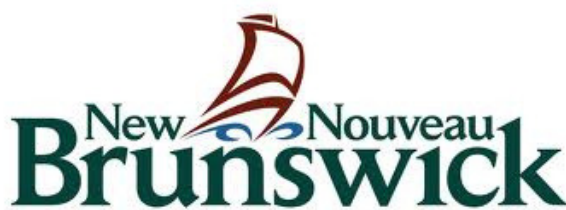


NEW BRUNSWICK
**CLIMATE
CHANGE
EDUCATION
PLAN**

FEBRUARY
2019



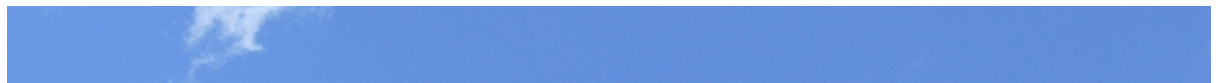
Your Environmental Trust Fund at Work
Votre Fonds en fiducie pour l'Environnement au travail

PROPOSED BY
GEOFF MACDONALD

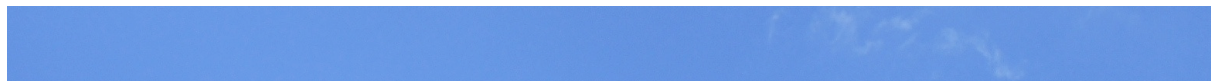


TABLE OF CONTENTS

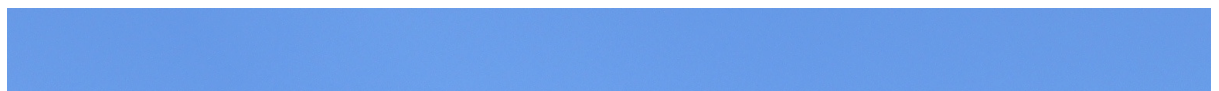
- 1** FORWARD
- Framework
 - Acknowledgments



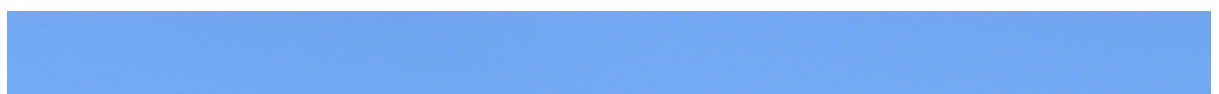
- 3** INTRODUCTION
- About the author and The Gaia Project
 - Objectives



- 5** COMMON BARRIERS
- misconceptions
 - teaching strategies
 - commitment and support



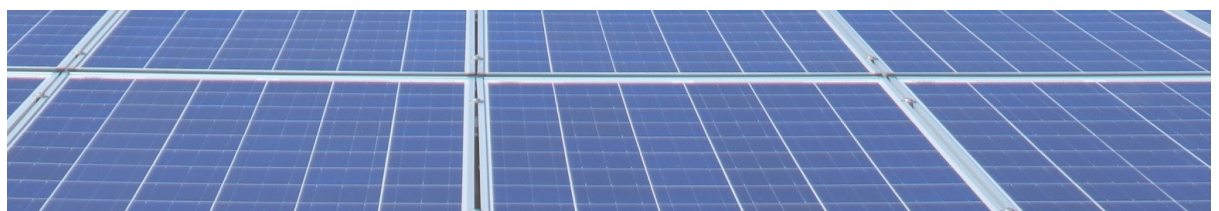
- 8** THE CLIMATE CHANGE EDUCATION PLAN
- meeting objective #9
 - classroom resources
 - community support
 - professional learning



- 13** TIMELINE TO MEET OBJECTIVES



- 14** REFERENCES



FOREWARD

SUMMARY AND FRAMEWORK

The United Nations' Intergovernmental Panel on Climate Change released a scientific report titled, "Global Warming of 1.5 Degrees Celsius" as an urgent warning to implement climate change adaptation, mitigation and sustainability practices to avoid significant risks of drought, floods, extreme heat and poverty for hundreds of millions of people (IPCC, 2018). This document includes recommendations to strengthen the global response to the threat of climate change while promoting sustainable development, and efforts to eradicate poverty. We have a responsibility as citizens of this province, country and planet to empower all citizens to take appropriate action against human induced climate change.

