it is not easily excreted. When we consume fish and other foods that are contaminated with mercury it goes through a process called 'biomagnification', meaning that we absorb and retain some of the mercury that is contained in all the different animals that we eat. This means that predator fish that eat smaller fish (i.e., ones lower in the food web) will have higher mercury than those fish that eat insects or plants. This is why it is recommended to monitor our fish consumption. For example, some types of tuna are high up in the food web and have high bioaccumulation of mercury because of biomagnification. Some freshwater fish can also be high in mercury, depending on what they eat and where they live.

The gradual accumulation of mercury through food or water can result in chronic diseases that develop over time. Long-term consumption and accumulation of mercury that is over the recommended safe limit (0.03 mg per day) can result in eventual damage to the kidneys and the nervous system. You may not "see" or "feel" any effects because they are internal organs, but the damage can still be occurring over time and can result in adverse health impacts that become more apparent later in life.

CONSUMING CONTAMINATED WATER

FUTURE RESEARCH

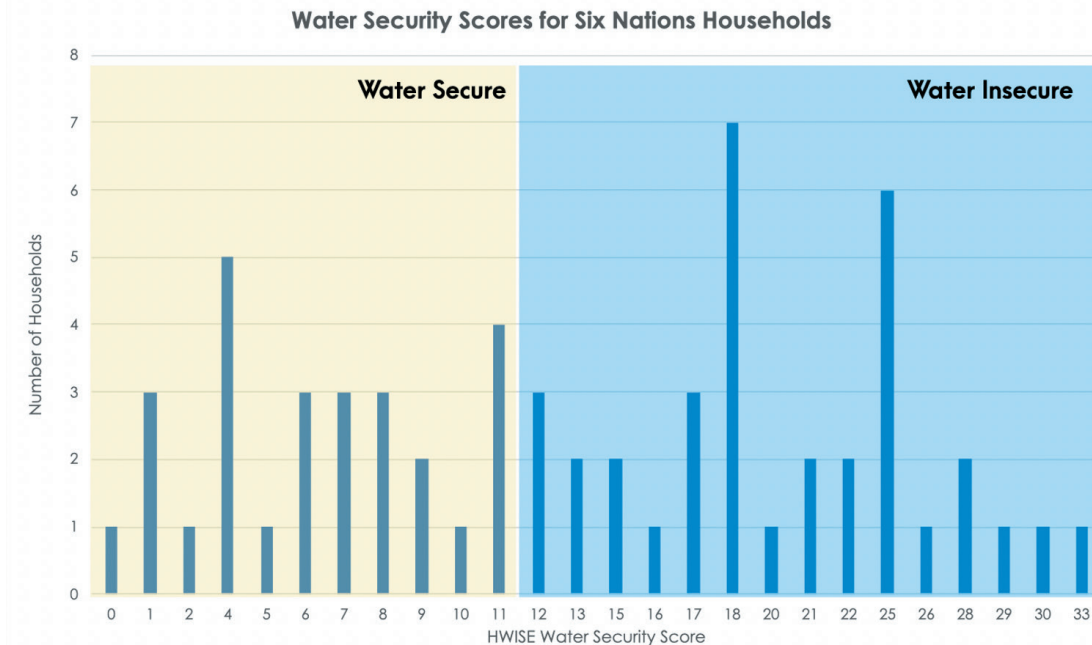
The second phase of research ([refer to page 28](#)) will focus on determining which form (or 'species') of mercury is in Six Nations homeowners tap water (i.e. organic, inorganic or metallic). Additionally, the research team is developing chlorine and mercury sensors that can test water quality in real-time.

- 🌐 [Guidelines for Canadian Drinking Water Quality - Summary Table:](https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html#2)
- 🌐 [Guidelines for Canadian Drinking Water Quality for Mercury:](https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-mercury.html)
- 🌐 [World Health Organization - Facts about Mercury Exposure:](https://www.who.int/news-room/fact-sheets/detail/mercury-and-health)
- 🌐 [Global Water Futures Sign-Up for Mercury Testing:](https://www.ohneganos.com/water-testing)
- 🌐 [Basic Information about Mercury:](https://www.epa.gov/mercury/basic-information-about-mercury)
- 🌐 [Mercury in Ontario:](https://www.ontario.ca/page/mercury-ontario)
- 🌐 [Guide to Eating Ontario Fish:](https://www.ontario.ca/environment-and-energy/eating-ontario-fish)

