

Climate Change Topics of Interest for Public Outreach:

Natural Environment (*'Green Infrastructure'*)

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From: Tim Cumming, Communications Specialist, Ausable Bayfield Conservation

To: Municipality of South Huron Climate Change Adaptation Committee (SHCCAC)

Upcoming meeting date: Thursday, February 4, 2021

Background: The South Huron Climate Change Adaptation Committee, in reaching out to the public and sharing the outcomes and next steps of the *Climate Change Adaptation Strategy*, are thinking about public education themes related to climate change, for 2021 outreach. Themes of interest include Agriculture (Ryan Munn); Green Technology/Energy Efficiency (Marissa Vaughan); Natural Environment [Green Infrastructure] (Tim Cumming); Waste Reduction (Alyssa Keller); Regional Perspectives/Partners (Chair Steve Boles); and Flood Protection (Chair Steve Boles).

Thanks to Stacey Jeffery, South Huron Climate Change Officer, for having provided valuable links (e.g., Green Infrastructure Ontario; Lake Huron Centre for Coastal Conservation) that have informed this draft summary.

Resources: Here are some relevant resources for the Natural Environment theme:

[Home - Green Infrastructure Ontario](#)

<https://greeninfrastructureontario.org/>

[The Lake Huron Centre for Coastal Conservation](#)

<https://www.lakehuron.ca/>

[Adapting to the New Normal | lhccc \(lakehuron.ca\)](#)

[Stormwater Stroll – Bayfield self-guided tour \(healthylakehuron.ca\)](#)

Ausable Bayfield Conservation – Stormwater Stroll (Bayfield):

[Main Bayfield Community Watershed Plan \(abca.ca\)](#)

Considerations:

The value of nature – including human-managed 'green' infrastructure – is undervalued. It has great value now – and its importance will increase as our climate continues to change.

Green infrastructure is defined as “ ... the natural vegetative systems and green technologies that collectively provide society with a multitude of economic, environmental and social benefits.” (*Green Infrastructure Ontario*)

Some of the 'natural environment' (green infrastructure) features include: wetlands; woodlots and forests; creeks, rivers, lakes, and other watercourses; riparian (riverbank) zones; meadows and agricultural lands; green roofs and walls; grassed areas and parks and gardens; and more. Importantly, natural environment (green infrastructure) includes soil. Soil is needed in volumes and qualities able to absorb water and sustain natural areas.

There are also low impact development (LID) technologies such as permeable pavement; and residential tools such as rain barrels; etc. These green technologies “ ... replicate the functions of ecosystems, such as stormwater storage and filtration.”

The natural features of our environment are “ ... vital assets to our communities — but these assets lack sustained funding and policy support ...” (Green Infrastructure Ontario)

“Natural infrastructure is an area or system that is either naturally occurring or naturalized and then intentionally managed to provide multiple benefits for the environment and human well-being. Natural infrastructure can be considered an active form of nature likely focused on the most important of these benefits. Natural infrastructure comprises an active management component aimed at providing (or conserving) the key advantages—such as climate resilience, clean water and biodiversity. In addition to naturally occurring and constructed wetlands, other examples of natural infrastructure include riparian buffers, urban forests and woodlots, meadows and pastures, and community gardens. Green roofs, treatment lagoons and urban stormwater drains can be naturalized with human intervention and therefore also count as natural infrastructure.”
(<https://www.iisd.org/articles/multiple-benefits-natural-infrastructure>)

Our natural environment, and the powerful characteristics of that environment, provides natural infrastructure that is important now and will be more important than ever as we mitigate and adapt to climate change.

A local example of low impact development (LID) infrastructure is highlighted in Bayfield, Ontario through the ‘Stormwater Stroll.’

Featured residential projects, of this self-guided tour, include residential rain gardens and permeable driveways (16 Fry Street); rain barrel (17 Euphemia Street); trees (Jane, Chiniquy and Main Streets); permeable driveway (37 Main Street); grass and cattail ditches (52 Chiniquy Street); and demonstration rain gardens (Colina Street).

Perhaps this concept (self-guided tour of projects that have been done and can be done by people in the municipality) is something that could be considered in South Huron – highlighting and modeling projects that show best practices in green infrastructure.