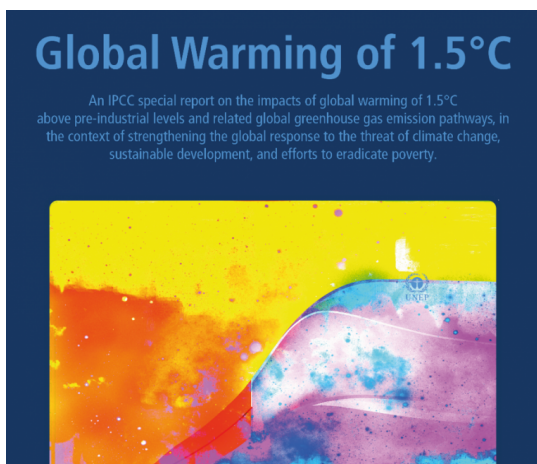


figure 1: The 2018 IPCC special report on the impacts of global warming (IPCC, 2018).

New Brunswick was required to develop the Climate Change Action Plan in 2016, part of which necessitates climate change education for students at all levels. This document has been developed to help guide the strategic implementation of climate change education throughout New Brunswick's public education system [Kindergarten to Grade 12].

FRAMEWORK

The goal of this project is to implement climate change education throughout K-12 levels. Through research barriers were identified that require careful strategy and planning. The barriers include the potential eco-anxiety of students and a lack of confidence teachers possess to teach climate change content. The Gaia Project intends to oversee the development of supports and resources for teachers and other educational partners to counter eco-anxiety among students and improve self-efficacy. This shift of the subjective norm will require professional learning, classroom resources and a community of best practice for climate change educators. Communication, collaboration and commitment will be critical components to a successful implementation of high impact climate change education in New Brunswick.

ACKNOWLEDGMENTS

FUNDERS AND SUPPORTERS OF THE GAIA PROJECT AND THE CLIMATE CHANGE EDUCATION PLAN



Environment and
Climate Change Canada



Your Environmental Trust Fund at Work
Votre Fonds en fiducie pour l'Environnement au travail



Énergie NB Power



EDUCATIONAL PARTNERS OF THE GAIA PROJECT AND THE CLIMATE CHANGE EDUCATION PLAN



NEW BRUNSWICK
ENVIRONMENTAL NETWORK
RÉSEAU ENVIRONNEMENTAL
DU NOUVEAU-BRUNSWICK



Learning for a
Sustainable Future
LSF



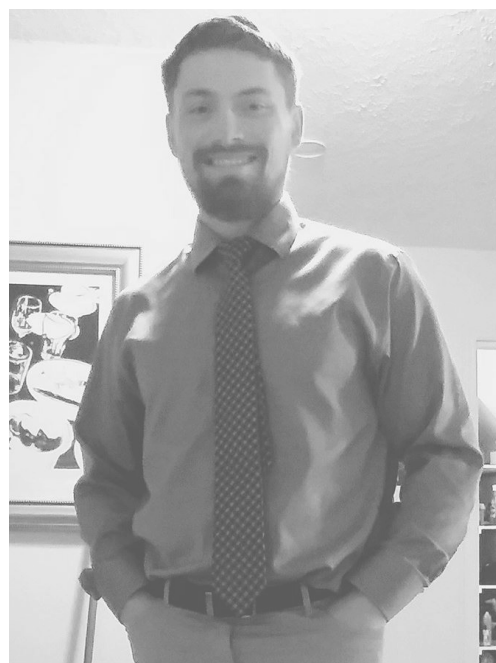
INTRODUCTION

ABOUT THE GAIA PROJECT AND THE AUTHOR

Geoff MacDonald (MEd, BEd, BSc), Manager of Climate Education at The Gaia Project, was proudly born, raised and educated in New Brunswick. He holds a Bachelor of Science, Bachelor of Education, and Master of Education from the University of New Brunswick, which focused on teacher education and inquiry-based learning strategies.¹ Geoff's areas of specialization also include hands-on science education and curriculum development.



The Gaia Project is a non-profit charitable organization with the mission "to empower youth to take action on climate change for a healthy environment". For ten years The Gaia Project has been a leader in experiential learning projects centered around improving energy literacy, climate literacy, STEAM skills and career planning for NB's children and youth. Their unique programs challenge students to confront and work through real world problems over the course of days, weeks or months to find solutions and create change.