Health and Water Use Survey

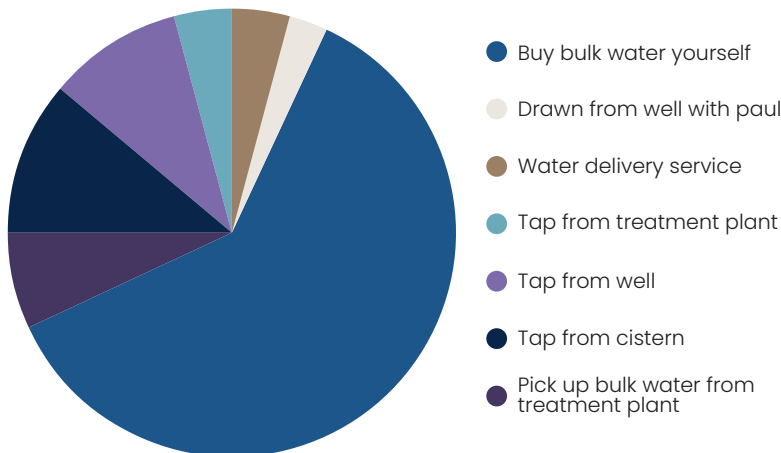
A health and water use survey was completed by 66 residents and interviews were also conducted with 25 residents from Six Nations. Led by McMaster University PhD student Sarah Duignan, the survey and interview guide were co-created with the Six Nations community and explored water sources and uses of water within households, water and food security, and the overall general health of households. A new extension of this survey will be deployed in 2021.

2019 Health Survey Results



*Score of 12 or above = water insecure (HWISE scale)

- Average water security rating at Six Nations is 14.5*
- 60% of households were water insecure
- 35% of household said that in the last four weeks they worried that they would not have enough water for their household needs
- 38% of households said that in the last four weeks there had been no usable or drinkable water whatsoever at home



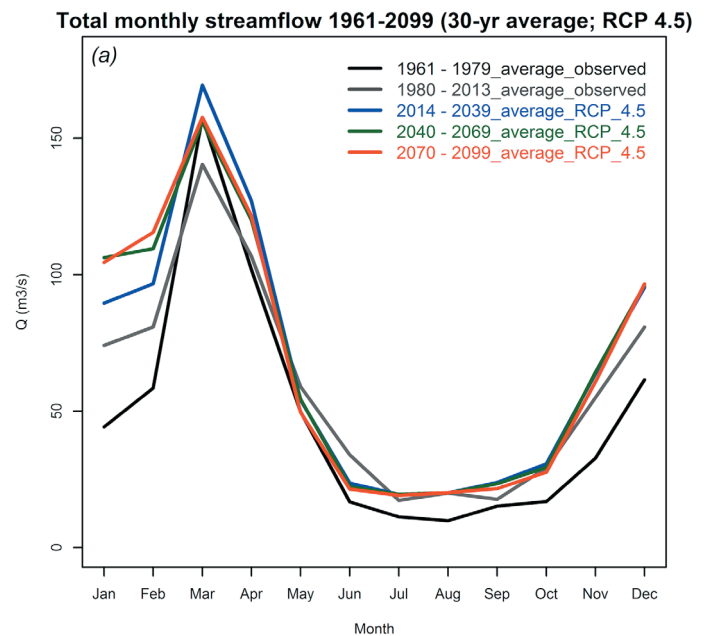
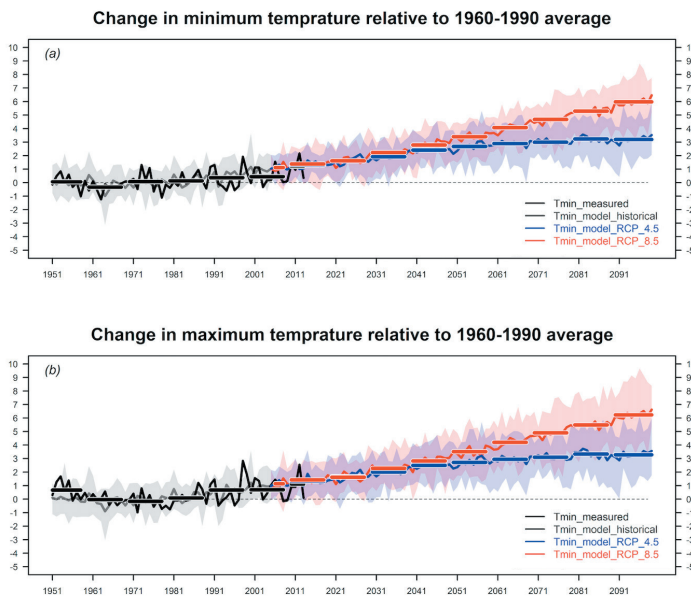
Key Findings:

