

**CLIMATE
CHANGE
EDUCATION:**



**ACTING FOR
CHANGE**

“The next United Nations climate conference, COP21, will be one of the biggest international summits. The stakes are high: managing the climatic disruption that threatens our societies and our economies. The conference should lead to the adoption of a universal agreement that will provide a framework for transition toward low-carbon societies and economies able to withstand climate change.”

Paris 2015: UN CLIMATE CHANGE CONFERENCE: Infography
<http://www.cop21.gouv.fr/en>

Created in association with PEASE:
The Policy Enactments and Sustainability
Education Group, Ontario, Canada.



Acknowledgements

The authors acknowledge the kind support of York University, Lakehead University and the TD Friends of the Environment Foundation, and we thank Carolyn Scotchmer (TD FEF) for her advice and encouragement.



Contributors

Ana Martinez, Faculty of Education, York University; **Anders Sandberg**, Faculty of Environmental Studies, York University; **Christina Philips**, Faculty of Education, York University; **Daniel Rawlins**, Willowdale Middle School; **David Greenwood**, Faculty of Education, Lakehead University; **Dawn Bazely**, Department of Biology, York University; **Hilary Johnson**, Woburn Collegiate Institute; **Jacques Katz**, Fern Avenue Public School; **Janet Dignem**, Durham, District School Board; **Josefina Reuter**, York University; **Justin Dillon**, University of Bristol, England; **Larry Bencze**, OISE, University of Toronto; **Leesa Fawcett**, Faculty of Environmental Studies, York University; **Lisa Gal**, George Henry Academy; **Natasha Myers**, Department of Anthropology, York University; **Neesha Joffri**, Faculty of Education, York University; **Philip Vaughter**, Institute for Research and Innovation in Sustainability, York University, Canada; **Rita Filicetti**, George Henry Academy; **Sabrina Scott**, Department of Science and Technology Studies, York University; **Stephen MacDonald**, Forest Hill Collegiate; **Steve Alsop**, Faculty of Education, York University; **Tim Leduc**, Wilfrid Laurier University; **Vanessa Alsop**, The Dragon Academy.

Making Space for Education

Education needs to be more widely recognized in climate change meetings, debates, policies and actions. We release this report during the global leaders conference of the parties on climate change in Paris, France, December 2015 and invite politicians, administrators, teachers and students to consider how public education might play a more prominent role in responses to climate change. With heightened expectations for meaningful and binding outcomes from the conference, the time is now right to embark on diverse and progressive educational climate dialogues and reforms in Southern Ontario, Canada and beyond.

We acknowledge and applaud the multiplicity of ways that students, teachers, schools and school boards are responding to contemporary global changes. A series of local policy reforms emphasize the importance of explicitly including climate change within policy and curricula. These include the *Go Green: Climate Change Action Plan* from the Toronto District School Board, which serves in many respects as the most comprehensive and far-reaching policy statement in our region.

Such examples offer a firm starting point from which to build more widespread, ambitious and innovative policies and practices. With this agenda in mind, *Climate Change Education: Acting for Change* has three goals: recognize the profound importance of education as a response to climate change; share innovative and practical school-based approaches to climate change education; and make recommendations for future policies and practices. It contains nine teaching practices and nine recommendations.

The report was built from a series of climate meetings with teachers and researchers - all recognized as jurisdictional leaders in climate change education

(CCE). These exchanges took place over two months. We also sent a draft copy of this report to senior educators and researchers for their responses, which were then incorporated into the evolving text. The previous page provides a list of those involved.

This report is for students, teachers, school and board administrators, teacher educators and ministers of education in southern Ontario and in other educational jurisdictions in Ontario and across Canada. It is our collective hope that it offers innovative and inspiring practices combined with provocative recommendations. This report is a distinctively *local* contribution to the upcoming climate change negotiations. We hope it inspires many others. School-based climate change education is so important that it deserves so much more of our attention and support.

Authors

Steve Alsop
Faculty of Education,
York University, Canada

David Greenwood
Faculty of Education, Lakehead
University, Canada

Philip Vaughter
Institute for Research and Innovation in
Sustainability, York University, Canada

Sabrina Scott
Department of Science and Technology
Studies, York University, Canada
Witchbody Studio Illustration & Design
<http://witchbody.com>

December 2015



Climate Education Practices

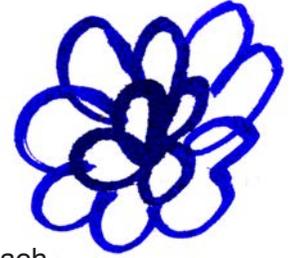
Nine educational leaders in Southern Ontario schools were asked to share their most promising climate change teaching practices.