Manager of Education, Geoff MacDonald (M.Ed, B.Ed, B.Sc) developed the NB Climate Change Education Plan,

In 2018, The Gaia Project was the recipient of the Education Award at the NB Power Energy Efficiency Excellence Awards which recognized an educational institution that developed and implemented an educational program to inspire action on energy efficiency and/or conservation (NB Power, 2018). Along with other government departments, The Department of Education and Climate Change Secretariat delegated and assisted in funding the development of the Climate Change Education Plan for New Brunswick schools. This multifaceted initiative will empower youth to make informed decisions about energy consumption and human impact on the environment through principles of experiential learning and problem-based learning.

1. Inquiry-Based Learning begins with questions, problems or scenarios and requires the learner to navigate their own path of obtaining knowledge often through their own experiences with the phenomena (Jones & Elck, 2007).

OBJECTIVES

WHY DO WE NEED CLIMATE CHANGE EDUCATION IN NEW BRUNSWICK?

Climate change is one of the greatest modern challenges facing our world (IPCC, 2018; IPCC, 2013). Sustainable Development Goals (SDGs) were created by world leaders at a historic United Nations summit to achieve a more sustainable future for our planet by addressing issues of poverty, inequality, climate, environmental degradation and prosperity. By 2030, the objective is to improve global energy efficiency, environmental protection and work towards sustainable communities that will one day thrive again. To develop an effective response to climate change, the educational sector must set the standard and prepare youth to live with its impacts (UNESCO, 2015). This Climate Change Education Plan, aligns with several priority areas from the UNESCO Global Action Program (GAP) including, transforming learning, building capacities for educators, empowering youth and accelerating localized sustainability projects (UNESCO, 2015).

2. Climate Change Education (CCE) involves the learning, awareness and effective responses to climate change. CCE prepares students to live with the impacts of climate change and empowers them to take appropriate actions towards more sustainable lifestyles (UNESCO, 2015).



figure 2: The United Nations 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries in a global partnership. These strategies aim to improve health and education, reduce inequality, and spur economic growth. (UNESCO, 2015).

INCORPORATE CLIMATE CHANGE INTO EDUCATION AT ALL LEVELS

This document has been developed as a strategic plan to implement Climate Change Education² (CCE) into New Brunswick schools and assist in meeting the commitments of the NB Climate Change Action Plan. The New Brunswick government introduced the Climate Change Action Plan in 2016 which includes objective #9, to "Incorporate climate change into education at all levels, including experiential learning and connecting learners with climate change initiatives in their local communities." (NB, 2016 pg 5). The Gaia Project will advance the UNESCO SDGs and GAP priority areas of education through the delivery of this plan in order to better support teachers and prepare students for a sustainable future.

CLIMATE CHANGE CLASSROOM BARRIERS

RESEARCH OVERVIEW

This project required extensive research on Climate Change Education (CCE). During 2017-18 The Gaia Project was funded by the Environmental Trust Fund and Department of Education to investigate educational programming across North America to identify leaders while investigating potential barriers that may arise throughout the implementation process. Although the majority of CCE research is current and ongoing, **three common barriers of CCE have been identified** to inform and advance the Climate Change Education Plan. These barriers include; **1)** general misconceptions about climate change science, **2)** a lack of leadership with CCE teaching strategies and **3)** significant gaps in government and community commitments toward CCE policy at the educational level.

1 MISCONCEPTIONS

Research suggests that climate change misconceptions arise from a variety of sources and play a significant role in the prevention of effective CCE.

Common climate change education misconceptions include:

- Students and teachers have **knowledge-based misconceptions** about climate change, for example, that the ozone layer is caused by major greenhouse gases such as CO₂ (Monroe, Plate, Oxarart, Bowers & Chaves, 2017; Taber & Taylor, 2009; Baker & Loxton, 2013).
- Teachers fear **parent reactions** to CCE topics, for example, some families might possess beliefs that do not support climate change theories (Wojcik, Monroe, Adams & Plate, 2014).
- Teachers believe climate change themes are **too controversial for students**, for example, the potential for natural disasters will scare students (Baker & Loxton, 2013; ACEE, 2017).
- Climate change **only connects to science curriculum** outcomes, for example, social studies teachers may not identify the relevance this world issue has on the economy (Alber, 2018; McNeill & Vaughn, 2012).

2 BARRIERS TEACHING CLIMATE CHANGE EDUCATION

Teaching strategies of CCE are often left out of the literature (Comeau, 2016) leaving teachers uncertain about how climate change, sustainability and energy literacy topics connect to the subject matter they are responsible for (Alber, 2018; Baker & Loxton, 2014). The following barriers may impede the implementation of CCE resources.