- 77% of people use some form of bottled water for drinking (bulk delivery or buying bottled water themselves).
- 47% of people cited taste, smell, or appearance of tap water as major issue
- 31% of people were unsatisfied with their drinking water situation, and “would like access to main line if it was cheaper”

Climate Change and Hydrological Predictions

In collaboration with co-creation team members, one of the research groups led by Dr. Altaf Arain has been working to determine anticipated impacts of climate change and extreme weather events on streamflow, flooding/drought events, and water resources in the Six Nations area. A hydrological model (GS-Flow) is being used to explore the hydrological predictions of the McKenzie Creek (Six Nations and surrounding areas). This project will provide downscaled projections of temperature and precipitation for the Six Nations area to aid the community with future water security and climate change mitigation and adaptation planning.

Modelling Results



(a) Minimum temperature and (b) maximum temperature predictions relative to 1960–1990 baseline average. (c) Total monthly streamflow changes for McKenzie Creek relative to historical averages and based on 'best case scenario' (RCP 4.5).

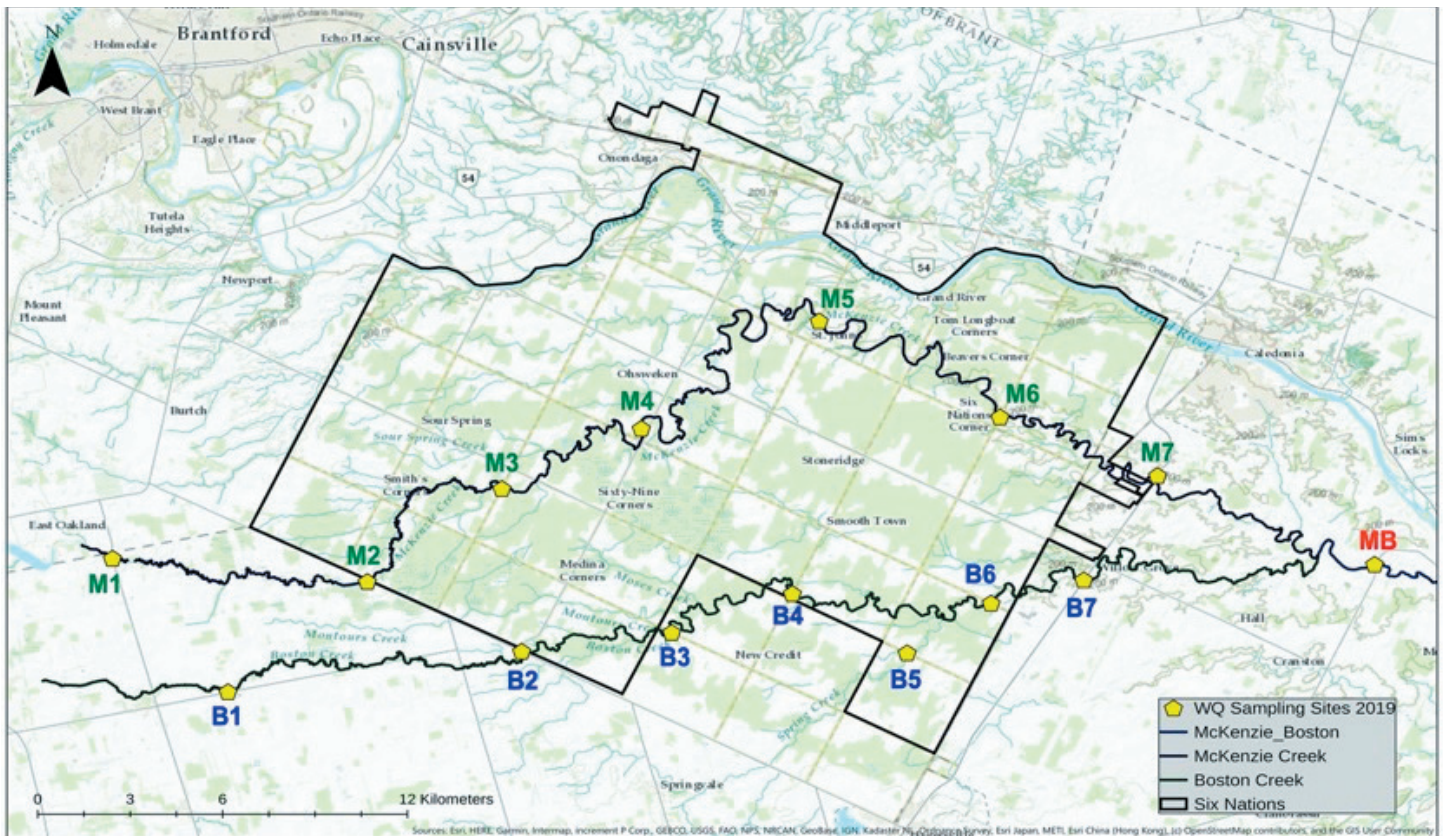
- Annual temperatures are projected to increase significantly over 2006–2098.
- Tmax will increase by 3.6 – 6.6°C; Tmin will increase by 3.4 – 6.1°C
- Increase in hotter summer days (Tmax \geq 25°C) and nights (Tmin \geq 20°C)
- Statistically significant increase in heavy (\geq 10mm) and very heavy rainfall (\geq 20mm)
- Increase in spring streamflow in early 21st century, followed by decrease in later years