Lived, Integrated Curriculum: Start with Students' Lives and Interests



Jacques Katz explores climate change as an integrating 'Big Idea' with his fifth grade classroom in Fern Avenue Public School, Toronto. This starts with student driven questions. In the past these have included: How does climate change happen? What are the impacts of climate change? What can the school do about it? Over the course of the following half-year, climate change becomes an integrated theme, woven into all subjects, including social studies, science, dance, math, and language. Students participate in a variety of projects and activities including: writing and illustrating verses in the style of *The Lorax* for real animals experiencing the impacts of climate change; creating verb-chain dances to illustrate the impacts of climate change on the environment; collecting school data about modes of transportation and advocating for change among their peers and local community. Using resources as diverse as NASA's Climate Kids program and local government documents, Jacques then invites his students to "live" in a future with climate change. For one school week, electricity in the class is rationed, unstable weather causes recesses and other activities to be cancelled, food availability is explored, and pencils, paper and other material resources are conserved due to dwindling supplies.

Climate Data and Policy Analysis: Imagining Community Adaptation



Janet Dignem's favored approach to climate change is embedded in contemporary earth and space science. From early lessons introducing students to definitions and terminology, to historical overviews of the planet's climate, examining forcing mechanisms, and learning about interactions between the earth and the sun, Janet explores overarching climate trends. One associated lesson tract that Janet and her colleagues at Durham District School Board find especially successful is using IPCC reports as well as the *Ontario Government's Climate Change Action Plan (2007)* as key texts for analysis. This approach aimed at the high school level uses region-specific data to show how global processes impact places at the local level. By examining climate change data, emissions profiles, plans, and policies, Janet encourages students to ask questions about how economic growth, population growth, and changing provincial and federal policies have impacted the province's GHG emissions levels. By examining changing trends in both emissions/climate over time, students not only think about causes of climate change, but also about diverse mitigation and adaptation strategies for their school and communities.

Learning with Systems Thinking: Noticing Environmental Relationships

Daniel Rawlins is a grade 7 and 8 teacher at Willowdale Middle School, Toronto, who likes systems thinking – water systems, biological systems, energy systems, economic systems, transport systems and others. For Daniel, systems are an excellent way to explore climate change within his science classes. In talking about a system such as

the water cycle, he incorporates climate change issues such as ocean acidification, glacial melt, and freshwater supply into a grounded understanding of local and regional systems under investigation. This approach, he suggests, offers a fruitful and relevant way to look at climate change in all of its complexity and interconnectedness.

Using data on local ecological and social systems as they relate to climate change allows students to understand dynamic human-ecological interconnectedness. Daniel nurtures critical media literacy skills in science by analyzing local climate discussions in the news media, which his students then relate to environmental and social systems.

Complex Climate Negotiations: Role-Playing Key Stakeholders

Hilary Johnson is a high school geography teacher at Woburn Collegiate Institute. Her teaching explores how natural environments are affected by human activities, and how environmental and economic processes play into international politics, trade, and natural resource use. In one activity, Hilary focuses on Canada's oil sands industry, encouraging students to ask critical questions. *The Black Gold: Oil Sands* is a simulation activity that she has developed in which students role play 8-10 stakeholder groups within the oil sands industry. Provincial governments, First Nations groups, business lobbying groups, and environmental NGOs are examples of some of the groups involved. One group of students are tasked with being a governing board that will make the final decision on whether or not the different parties will get what they are positioning for. Groups then research their stakeholder group's position on the topic, as well learn to 'frame' the associated evidence. They then engage in multi-lateral negotiations between all parties, presenting their positions and their evidence in order to convince their classmates. They conclude by debriefing on decisions reached. Climate change is the

major theme embedded throughout the lessons, connected with state of the economy, land sovereignty, and numerous other issues. In creating this lesson, Hilary highlights how climate change might be socially situated, highlighting the politics of whose voice gets to count (and not) in decision-making.