- Implementing new material and/or curriculum could be **met with resistance** from grade K - 12 teachers who already work extremely hard to situate a hefty curriculum load during the school year (Goodchild, Padolsky & Cheng, 2017).
- CCE topics may create a level of **eco-anxiety**³ or climate change fatigue for students and teachers if framed through fear and tragedy. This subject matter must be treated with **sensitivity and hopefulness**. To establish age appropriate material, experts recommend framing climate change topics around mitigation and adaptation strategies.

3. Eco-anxiety can be the result of gradual, long-term changes in climate resulting in emotions such as fear, anger, powerlessness, or exhaustion. This can often lead to people distancing themselves from these environmental issues.



The Gaia Project's Trash Tracker Program in 2016

- Some teachers may **lack a connection to the environment** which has been suggested to be a critical condition to effective action toward climate change issues (Kollmuss & Agyeman, 2002).
- **Project-based** CCE allows students to identify their role in society as an social engaged participant. However, these projects require time and supplies that may not be available to every teacher.
- Climate change topics are often **limited to the scientific classroom** disciplines. Although a connection to scientific material is clear, the coursework of social science and art classrooms help students develop a societal connection to project-based activities.

3 COMMITMENT AND SUPPORT

In 2018 a National Overview of Canadian Climate Change Policy was conducted by Bieler, Haluza-Delay, Dale and McKenzie, which examined and ranked provincial climate change policies to their corresponding educational targets. **New Brunswick was not discussed in detail** as there was seemingly nothing to mention. Compared to provinces such as Ontario, Manitoba and British Columbia, it appears that New Brunswick has not taken significant action to improve the educational model surrounding climate change and energy subject matter (Bieler, Haluzda-Delay, Dale & McKenzie, 2018).

Bieler et al. (2018) revealed an overall **"shallow engagement with climate change within education policies"** (Bieler, 2018; pg 79) and suggested that many provincial climate change policies fail to address CCE implementation strategies.

The New Brunswick Climate Change Education Plan requires mindful planning, piloting and execution over a number of years. This project affords our province the potential to propel forward as a leader and respected model of CCE both in practice and policy. As the global collective continues to adopt the SDG model, The Gaia Project will act as a leader in Atlantic Canada.

Successful implementation of new instructional materials depends upon some **formal teacher professional development opportunities along with informal peer mentoring and outreach partnerships** (Fullan, 2014; Huberman, 1991). These processes require continued financial supports, patience and progressive development. Successful implementation depends upon a **shared commitment** among the New Brunswick government, teachers, and other motivated organizations to encourage the required behavioral shifts to improve our way of life.



THE NEW BRUNSWICK CLIMATE CHANGE EDUCATION PLAN

MEETING OBJECTIVE #9 OF THE CLIMATE CHANGE ACTION PLAN

The Climate Change Education Plan has been strategically designed with a foundation built on three key pillars of action. Each component informs and supports the other in a thoughtful manner. **These three supportive components must advance and inform the plan as a whole** throughout the implementation process via resource evaluation and survey responses from teachers.