As part of our public outreach, we should engage people in considering practices (e.g., rain barrels; rain gardens; constructed wetlands; tree planting; etc.) on their properties.

People who don’t have enough property for tree planting or wetlands could donate to tree planting.

We could identify some of the projects in South Huron that we can showcase as examples of what neighbours are doing to make this municipality resilient for the future.

This could be done by virtual tours; self-guided tours; tours; demonstration projects; etc.

We should consider ‘social diffusion’ – the fact that people respect and value their peers and people might be more prepared to do projects and practices that their neighbours and friends are modeling.

We could also promote the wetlands and stormwater management projects people can do on their properties – and there may be grants and funding incentives to help them.

A pertinent municipal resource is:

Municipal Hub: Green Infrastructure Resources for Municipalities

<https://guides.co/g/green-infrastructure-resources/192859>

Green Infrastructure Ontario (GIO)

The Municipal Hub: Green Infrastructure Resources for Municipalities was created as an outcome of our Advancing Municipal Action on Green Infrastructure project, funded by a grant from the Greenbelt Foundation and developed in partnership with the Ontario Parks Association.

PROVINCIAL POLICY STATEMENT (*Excerpts*)

The Province of Ontario's Provincial Policy Statement (PPS; OMMAH 2014) says:

"The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features."

The Provincial Policy Statement provides policies for the protection of natural heritage systems including natural features such as significant woodlands, wildlife habitat, wetlands, valleylands, fish habitat, and the habitat of endangered and threatened species (OMMAH 2014).

HURON COUNTY NATURAL ENVIRONMENT UPDATE (*Summary and excerpts*)

Huron County's study provides local context for the importance of natural environment and climate change.

Huron County has a Natural Environment Update.

Here is the link:

Huron County Natural Environment Update - December 2020.

<https://www.huroncounty.ca/plandev/county-wide-projects/huron-natural-environment-update/>

The County of Huron provided a technical document, *Natural Environment Update for Huron County*, in September 2019.

It is background research for natural environment planning.

The document underlines how natural areas (e.g., woodlots, rivers, ponds, and meadows) have value to individuals and the broader community.

To enhance these features requires a coordinated approach.

Healthy nature areas provide benefits to humans and other living things. Those benefits include clean water and clean air, healthy and productive soils that help feed the world and protect water quality, habitat for plants and wildlife, resiliency to extreme weather events (such as flooding), protection of groundwater, opportunities for recreation and education, improved physical and mental health, a beautiful landscape, and sustainable economy (e.g. timber harvest, maple syrup production, etc.) (Olewiler 2004; Luinstra 2010).

The abundance, size, shape, and proximity to other natural areas all contribute to the resilience of the landscape to threats.

Some factors threaten the health of the natural environment in Huron County. These factors include fragmentation, loss of habitat, development pressure, unpredictable and extreme weather events, pollution, and the proliferation of invasive species, pests, and disease.

Natural features protect diverse species of plants and animals (flora and fauna). This helps to protect ecosystem health and human health.

There is as much as 20 per cent natural cover in the county, according to the report (although some areas have much less).

Huron County is, according to aerial imagery (2006), covered by woodland cover (16.6%); wetlands (6.5%); meadows (1.8%); and thickets, which are areas with shrubs and small trees, at 0.49%.

Ninety-eight per cent of the natural cover is significant. All of the natural cover is important to the nature system.

Natural cover is uneven throughout the county and fragmented. Where possible, it is advisable to connect natural features.

In terms of aquatic habitat, most watercourses (44.3%) have permanent flow, warm or cool/cold water and have sensitive or significant species (classified as System 1)

Sixteen per cent of watercourses have permanent flow, warm water and support baitfish (System 2).

Eleven per cent of watercourses have intermittent flow, warm water, and are seasonally accessed by baitfish and other larger fish (System 3).

About 21.4 per cent of Huron County watercourses have been tiled underground and are considered 'closed.'

About seven per cent of watercourses have not been classified ('Unclassified'). (These channels are ephemeral - meaning lasting a short time).

Some recreational water use is impaired by nitrate, phosphorus, and bacteria.

Huron County's rivers have different aquatic habitat and water chemistry.

Stewardship can help reduce nutrient inputs into creeks, rivers, and Lake Huron.