Her lessons can be found at:
<http://tinyurl.com/WoburnBlackGold>

Incorporating Lifestyle and Art: Natural Products, Green Design, and Community Gardens

Teaching art and running the school library at George S. Henry Academy has provided Rita Filicetti numerous opportunities to engage with multiple sustainability issues. Whether it's using industrial design lessons to teach students how to transform waste into useful household items (some examples include purses, tables, chairs, frames, and a really cool pair of shoes), or working with the school's Green Team to create their own lip balm and body butter (lavender is a favorite flavor, though Rita is keen to promote more native plants), she is always on the lookout for ways to incorporate green design and thought into how she works with students. Not content to stop with an already full portfolio of green design classes, Rita's latest project is creating the school's community garden from scratch. Patterning the design of the garden on the Medicine Wheel and using principles of permaculture, Rita is incorporating native plants, organic vegetables, and the school's compost into creating a garden that recognizes the school's history while looking towards its future. Furthermore, the garden will serve as a seed bank for the surrounding community, allowing community members access to fruits, vegetables, and flowers for their own gardens – a practice that Rita notes is in line with the school's original motto – "to plow with care." Fostering a sustainable and ecologically connected lifestyle shapes Rita's educational responses to climate change.

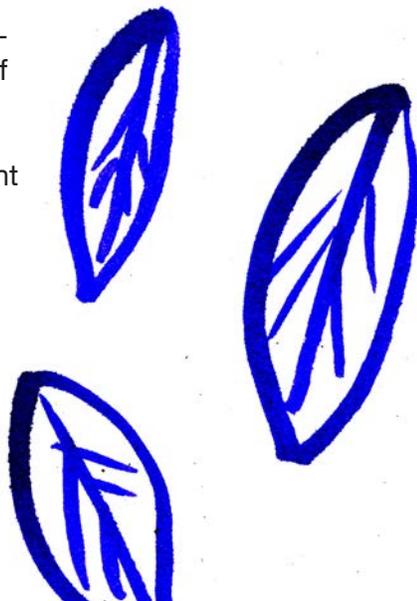


Understanding Northern Climate Change: Role-Playing Caribou in a Changing Habitat

Josefina Rueter draws from her teaching connections with Nunavut to stress the importance of incorporating indigenous knowledge in the curriculum, especially when teaching topics such as climate change. Environmental stewardship, cooperation, and problem solving are all critical skills that have been emphasized throughout Inuit culture for generations, and continue to be emphasized in the territory's curriculum. She also feels it is important for students to remember their connection to the North, encouraging them to consider that changes in the arctic mean changes to the rest of the world, and actions in Southern Ontario can impact northern arctic communities for generations. One of Josefina's favorite activities to help initiate conversation about a wide range of environmental issues facing Canada (including climate change) was a role-playing exercise. She put her elementary class into the role of a caribou herd, with one of the school's sports fields representing their range of their tundra habitat. The gist of the activity was simple – cross the field, just as caribou cross the tundra yearly in their annual migration. However, after the initial crossing, Reuter and the other faculty and staff began to create obstacles for the herd. Tarps represented oil spills, sheets and blankets were suburban developments, and ropes were roads. With each successive crossing of the field, the class found their once free movement more and more restricted. Physically experiencing the impact (as caribou) of suburban neighborhoods, oil infrastructure, and roads for more cars and trucks opened the door for discussions linking development to impact on habitat and climate, and indigenous knowledges and practices.

Climate Change and The Story of Stuff: Minimizing E-Waste

Lisa Gal teaches computer technology and communications at George S. Henry Academy in North York. When one of her colleagues began an evaluation of the school's older computer equipment to see which pieces could be updated to save on the cost of replacing them, Lisa saw an opportunity to connect discussions of electronic waste (e-waste) and consumerism to climate change. Lisa noticed that discussions of the amount of GHGs that go into producing electronics and disposing of them were often overlooked. Using documentaries on e-waste and waste in general (such as web-based resource *The Story of Stuff*), she began discussions with students on how the frantic pace of replacing technology (computers and other consumer products) impacts global ecosystems. After doing an inventory of many of the school's computers, the class was able to update a number of computers so they could potentially act at least as word processors for the school, keeping them out of the e-waste stream, and in the hands of students and teachers, as long as possible.