Future Implications:

- Overall increases in seasonal temperature, with significant warming projected for summers and winters.
- Increases in summer temperatures and more frequent and intense heatwaves, and droughts will impact the region's climate as well as growing season length, evapotranspiration, water budget and ecosystem, and food productivity.
- Earlier snowmelt and increased winter precipitation will increase winter–spring streamflow resulting in greater risk of winter–spring flooding.

Ecosystem Health Assessment Water Testing

The ecosystem health sub-team led by Dr. Patricia Chow-Fraser has conducted field research to determine spatial trends in nutrients, suspended solids, physical conditions, and fecal bacteria (*E. coli*) in the McKenzie and Boston subwatersheds around Six Nations of the Grand River. From the period of April to October 2019, a monthly water monitoring program was carried out at 15 stations (7 on McKenzie Creek, 7 on Boston Creek, and 1 at the confluence downstream of the Reserve).



The sampling sites were chosen in collaboration with Clynt King, a former Environmental Officer working with the Six Nations Elected Council, chosen based on ease of sampling, available historical information for comparison purposes, and the ability to assess the degree of pollution from farm run-off upstream of the reserve.

There were four main goals of the creek assessment:

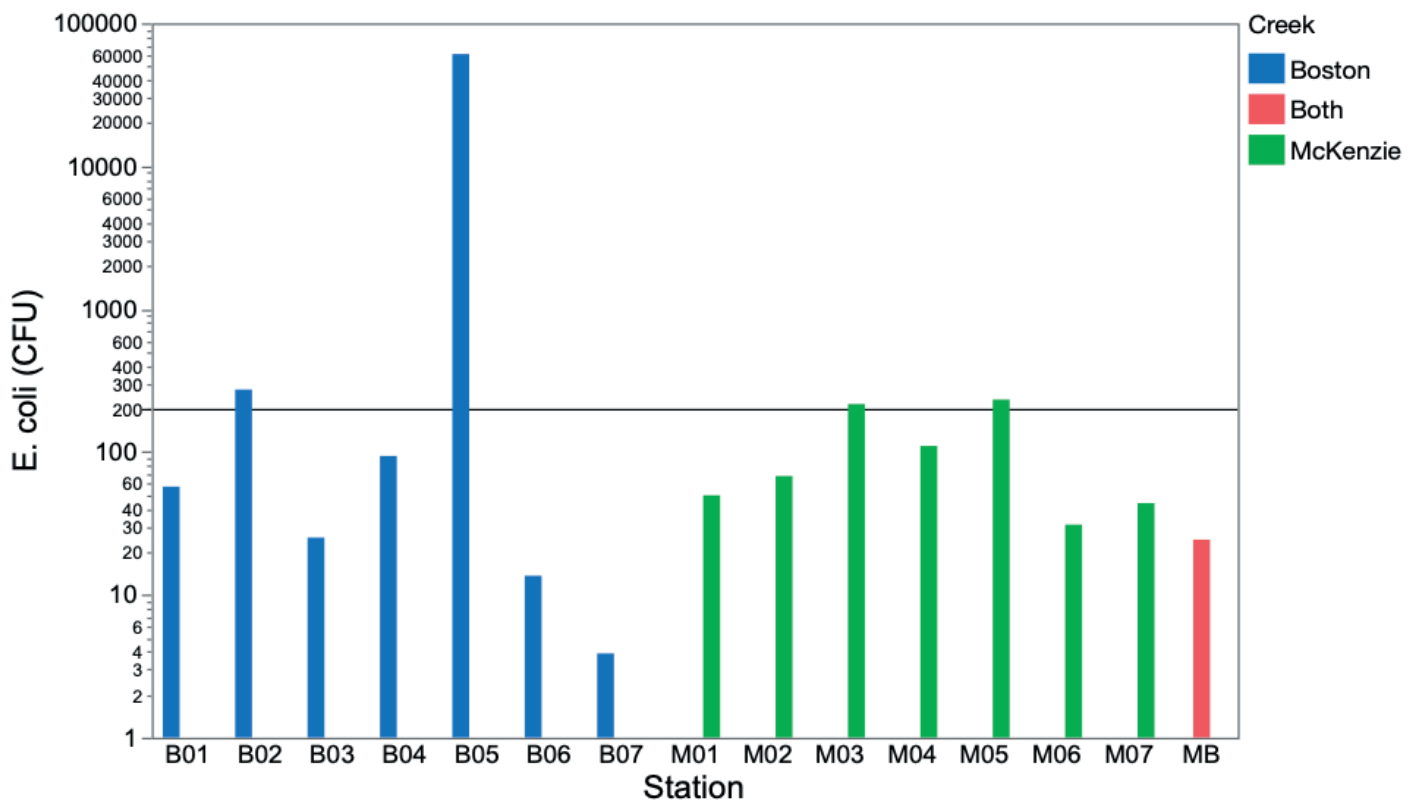
1. Conduct monthly sampling at the monitoring locations along the McKenzie and Boston Creeks during the period of April to October 2019.
2. Determine mean seasonal (April to October) concentrations of fecal indicator bacteria (specifically *E. coli*), primary nutrients (various forms of phosphorus and nitrogen), and suspended solids at each station.
3. Record the mean seasonal water temperature, turbidity, pH, dissolved oxygen and specific conductivity at each station.
4. Explore the potential link between high pollution levels and surrounding land uses and landscape features.

Potential Pollution Sources:

- Fecal material can typically enter a creek as runoff from farmland (from animal manure); however, this could also be runoff from poorly maintained septic fields and spills from sewage lagoons.