The presence or absence of species, including species at risk, are important indicators of environmental health. Huron County is home to some rare and important species.

In coordinating a strategic approach to enhancement of natural features, it is important to consider the community interests in this working landscape, including agriculture and other sectors.

Huron County's Take Action for Sustainable Huron report (Huron County 2011) promotes the protection of the county's natural features.

The 2019 The Natural Environment Update for Huron County guides municipal land use planning, informs stewardship efforts, and supports the Forest Conservation Bylaw.

About 60,000 people live in Huron County. The county is considered one of the most rural areas of Ontario as it has no urban centres of more than 8,000 in population and roughly 60 per cent of the population is rural farm and non-farm (HBDC 2010).

Agriculture employs about 17 per cent of the workforce and this is the highest of any sector for employment in the county (HBDC 2010).

The northern part of Huron County is in the Great Lakes-St. Lawrence Forest Region while the southern portion is in the Deciduous Forest Region (Rowe 1972).

These regions characterize similar forest types over broad geographic locations as a result of climate and physiography (Cadman et al. 2007).

About one third of the county is Stratford Till Plain, where soils have good natural fertility and are ideal for agriculture (Chapman and Putman 1984).

The Horseshoe Moraines cut through the county in a north-south direction and have a more rugged topography resulting in a higher area of natural cover.

The Huron Slope landform lies west of the Horseshoe Moraines, with less severe topography than the moraines. It also has a higher percentage of natural cover than the Till Plain (Bowles et al. 2001). The physiography, surficial geology and economics are important influences that helped to shape the present land use pattern of the area.

HURON COUNTY CLEAN WATER PROJECT

The most important Huron County Clean Water Project (HCWP) category with respect to natural environment is the Forest Management Plan category.

All the other categories have the goal of protecting and improving water quality.

We automatically think of trees when we think of our natural environment but water is also a key part of our natural environment.

Mari Veliz, Healthy Watersheds Manager, has information on the impact of climate change on our water systems.

Mari Veliz, Healthy Watersheds Manager, has presented to Huron-Perth public health, in May 2019, about soil carbon.

Kate Monk, Manager of Stewardship, Land and Education also presented a version of this presentation to Sustainable Huron.

Natalia Moudrak, Director of Climate Resilience, at Intact Centre on Climate Adaptation, delivered a presentation about the risk reduction benefits of wetlands.

Adaptation and mitigation need to be considered in the context of watershed management and a 'systems' context.

An understanding of a watershed system is needed. The creek in your backyard is an important place to start.

WATERSHED REPORT CARDS

Ausable Bayfield Watershed Report Cards have important information.

Here is the link:

[Watershed Report Card \(abca.ca\)](http://abca.ca)

<https://www.abca.ca/watershedreportcard/>

Here is some information on rain gardens (Ausable Bayfield Conservation):

<https://www.abca.ca/community/raingardens>

https://www.abca.ca/downloads/WRC_2018_Summary_Brochure_Legal-Size_Web.pdf

Here are some other websites with residential strategies for low impact development (LID):

<https://raincommunitysolutions.ca/en/green-infrastructure-faq/>

<https://raincommunitysolutions.ca/wp-content/uploads/2017/07/GCC-SoakItUp-Toolkit-2017.pdf>

https://wiki.sustainabletechnologies.ca/wiki/Main_Page

<http://thamesriver.on.ca/lid/>

Forestry and Land Stewardship Specialist Ian Jean also has information:

Forests represent only 14 per cent the Ausable Bayfield watershed but they have a very important role in climate change mitigation and adaptation.

Forests store significant amounts of carbon in above-ground biomass and in forest soils.

In clearing land and conversion to other uses, carbon is emitted through decay and combustion (usually a large portion of the material is burned), through gradual decay and loss of soil organic matter (forests accumulate soil organic matter while most conventional agriculture results in gradual losses of soil organic matter).

Clearing and conversion of forested land to other uses has been identified as one of the most detrimental negatives for carbon sequestration and global climate change.

There is also the lost opportunity for ongoing carbon sequestration and carbon mitigation provided by forests.

A number of studies shows that sustainably managed forests have the potential to provide more carbon sequestration than unmanaged stands that are simply left to grow.