1. Classroom Resources (50%)

- Develop teacher friendly options
- Spotlight existing resources locally

2. Community Support (20%)

- Outreach partnerships
- Conferences
- Community events

3. Professional Learning (30%)

- Workshops
- Webinars
- Resources guides

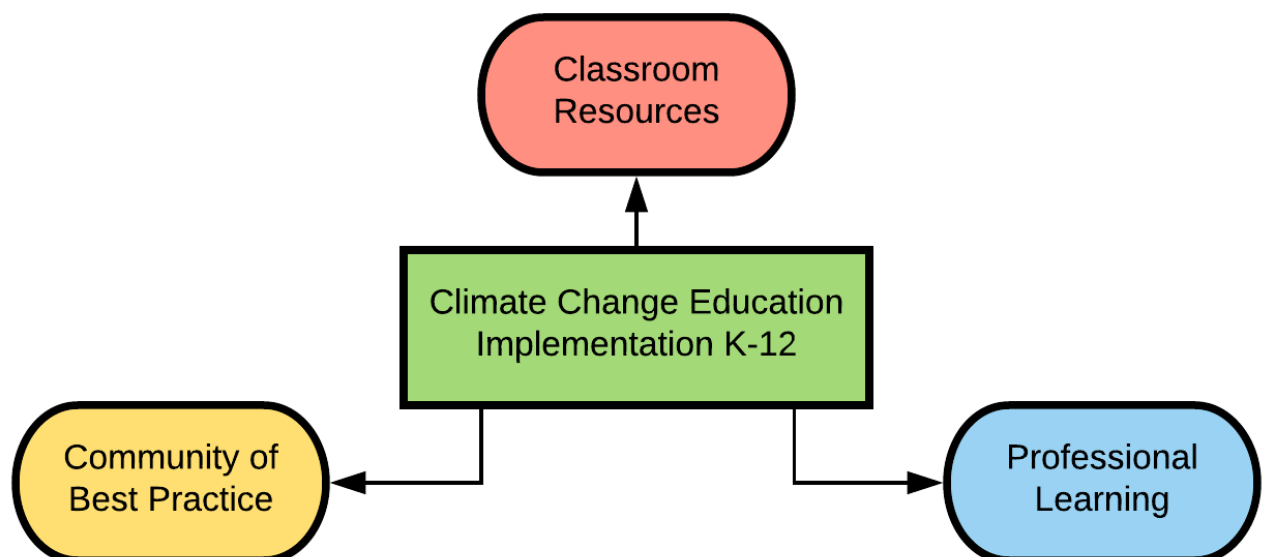


figure 3: Climate Change Education Plan mind map highlighting the three pillars of support required for successful implementation; teacher resources, professional learning and a community of best practice.

CLASSROOM RESOURCES

Research currently suggests that CCE teaching strategies such as project-based experiential learning may generate hope for students and initiate a willingness to act toward climate change mitigation (Boyes & Stanisstreet, 2012). **To support the objective #9 of the Climate Change Action Plan**, The Gaia Project is currently developing teacher friendly classroom resources that include hands-on investigations and project-based experiments. These lessons are designed to complement the current New Brunswick curriculum and **will be accessible across the province from an online platform**. The online resources will be promoted and obtained on The Gaia Project website.

About The Gaia Project Climate Change Lesson Plans For teachers:

- Lesson plans in development are for teachers in **French and English**.
- Lesson plans target science, social studies and other **NB curriculum outcomes**.
- Activities and investigations emulate the successful **experiential learning** programming of The Gaia Project at a low cost.
- CCE themes and topics must be carefully presented at **age appropriate levels** to allow students to take age appropriate actions, so resources are cataloged in four age groups; grades K-2, 3-5, 6-8 and 9-12.
- Lessons are strategically designed to promote an **environmental connection for students at an early age**, present forms of human impact on the environment, and then provide students with methods of age-appropriate action that can benefit their school and community.
- Teachers will be guided through sustainable living projects that **promote a willingness for students to act on climate change**.
- CCE lessons have been effectively⁴ delivered through the **5E learning cycle** to improve student attitudes and climate change knowledge.
- Lesson plan **development and improvement will be ongoing** during the next three years as the material is evaluated on ease of access and improvements to student attitudes. .
- Lesson plans include aligning CCE resources such as internet activities, professional outreach partnerships and other resources in New Brunswick and/or around the globe.

4. The 5E learning cycle was developed to guide teaching through scientific inquiry and slow students to guide their own learning through curiosity (Bybee, Taylor, Gardner, Van Scotter, Powell, Westbrook & Landes, 2006).

CLASSROOM RESOURCES (SAMPLES)

ENERGY PRODUCTION INFOGRAPHIC



RENEWABLE ENERGY

Renewable energies include wind, hydro and solar electricity which depend on the natural occurrence of wind, water and sunlight for production. Hydro is very a very efficient source of electricity while solar and wind generate the least amount of electricity.



Wind Requirements:
Air carries much less energy than water, so much more of it is needed to spin rotors. One needs either a few very large wind-mills or many small ones to operate a commercial wind-farm. In either case, construction costs can be high. There are a limited number of suitable locations where the wind blows predictably.



Hydro Requirements:
Most hydro-electric plants use a reservoir to compensate for periods of drought, and to boost water-pressure in the turbines. The massive dams required are also handy for controlling floods. Costs stem from the loss of land submerged by the reservoir. Dams have displaced people, and destroyed wildlife habitat and archaeological sites. A dam-burst can be disastrous



Solar Requirements:
Solar-cells do not use a generator; they are the generator. Usually arranged in panels, these devices take advantage of the ability of light to cause a current to flow in some substances. They produce no pollution when operating. Solar panels have been relatively expensive to make, and of course they won't work at night or in foul weather.

NON-RENEWABLE ENERGY

Non-renewable energies include burning fossil fuels such as coal and nuclear power plants. The fuel for these energy sources are not renewable and have taken millions of years to develop.