- Both the McKenzie and Boston Creek watersheds are heavily farmed: the tile drains to the southwest can lead to increased concentrations of nutrients and sediment.
- Community sewage lagoons may pose concern for the McKenzie Creek during extreme flooding events (ex. Hurricane Hazel in 1954).

Monitoring Results

- An indicator of fecal matter in surface waters is the fecal coliform bacteria called Escherichia coli (E. coli), which is found in the intestinal tract of humans and animals. In surface waters, acceptable levels of E. coli (measured as colony forming units (CFU) per 100 mL) for recreational use is a geometric mean of 200 CFU/100 mL.
- Through measurement of total coliforms and E. Coli, which are indicative of drinking water quality, the geometric mean (i.e., average) of fecal bacteria (indicative of human pathogens) is found to exceed water quality objectives at 2 of 7 sites in Boston and McKenzie Creeks (*see Image below*) objectives at 2 of 7 sites in Boston and McKenzie Creeks.
- Turbidity and total suspended solids (TSS) are too high in both the McKenzie Creek and Boston Creek to support a healthy aquatic ecosystem.
- Total phosphorus levels are too high in both the McKenzie Creek and Boston Creek to support a healthy aquatic ecosystem.
- Water quality parameters indicate that conditions in McKenzie and Boston Creeks are very different and have different stressors.



New Projects

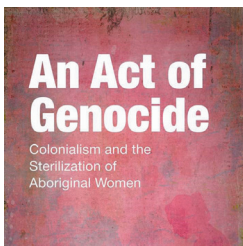
Co-Creation of Indigenous Water Quality Tools – Aquatic Assessment and Restoration Strategy

'Phase 2'

Timeline: 2020–2023

Beginning in Fall 2020, this new research project is the 'Next Step' and will function as a continuation of the original Co-Creation of Indigenous Water Quality Tools. The Aquatic Assessment and Restoration Strategy project has been designed to work off of the accomplishments and findings of Co-Creation to continue producing tangible solutions. For example, environmental contamination that was identified by the research completed in Co-Creation will now be further explored in terms of its impact on ecosystems, local habitat, and wildlife.