This is mainly due to the production of solid wood products which store carbon for long periods of time.

Solid wood products also displace carbon emissions when they are used in place of other materials such as steel and concrete.

Sustainable forest management provides a net carbon sink, while production of steel and concrete building products are net sources of carbon emissions.

There were media reports a couple years ago about Canada's forests being a net source of carbon emissions – that was for the year 2018 and was due to a large number of natural disturbance (wildfires and mountain pine beetle) that particular year. Forest management activities actually provided a net carbon sink that year, but not enough to counter the emissions from natural disturbances. The big picture was completely missed in the media reports – that managed forests have great potential for carbon mitigation over the long term.

Re: Tree planting – Growing trees where they are not currently growing, or establishing more productive forests by infill planting, has been shown to increase carbon mitigation potential of a landscape.

Lastly, climate change is expected result in a northward shift in the optimal growing conditions for trees – possibly by several hundred kilometres this century. The average natural dispersal rate for trees has been estimated at ~ 50 km per century. So, the rate of climate change will outpace trees' ability to disperse north. Furthermore, the trees that are growing here today can't move so likely will find themselves growing in an increasingly unfavourable climate during the coming decades. Afforestation and infill planting could help address this by including a portion of more southern genotypes in to planting programs.

Key aspects for climate change:

Keep the forests we have and discourage conversion to other land uses.

Increase forest cover and infill plant to improve forest productivity where possible.

Support sustainable forest management and the production of solid wood products.

Incorporate assisted migration of trees in to tree planting strategies.

Lake Simcoe Conservation Strategy is attached.

There was some news a year or so about Canada's forests emitting more carbon than capture. This was true, for that particular year they looked at. Forests have the potential to be a carbon sink or source. Over the very long term they are a net sink. But the mitigation potential is greatly influenced by natural disturbances (wildfires and pests – e.g., Mountain Pine Beetle), especially in the short term. Forest management, through the production of wood products, can also optimize mitigation potential by removing carbon from the forest in the wood products, and using wood products in place of more carbon intensive materials such as steel or concrete.

Re: Climate change monitoring stations – As we experience continued changes to our climate, globally and locally, we will need to think of the data that is available.

The Ontario Ministry of the Environment, Conservation and Parks (MECP) has climate change monitoring stations – but how many are 'fully outfitted'?

Also – Ausable Bayfield Conservation Authority (ABCA) has some relevant data – Davin Heinbuck, Water Resources Coordinator, has information on impacts of climate change on groundwater.

Parkhill Creek climate change monitoring station (circa 2012)

Ausable Bayfield Conservation hosts the most heavily monitored climate station in the Province, with ABCA's partners at MECP.

There are seven stations, in total, across Ontario, with Parkhill's being the most complex. Ausable Bayfield Conservation Authority (ABCA) has numerous phases of studies ongoing with the University of Guelph including nutrients, watershed modelling, and eventually, climate change impacts on the hydrology within the watershed.

As for groundwater, Ausable Bayfield Conservation and its department/ministry partners, is approaching 20 years of data for some of the groundwater monitoring wells in Ausable Bayfield watersheds.

ABCA staff do see fluctuations and seasonal cycles, but they are on the scale of weather rather than climate.

With climate change, it is expected we will see changes in groundwater and those impacts have yet to be determined conclusively.

The thought is that there will be more variation in levels in response to prolonged droughts, and changes in precipitation and ground conditions ... notably in the winter.

The community plays an important role as ambassadors for conservation and climate change adaptation and mitigation.

Community ambassadors, neighbours, and peers (social diffusion) have more power to influence than staff.

Re: Flooding

Here is an article about a flood event that is relevant:

Erosion damage was costly from January 11-12, 2020 rainstorm but plant cover, erosion control measures helped to limit damage

Cost-share funding programs provide support for projects that limit erosion

The rainstorm event of January 11-12, 2020 hit hard in the local area hard and caused soil erosion along with other costly flood impacts. The storm resulted in examples of soil lost and soil saved.

The Stewardship, Land and Education Manager with Ausable Bayfield Conservation, Kate Monk, drove through the municipalities of Bluewater, Central Huron and Huron East on January 11 to survey some of the soil erosion damage.