Nuclear Requirements:
Nuclear plants don't use large amounts of fuel and do not refuel often, and are more efficient producers of electricity. The fact that green-house gasses and air-borne particulates are minimal during normal operation makes nuclear power attractive to many who are concerned about air-quality. Waste water is hotter than that from a fossil plant, and large cooling towers are designed to address this problem. The major risk is contamination and nuclear meltdown which can result in major disaster.



Fossil Fuel Requirements:
Fossil-fuels are the remains of plant and animal life that lived millions of years ago. Exposed to high temperatures and pressures underground, these remains have been transformed into forms of carbon: coal, oil, and natural gas. Unlike electricity itself, large amounts of fossil fuels can be stored. Many electric utilities have operated fossil-fuel plants for decades. Fossil-fuel plants can create serious environmental problems. Burning these fuels produces sulfur-dioxide and nitric-oxide air-pollution requiring expensive scrubbers. Wastewater from the used steam can carry pollutants into water-sheds. Even with very good pollution controls, there is still waste material produced. Carbon-dioxide gas, and ash are the current concerns

Energy information sourced from
<http://americanhistory.si.edu/powering/generate/gnmain.htm>

K-2 SUSTAINABILITY IN ACTION PROJECTS



Project 1: Waste Reduced Lunches

Step 1

- Draft a letter to your students' parents and/or guardians to inform them of the sustainable living activities and projects taking place in your classroom.
- Introduce the concept of reducing as the most important action to protect the planet.
- Ask parents and/or guardians to have conversations at home about recycle items and waste reduction.

Step 2

- Plan a week of waste reduction lunches and ask parents to pack lunches with reusable containers and avoid products with wrappers that are not recyclable.
- The week **BEFORE** waste reduction lunches use a simple hanging scale to weigh the class trash bag at the end of each day or ask the custodian to estimate the weight of bags collected. Record the weights on the board for students to see.
- During the waste reduction lunch project, weigh the classroom trash bag after class each day and record the results for comparison.

NOTE: This project can present socio-economical issues for some families and requires compassion for students of all backgrounds. Try not to isolate students if they don't participate fully.

K-2 SUSTAINABILITY IN ACTION PROJECTS



Project 1: Waste Reduced Lunches

Step 1

- Draft a letter to your students' parents and/or guardians to inform them of the sustainable living activities and projects taking place in your classroom.
- Introduce the concept of reducing as the most important action to protect the planet.
- Ask parents and/or guardians to have conversations at home about recycle items and waste reduction.

Step 2

- Plan a week of waste reduction lunches and ask parents to pack lunches with reusable containers and avoid products with wrappers that are not recyclable.
- The week **BEFORE** waste reduction lunches use a simple hanging scale to weigh the class trash bag at the end of each day or ask the custodian to estimate the weight of bags collected. Record the weights on the board for students to see.
- During the waste reduction lunch project, weigh the classroom trash bag after class each day and record the results for comparison.

NOTE: This project can present socio-economical issues for some families and requires compassion for students of all backgrounds. Try not to isolate students if they don't participate fully.

K-2 ENERGY CONNECTIONS SEASONS



GRADE: K-2 **SUBJECTS: YOU AND YOUR WORLD**

Description: Students will be asked what season they are in. To help determine the answer go outside and collect evidence to make an informed decision. Students should revisit the outdoor environment weekly to observe change and collect data to compare previous results. Students will have a class discussion about how families and friends changed their habits and behavior during the season change. Watch for weather, wildlife, plant growth, human activity, etc.

LESSON OBJECTIVES/OUTCOMES (NB CURRICULUM DOCUMENTS):

- 1.2.4 Record observations and display data to explain seasonal changes. (Anglophone)
 - describe how humans prepare for seasonal changes
- 3.1 Establish the link between the seasons and the changes in the conditions of the living environment of living beings (francophone)
 - investigate the changes that occur seasonally in the characteristics, behaviours and location of living things resulting from the solar cycle
- 1.4.1 Students will be expected to demonstrate an understanding that the way people live in their community evolves over time.
- 1.2.5 Describe how people depend upon and interact with different natural environments.
 - identify new questions about what has been learned from a variety of sources

MATERIALS:

- LAPTOP
- FLASHLIGHT
- SUNSCREEN
- SEASONAL CLOTHES
- SEASONAL FOODS
- BUG SPRAY

figure 4: Some sample pages of the Gaia Project climate change lesson plans. These lessons follow the 5E learning cycle and emphasize project-based activities and investigations.