New research objectives also require new skills, so we are proud to announce several additions to our core team:



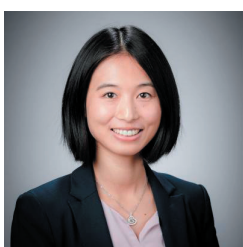
Karen Stote

Karen Stote has Irish, Scottish and English roots, but was born and raised on unceded Wēlastəkwiyyik (Maliseet) and Lnu (Mi'kmaq) territories. She is Assistant Professor of Women and Gender Studies, Wilfrid Laurier University, with interests in Indigenous-settler history, feminism and the politics of decolonization, and reproductive and environmental justice. She is author of *An Act of Genocide: Colonialism and the Sterilization of Aboriginal Women* (2015) and is currently researching family planning policy to better understand the context informing recent experiences of coerced sterilization. She looks forward to getting to know, working with and learning from members at Six Nations.



Karen Kidd

Karen Kidd is an ecotoxicologist that joined McMaster in 2017. She is the Jarislowsky Chair in Environment and Health in the Department of Biology and School of Earth, Environment and Society. Karen and her team study how diverse contaminants concentrate in and affect aquatic species and are transferred to fish through the food web. She will work with the Ecosystem Health team to assess levels of chemical contamination in fish and turtle species (mercury and 'PFAS'). One type of PFAS is commonly known as 'C8' and is a manmade chemical used in the process of making Teflon and similar chemicals.



Zoe Li

Dr. Zoe Li is an Assistant Professor of Civil Engineering at McMaster University. Her research interests include hydro-environmental modeling, stochastic simulation, uncertainty quantification, risk assessment, environmental systems analysis, and climate impact assessment. She will work with the Ecosystem Health team and develop a data integration platform for Six Nations.



Mark Servos

Prof. Mark R. Servos is currently the Canada Research Chair in Water Quality Protection in the Department of Biology, University of Waterloo, where his research and teaching program is related to the science underlying risk assessment and management of emerging threats to water resources. Prof. Servos worked as a research scientist with the Department of Fisheries and Oceans (Great Lakes Laboratory for Fisheries and Aquatic Sciences, 1988-1996) and Project Chief with Environment Canada (National Water Research Institute) (1996-2003) before he joined the University of Waterloo as a Professor of Biology in 2003. Mark will be working with the Ecosystem Health team to investigate stream health by using environmental DNA.



Gita Wahi

Dr. Gita Wahi is an Associate Professor in the Department of Pediatrics at McMaster University and Pediatrician at McMaster Children's Hospital. Dr. Wahi's research interests focus on the upstream determinants of childhood obesity including the contribution of the early life environment on the risk for childhood obesity and related cardiovascular risk factors. Her clinical practice includes the inpatient hospital-based service as well as pediatric obesity within the Children's Exercise and Nutrition Centre at McMaster Children's Hospital. Gita will be working with the TEK team to complete maternal and child focused projects.



Marilyn Powers

Dr. Marilyn Powers has over 20 years' experience in applying technological advances to education and training. A licensed professional engineer, Dr. Powers started her career in Virtual Reality by completing her PhD in Virtual Reality Surgical Simulation. Working with faculty and staff at Mohawk, Marilyn helps design and build AR/VR experiences to incorporate into their curriculum. Working with Industry, Marilyn helps to educate and discover new applications for AR/VR suitable for grant funding. Then we work together to define, build and deploy AR/VR experiences. For the GWF project, alongside Tony she will be working with the TEK Team to prepare a VR experience that will tell the story of the Grand River.



Tony Vieira

Tony Vieira is a musician, composer, educator, and media artist who creates immersive visual and sonic experiences for XR. His work for film, television, VR cinema, orchestral performance, location-area media, and AR have been screened, broadcast, performed, and exhibited internationally. Tony is a professor at York University in Toronto. He will be working with the TEK Team to prepare a VR experience that will tell the story of the Grand River.

Although we have new faces joining us, the governing research framework and Indigenous methodology will remain constant. This research will continue to be led by community, for community and with the overall vision of creating a legacy suite of holistic wellness tools produced by the harmony of Indigenous and Western knowledge systems.

Stay tuned for more information on Phase 2 of Co-Creation of Indigenous Water Quality Tools!

ACKNOWLEDGEMENTS



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let's talk  **science**

Contact Us

For more information about Ohneganos, please contact Dawn, Colin, or Kathryn!



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