"Fields without any plant cover lost significant amounts of soil on the hillsides and low draws as there was nothing to hold the soil," she said. The amount of erosion damage to soil was limited where there was more plant cover. "Cover crops, permanent pasture and even crop residue and stubble held onto the soil and this would have saved local farmers thousands of dollars," she said.

Structural erosion control measures such as berms, inlets and grassed waterways also saved a lot of soil, according to Monk. The berms hold back water and slowly release it into a tile. This reduces the energy and erosive power of the water. Some berms were overtopped but ones with rock chute spillways survived the excess water. The grassed waterways may not hold back this amount of water but they do hold onto the soil particles.

"Everyone wants soil to stay in fields to grow crops," said Monk.

If you see erosion in your fields, you are invited to call Ausable Bayfield Conservation Authority (ABCA) to arrange a site visit to assess the damage and develop a solution that works best for the farming operation. The Huron County Clean Water Project; Canada's Habitat Stewardship Program for Species at Risk; and Canadian Nature Fund all provide cost-share funding for berms, grassed waterways, cover crops, and trees.

Ausable Bayfield Conservation has helped landowners create wetlands over the past few years that also store and hold back water. Often constructed on non-profitable farmland, they collect water before it leaves the farm, and slowly release it. This benefits downstream landowners.

Locally, forests and wetlands also help to naturally control flooding and limit damages.

The Hay Swamp, for example, can hold millions of gallons of water.

It is important to manage water running off of land during storm events, according to Monk.

“Water can transport the topsoil with nutrients and fertilizers to municipal drains, rivers and eventually the lake,” she said. “Besides polluting watercourses, the sediment has a negative impact on aquatic life.”

Other topics:

In addition to the above topic (Nature/Natural Environment/Green Infrastructure/Natural Infrastructure), here is some information, pertinent to the files Ryan and Steve have taken on, provided for their information:

FOR YOUR INFORMATION – AGRICULTURE AND CLIMATE CHANGE

It is very exciting that Ryan – with his twin hats as an engineer and someone with a background in agriculture – is providing perspectives on agriculture and adaptations to help us prepare for weather extremes and our changing climate. His insights and command of this topic will be extremely valuable.

Ryan has identified a number of topics of relevance, including but not limited to, prolonged dry periods; intense rain events; lack of snow cover in the winter; soil erosion; pest control; nutrient management; grant funding available; controlled drainage; windbreaks; riparian/riverbank plantings; grassed waterways; etc.

Ausable Bayfield Conservation’s stewardship staff have compiled some links of interest to the themes of agricultural stewardship and adaptations and impacts in a changing environment.

Re: Controlled Drainage – Here is a link to a report from Ontario Soil and Crop Improvement Association (OSCIA):

<https://www.ontariosoilcrop.org/research-resources/research-projects/controlled-tile-drainage/>

Here are some articles on controlled drainage at the Huron County Demonstration Farm at the Huronview Complex near Clinton:

<https://www.drainagecontractor.com/learning-curve-2458/>

[Farmtario – Tile drainage heads for the hills \(huronview.net\)](https://www.huronview.net/post/tile-drainage-heads-for-the-hills)

<https://www.huronview.net/post/tile-drainage-heads-for-the-hills>

There are two new signs – at the Huronview Demo Farm – highlighting some of the innovations being introduced at that site, thanks the Huron County Soil and Crop

Improvement Association (HSCIA); the County of Huron; and industry and community partners including Ausable Bayfield Conservation. (huronview.net)

Agriculture and climate change on a federal level:

Climate change and agriculture – Canada.ca

<https://www.canada.ca/en/services/environment/agricultural-practices/climate-change-agriculture.html>

Climate change and agriculture – Agriculture and Agri-Food Canada (AAFC)

<https://www.agr.gc.ca/eng/agriculture-and-the-environment/agricultural-practices/climate-change-and-agriculture/?id=1329321967651>

Climate scenarios for agriculture – Agriculture and Agri-Food Canada (AAFC)

<https://www.agr.gc.ca/eng/agriculture-and-the-environment/agricultural-practices/climate-change-and-agriculture/climate-scenarios-for-agriculture/?id=1329321981630>

There is an agriculture-sector presentation, ‘What to know about climate change’ by Darrin Qualman, Director of climate change crisis policy with National Farmers’ Union (NFU), nfu.ca:

<https://www.nfu.ca/what-to-know-about-climate-change/>

There are resources from other General Farm Organizations (GFOs) as well – Ontario Federation of Agriculture (OFA) and Christian Farmers’ Federation of Ontario (CFFO).