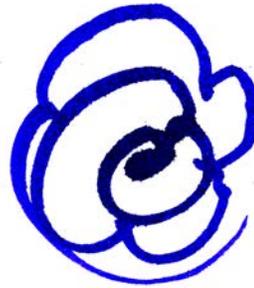


Climate Change and Biodiversity is in our Backyard: Noticing Native and Invasive Species

Ana Martinez works with groups of local teachers and students. Her practice seeks to connect climate change with observing and monitoring local changes: including backyard ice rinks, and maple tree sap. She encourages teachers and students to search for local outdoor evidence in which climate change becomes palpable. A popular activity is an annual inventory of tree species in schoolyards and local areas, in order to determine which species are thriving and which are declining. When compared to past decades, and previous measurement, data can show the rate of growth of both prevailing and declining species. Another exercise is the detection of exotic or invasive species endangering native species, such as the wild teasel, garlic mustard, dog strangling vine, or the emerald ash borer, some of which flourish under new climatic conditions. After these activities, students discuss how these changes came to be and how humans have played a role in both the climate and the introduction/appearance of foreign species in their area. Students are asked to consider how their local communities might adapt to these changes, and whether it is possible (and desirable) to reverse or stop the incursion of invasive species in a changing climate.

Encouraging Innovation and Resilience: Documentary Filmmaking and Creative Problem-Solving

Stephen MacDonald feels that more can be done about climate change in schools.



Over the past few years he has been moving climate change out of the periphery and putting it at the center of his practice. At Forest Hill Collegiate School, Stephen has made sure that students are not only engaged with an active understanding of the processes involved in climate change, but also became actively involved in seeking solutions to the problems caused by climate change. He has created assignments such as a green documentary where students highlight a local environmental issue, as well as a planning exercise to examine which plants will grow best in the school lot given the area's particular environmental conditions. In one assignment, students are tasked with showcasing how physical processes across the globe are connected to human activities.

Questions focus on physical disruptions that can impact Canada. Other questions encourage students to think about how human activities in their communities relate to physical processes around the globe – such as melting continental ice sheets. By prompting students with these 'big questions', these assignments encourage students to consider the interplay between human activities, the earth's physical processes, and ecological limits.

Recommendations for Change

Leading administrators, educators and researchers were asked to make recommendations to guide climate change education policies and practices. Nine recommendations follow.

Recommendation 1: Education Should Have a Greater Role in Responses to Climate Change

Climate Change Education (CCE) needs to become much more central and prominent in schools, school boards, and governmental jurisdictions. As it currently stands educational institutions have been widely criticized as being far too slow and conservative in their responses. In contrast, for instance, the recent encyclical letter, *Laudato si'*, by Pope Francis is considerably more progressive.

Most Canadian metropolitan areas and governmental jurisdictions now have climate change policies and have embarked upon short-term and longer-term planning and action. There are also a series of large-scale research and development projects on the future of the Great Lakes Bioregion. However, these invariably overlook education. Teachers, administrators and education researchers have distinctive expertise and should have a greater role in these, and other local responses, to climate change.



Recommendation 2: Schools and School Boards Need Climate Change Leaders

Schools and school boards need to nurture climate change leadership. This could take the form - for instance - of school-based teacher/student climate action groups and a division-wide group comprising teachers, students, administrators and municipal policy makers. These groups can work together and with others in kick-starting short and longer-term actions, including:

- Monitoring and mitigating GHG emissions and adapting school grounds and facilities;
- Adopting Climate Change Education as a major curriculum theme for innovative teaching and learning;
- Joining with local community climate groups (including youth groups), municipal planning and others, recognizing the importance of collaboratively mobilizing for change.

Recommendation 3: Climate Change Education Requires Understanding Human Ecology as Constantly Being Shaped by and Embedded with Global Ecosystems

Climate Change Education needs to challenge the erroneous divide between 'the environment' and people. It needs to push back on the false separations of nature and culture, and associated hierarchies. CCE needs to be ecologically embedded, immersed and responsive; it needs to motivate us to appreciate and experience our place as part of the world's global ecosystems. Our very existence is made possible because of environments that we inherit and share with diverse others.



Recommendation 4: Climate Change Education Needs to be Interdisciplinary

CCE needs to promote innovative cross-curriculum and interdisciplinary collaborations and thinking. Transitioning to a low, and more equitable carbon society needs expertise in science and technology, including climate and ecological models and alternative energy technologies. It also requires better understanding people, societies and cultures. Such expertise is often interdisciplinary in nature. All school subjects should be involved in shaping innovative changes in educational practices. CCE needs attractive, stimulating, progressive and generative trans-curriculum themes. These might include: food, water and soil, climate literature, imagery and movies, transportation, and studies of social movements for and against climate.