COMMUNITY SUPPORT

Many existing environmental education outreach groups target CCE objectives and have been identified as CCE leaders within their communities. For example, The Gaia Project, EOS Eco-Energy, Ducks Unlimited Canada, Falls Brook Centre, Nature NB, Let's Talk Science, Meduxkaeag River Institute, Canadian Rivers Institute, NB Wildlife Federation, Fundy Biosphere, and other organizations offer CCE related programming and activities within their local communities and schools.

The Climate Change Education Plan suggests that **outreach groups communicate and collaborate effectively with educators**. Outreach groups could be a critical support for teachers and schools attempting to implement effective project-based CCE.

Community outreach partners and teachers can deliver these programs through a team teaching effort as suggested in the Teacher-Scientist Partnership Model (Houseal, Abd-El-Khalick & Destefano,

2014; Falloon, 2013).

CCE success stories could be identified and presented to teachers, and community leaders around the province. For example, Sackville, New Brunswick participates in an annual event, '**Climate Change Week**'. The community comes together with the guidance of EOS Eco-Energy to act on climate change awareness and adaptation strategies. These type of community supports may be encouraged to enhance climate change awareness and education projects in schools.

Some teachers are already equipped and exposing their students to these topics, but **the overall majority of teachers will likely require support and modelling**. Additionally, environmentally aware teachers may act as **peer-mentors** for colleagues in their schools. Schools lacking these peer-mentors may be identified by school district coordinators across New Brunswick, and outreach support can be targeted toward schools lacking effective CCE leadership.



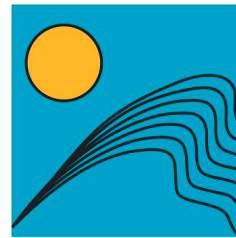
PROFESSIONAL LEARNING

Climate change classroom resources and community support may not be enough to reach the students of every New Brunswick school. Some teachers may even misuse these resources without direct guidance. Professional development workshops provide an opportunity to empower teachers to implement CCE lesson plans, activities and projects into a variety of subjects at all levels.

French and English teachers in New Brunswick should be given the opportunity to **enhance their knowledge and understanding of climate change.**

Professional learning and peer-mentoring are recommended supports for teachers to alleviate issues of resource misuse while inspiring the willingness to participate (Fullan, 2014; Huberman, 1991).

A recent study suggests that 39% of teachers in New Brunswick experience one or two science education PD sessions every five years (Campbell, Osmond-Johnson, Faubert, Zeichner & Hobbs-Johnson, 2017). **Climate change topics are not limited to scientific disciplines**, but teachers may fail to recognize how CCE relates to social studies, art, music and other subjects, resulting in their dismissal of CCE professional learning opportunities. Campbell et al. (2017) suggest that one day workshops are perceived as the most effective form of PD for teachers in New Brunswick.



Learning for a
Sustainable Future

LSF

Potential professional Learning facilitators other than The Gaia Project include Great Minds Think outside (New Brunswick) and Learning for a Sustainable Future (Ontario).

These workshops will be piloted by TGP and partners during the 2019-2020 school year in hopes that the NB Department of Education will support these opportunities and **increase availability to all 7 school districts throughout NB by 2021.**

Workshops will be facilitated by seasoned professionals at TGP and other capable organizations such as Learning for a Sustainable Future, Wolastoqiyik Pedagogy Training Centre and Great Minds Think Outside. Staff from TGP will seek training from national and international organizations on a range of topics including environmental inquiry, E-STEM [Environmental Science, Tech, Engineer and Math] and experiential education to learn from pre-existing training programs and bringing back programs and offer to New Brunswick teachers. Professional learning groups could potentially be funded by current or potential funders of TGP.

THE NEW BRUNSWICK CLIMATE CHANGE EDUCATION PLAN

TIMELINE TO MEET OBJECTIVES

The Climate Change Education Plan will be conducted in three phases of implementation:

1. Research, Networking and Resource Development

Extensive research will be conducted to determine effective C.C.E. teaching strategies and professional development options. Research will guide lesson plan development beginning with k-2, 3-5, 6-8 and 9-12 recommendations.

2. Small scale piloting k-12 resources in classrooms

Recommended lesson plans and other resources will be available to a limited amount of k-12 teachers for piloting. Feedback will be collected to improve resources.

Resources will be available as climate change companion guides with recommended activities, projects, labs and localized outreach opportunities.

3. Professional Learning Expansions and Large Scale Resource Piloting, K-12

Resources will be improved based on feedback and redistributed through an online platform for easy accessibility. Professional development opportunities will be made available in each school district for teachers who require support.