There are also resources from commodity organizations, etc.

Also, the Huron County Water Protection Steering Committee meeting, on November 13, 2020, had a focus on climate change.

Agenda for the November 13, 2020 Huron County Water Protection Steering Committee (*to be attached*)

Ausable Bayfield Conservation’s Forestry and Land Stewardship Specialist, Ian Jean, has provided some information related to water and soil erosion, grassed waterways, windbreaks, and tree planting.

Ausable Bayfield Conservation’s spring tree order form is online at abca.ca.

Ausable Bayfield Conservation has fall (autumn) tree orders.

People can order trees here: <https://www.abca.ca/forestry/treeorders/>

They can also order through private nurseries, etc. or plant trees through carbon offset/compensation/counter-balance programs.

As projections are that climate change is likely to result in more intense or severe rainfall storm and weather events and less snow cover, mitigating and adapting to the impacts of runoff and wind erosion events will be important for agricultural operations to maintain topsoil, avoid topsoil and nutrient loss, and to maintain and build soil health.

It will also be important to reduce runoff and sedimentation in creeks and rivers in order to maintain healthy watercourses and a healthy Lake Huron.

Stewardship staff at Ausable Bayfield Conservation link participating agricultural producers and other rural landowners in the watershed to financial incentives and grants to support their work that benefits water, soil, habitat, and climate change adaptation.

In Huron County, including the Municipality of South Huron, the County of Huron provides financial incentives – through the Huron County Clean Water Project, for projects such as grassed waterways, erosion control berms, winter cover crops, windbreaks, and watercourse buffers. (The Huron County Clean Water Project brochure is online and includes the list of 17 funding categories).

The Ausable Bayfield and Maitland Valley conservation authorities provide technical assistance and administer the funding project/program for the county.

Ian has attached the program guidelines and there is information online via the Ausable Bayfield Conservation website at abca.ca:

<https://www.abca.ca/forestry/huroncountyproject/>

The County of Huron website also provides information:

<https://www.huroncounty.ca/plandev/county-wide-projects/water-protection/>

The grassed waterways and erosion control guidelines are on page 20 or the second attachment (pending).

Tree planting for windbreaks or along watercourses is on page 14 or third attachment (pending).

Thanks for your leadership on this file, Ryan!

FOR YOUR INFORMATION – FLOODING

Thanks, Chair Boles, for taking on the important topic of flooding.

Flood forecasting and warning, and flood mitigation and adaptation, is extremely important now and, increasingly, in the future.

Each year, Ausable Bayfield Conservation Authority (ABCA) holds an Annual Flood Emergency Planning Meeting for emergency coordinators, firefighters, police, municipal staff, community journalists, etc.

Here is some information on the 2019 meeting: <https://www.abca.ca/post/?ID=917>

(Also, this is included in the Ausable Bayfield Conservation Annual Reports:

[Annual Reports \(abca.ca\)](https://www.abca.ca/about/annualreports/)) (<https://www.abca.ca/about/annualreports/>)

When ABCA issues flood messages to municipalities, they also provide this information to the public through the flood messages page (<https://www.abca.ca/news/flooding/>) and through social media (Facebook; Twitter).

A Shoreline Slope Stability Risks and Hazards Fact Sheet (Terraprobe Inc.), at abca.ca, has been created for property owners:

https://www.abca.ca/assets/files/Appendix_E_to_SMP_2019_Shoreline_Slope_Stability_Risks_and_Hazards_Fact_Sheet_Terraprobe_Inc_RE%281%29.pdf

There are also new fact sheets about bluff and dune vegetation and bluff access on a new Lake Huron web page at abca.ca is at this link:

<https://www.abca.ca/about/lake-huron>

The Province of Ontario asked Special Advisor Doug McNeil to report on the 2019 flood events, including recommendations for improving flood resilience and enhancing public safety: <https://www.ontario.ca/document/independent-review-2019-flood-events-ontario>

Thanks, Steve, for having made this a priority!