Recommendation 5: Climate Change Education Needs to Embrace Climate Change as a Condition of Contemporary Environmental and Social Imbalances

CCE needs to bring contemporary social and ecological conditions to the foreground. Climate change is diverse, complex and multifaceted. It is not solely an atmospheric or climatic phenomenon, but better conceived as a symptom, condition or network of contemporary environmental, social and economic imbalances. Naomi Klein, for instance, describes it as a 'perfect storm'. Others associate it with a new period in geological history, 'the Anthropocene'.

Climate Change Education needs to

actively explore broader social and ecological contexts in which cotemporary changes are unfolding. These include accelerating biodiversity loss, intensifying resource extraction and commodification, unprecedented disparities between the rich and the poor, weakening state democracies and increasingly powerful global industrial political economic players. It seems impossible to understand climate change without engaging in discussion of socio-economic conditions in which our educational practices reside and also seek to influence. A potential educational resource with this focus is a new publication from *Rethinking Schools: A People's Curriculum for the Earth*.

Recommendation 6: Climate Change Education Should be Place and Community Inspired and Responsive

CCE must intersect and connect with where and how people live their everyday lives in place and community. Every place and community has assets - and challenges - that can contribute to a growing understanding of how people both shape and are shaped by their changing environments. Exploring this fundamental precept of human ecology through sustained local experience, inquiry and action - whether through natural history, cultural study, environmental monitoring, community mapping, or action research for local change - lays important groundwork for connecting lived experience in place to regional and global concerns. Further, schools need to see the larger local community as a potential set of assets for extending learning as well as for opportunities for meaningful community participation in climate change curriculum. In short, climate change educators and leaders need to constantly practice 'bringing the biosphere home' so that all learners can make social, ecological and climatic connections between near and far, as well as between the past, the present and the future.

Recommendation 7: Climate Change Education Needs to Effectively Engage the Political

Climate change is a public health issue, an economic issue, an ecological issue, a security issue, a power issue, and an identity issue. CCE fundamentally relates to values, and necessitates principles of ethics, justice and equity. By ignoring these political dimensions, we do a disservice to the possibilities of schools nurturing critical thinkers and citizens. Everybody on Earth is affected by climate change; however, they are affected unequally and unjustly. CCE must remain especially attentive to those who live, endure and suffer the greatest impact of changes and continue to mobilize in dynamic and creative ways. Such individuals and groups are often marginalized, and least responsible for these changes. CCE needs to disclose climate injustices, and join with others imagining and taking action for change. It needs to openly encourage diverse and lively political discussions that are critical and generative.

Recommendation 8: Climate Change Education Needs to Engage Indigenous and Local Cultural Knowledges and Practices

CCE should embrace knowledges and cultural practices of First Nations, Inuit and Métis. They have brought wisdom and understanding of environmental change and stewardship for many millennia. Elders should be consulted about their recommendations for bringing climate change into the school's curriculum.

Curricula and associated resources developed in Saskatchewan, Manitoba and Nunavut can serve as innovative and inspiring curriculum models. CCE needs to connect with other local expertise that has remained closely connected to ecosystems, biodiversity, land and water.

Recommendation 9: Climate Change Education Should be Imaginative, Exciting, Hopeful and Playful

Climate Change Education needs to be vibrant, engaging and inspiring. It should aspire to being more alive, seeing the world in new ways and with new possibilities. It cannot afford to be boring, intimidating or off-putting, sinking into well-worn doomsday, apocalyptic narratives. It needs to leave students with a sense of optimism, beauty, delight and playfulness: being more about passion, hope and love, than apathy and despair. Climate change education should not sidestep global imbalances and responsibilities, but embrace these 'full-on,' pushing back drabness and releasing creativity and imagination, inspiring new ways of thinking and acting. CCE should be bold and captivating, not tinkering on the margins but a vibrant invitation for teachers and learners to play an ever-increasing role in imagining and shaping futures.

“The largest vision toward which this manifesto points is not some new doctrine or plan, not a new and already-worked-out set of possibilities, but rather a more critical and at the same time free-spirited welcome toward possibility itself, toward the extraordinary moment at which we stand and into the unique imagination space that embracing our moment opens up.”



Anthony Weston (2012) Mobilizing the Green Imagination: An Exuberant Manifesto. (p. xvi.) Gabriola Island, BC: New Society Publishers.