CLIMATE CHANGE EDUCATION PLAN TIMELINE		
YEAR 1	YEAR 2	YEAR 3
Climate Change Education Research and Resource Planning and Development June 2018 to Mar 2019	Phase 2 piloting; k-12 resources Oct 2019 to June 2020	Professional Learning and Large Scale Piloting Sept 2020 to June 2021
Small Scale Piloting; k-12 Resources April 2019 to April 2020	Professional Learning Workshop Pilot April 2019 to Sept 2020	NB Pre-Service Teachers introduced to C.C.E. teaching strategies Sept 2020
	Climate Change week piloted around New Brunswick April 2020 or Sept 2021	Teachers Offered Gaia Project CCE Resources; K-12 Sept 2022

figure 5: This three year commitment has been designed for careful, strategic implementation with classroom resources, professional development and community supports in place at appropriate times. Some minor alterations may become appropriate as the plan evolves moving forward.

REFERENCES

- ACEE. (2017). What is Excellent Climate Change Education? Alberta
- Alber, B. (2018). A Lesson in Climate Change Education: Examining how Climate Change is taught in the Nova Scotia Public School Curriculum (Doctoral dissertation).
- Baker, J., & Loxton, J. (2013). Climate change knowledge and attitudes of pre-and in-service Nova Scotia teachers: An assessment of educator readiness and needs. Nova Scotia.
- Bieler, A., Haluza-Delay, R., Dale, A., & McKenzie, M. (2017). A National Overview of Climate Change Education Policy: Policy Coherence between Subnational Climate and Education Policies in Canada (K-12). *Journal of Education for Sustainable Development*, 11(2), 63-85.
- Boyes, E., & Stanisstreet, M. (2012). Environmental Education for Behaviour Change: Which actions should be targeted?. *International Journal of Science Education*, 34(10), 1591-1614.
- Comeau, L. (2016). A climate action plan for NB is a clean energy plan. Conservation Council of New Brunswick.
- Fullan, M. (2014). *Teacher development and educational change*. Routledge.
- Jones, M., & Eick, C. (2007). Implementing inquiry kit curriculum: Obstacles, adaptations and practical knowledge development in two middle school science teachers. *Science Education*, 492-513.
- Huberman, M. (1992) Teacher development and instructional mastery', in HARGREAVES, A. and FULLAN, M. (Eds.), *Teacher Development and Educational Change*, Basingstoke, Falmer.
- International Panel on Climate Change. (2018). Special Report on Global Warming of 1.5°C (Report). Incheon, South Korea: Intergovernmental Panel on Climate Change. Retrieved 7 October 2018.
- Intergovernmental Panel on Climate Change (2013). The physical science basis. Contribution of working group I to the fifth assessment report of the IPCC. Cambridge: Cambridge University Press.
- M., Roth, W. M., & Abdullah, M. N. S. B. (2015). Enhancing primary school students' knowledge about global warming and environmental attitude using climate change activities. *International Journal of Science Education*, 37(1), 31-54.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, 8(3), 239-260.
- McNeill, K. L., & Vaughn, M. H. (2012). Urban high school students' critical science agency: Conceptual understandings and environmental actions around climate change. *Research in science education*, 42(2), 373-399.
- Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2017). Identifying effective climate change education strategies: a systematic review of the research. *Environmental Education Research*, 1-22.
- NB Power. 2018. Energy Efficiency Excellence Awards. Retrieved from: <https://www.nbpower.com/en/save-energy/events-and-training/energy-efficiency-excellence-awards/>
- Province of New Brunswick. (2016). Transitioning to a Low-Carbon Economy: New Brunswick's Climate Change Action Plan. Fredericton, N.B.
- Taber, F., & Taylor, N. (2009). Climate of Concern--A Search for Effective Strategies for Teaching Children about Global Warming. *International Journal of Environmental and Science Education*, 4(2), 97-116.
- UNESCO. (2015). Education for All Global Monitoring Report. Teaching and Learning: Achieving Quality for All, UNESCO Publishing: Paris. <https://en.unesco.org/gap/priority-action-areas>
- Wojcik, Deborah J., Martha C. Monroe, Damian C. Adams, and Richard R. Plate. 2014. "Message in a Bottleneck? Attitudes and Perceptions of Climate Change in the Cooperative Extension Service in the Southeastern United States." *Journal of Human Sciences and Extension* 2 (1): 51-70