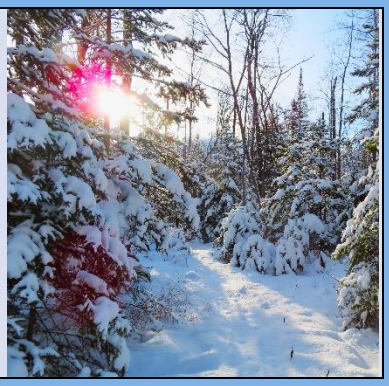
The Freshwater Connection

Publication of the Central Algoma Freshwater Coalition – Winter 2024

Winter 2024
Trees
Climate Change - Methane Hydrate



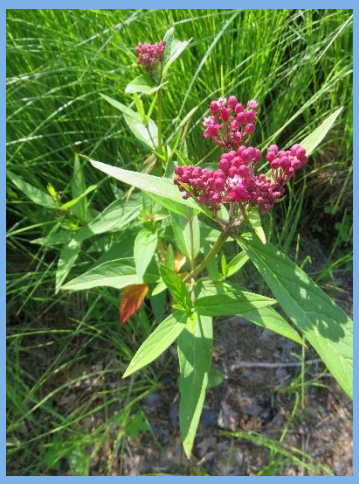
Planting Trees / Shrubs / Herbs

Planting trees that are local to our area have many advantages in providing habitat, shade, helping to fight climate change and enhancing water quality. When choosing trees to plant they should meet the soil and shading conditions to each tree species. A good resource guide is the Ontario Tree Atlas at https://www.ontario.ca/page/tree-atlas

When choosing trees to plant consider that there are invasive forest pests killing elm, ash, and beech. Also consider potential future invasive species such as Oak Wilt and Hemlock Woolly Adelgid.

If you would like help from professionals, there are grants to plant riparian zones and larger acreages at the 50 Million Trees Program and the 2 Billion Trees Program.
https://forestsontario.ca/en/program/50-million-tree-program

https://www.canada.ca/en/campaign/2-billion-trees/2-billion-trees-program.html



Planting Shrubs / Herbs

Clean North has a guide called – Sault/Algoma - Grow me instead guide. Photo Swamp Milkweed
https://www.cleannorth.org/sault-algoma-grow-me-instead-guide/

Oak Wilt

Oak wilt is an introduced species to Ontario. This fungus grows on the outer sapwood of oak trees, restricting water and nutrient flow through the tree. Found in Canada for the first time in 2023, in the Niagara Falls area of Southern Ontario. It also occurs in Michigan.
Read More
https://www.ontario.ca/page/oak-wilt#:~:text=Oak%20wilt%20is%20an%20introduced,Falls%20area%20of%20Southern%20Ontario.

Hemlock Woolly Adelgid

Hemlock woolly adelgid is an introduced species to Ontario. It has been found in Southern Ontario near Lake Erie and Lake Ontario. These tiny insects feed on nutrient and water storage cells at the base of needles, causing them to drop.
https://www.ontario.ca/page/hemlock-woolly-adelgid

Norway Maple

Considered Invasive - Norway Maple and Cultivars (Selective Breed)
Norway Maple (Acer platanoides) was introduced North America because of its aesthetically pleasing landscaping look. Nowadays varieties of the Norway Maple may be cultivars and sold under a wide range of names. Norway Maple may out compete native maples in natural areas. **Remember to refrain from planting any of the Norway Maples on your property, including cultivars.**

The true native maples are a great idea to plant - always buy by scientific name - the list is below
Red Maple (Acer Rubrum)
Silver Maple (Acer Saccharinum)
Freeman Maple (Acer Freemanii)
Sugar Maple (Acer Saccharum)

If you already have Norway Maple - attached is the Best Management Practice to manage the species!

https://www.ontarioinvasiveplants.ca/wp-content/uploads/2021/05/BMP_NorwayMaple_April2021_WEB.pdf

Planting Hope: Freeman Maple as a Sustainable Replacement for Black Ash Trees

By Daniel Featherstone

Introduction:

In recent years, our landscapes have witnessed a tragic decline in black ash trees (Fraxinus nigra), primarily due to the devastating impact of the emerald ash borer (Agrilus planipennis). This invasive species, which targets ash trees, has left a noticeable void in our ecosystems and urban landscapes. However, hope springs anew with the potential of planting Freeman Maples (Acer × freemanii), a hybrid between red (Acer rubrum) and silver maples (Acer saccharinum), as a sustainable and resilient alternative.

The Crisis: Emerald Ash Borer's Impact

The emerald ash borer, a beetle native to northeastern Asia, has wreaked havoc across North America, infesting and killing millions of ash trees since its discovery in 2002. Black ash trees, a critical species for wildlife habitat in riparian and wetland ecosystems, have been among the hardest hit. The loss of these trees not only disrupts the ecological balance but also impacts cultural practices, especially among Indigenous communities that rely on black ash for traditional basket weaving.

Freeman Maple: A Resilient Hybrid

This hybrid combines the best traits of its parent species - the red maple's brilliant fall color and the silver maple's rapid growth and adaptability. Notably, Freeman Maples are not susceptible to the emerald ash borer, making them a durable and long-term solution for reforestation. As this species can thrive in moist soil regimes

where black ashes are common, this species could be used to fulfill the habitat requirements for species such as wood ducks which need large cavity trees near the edges of water to nest.

Advantages of Planting Freeman Maple

Resilience to Pests: Unlike black ash trees, Freeman Maples are not targeted by the emerald ash borer, ensuring their longevity and sustainability in our landscapes.
Environmental Benefits: These trees play a crucial role in improving air quality, reducing stormwater runoff, and providing habitat for wildlife.
Aesthetic Appeal: Known for their striking fall foliage, Freeman Maples can enhance the visual appeal of any area, from parks to residential neighborhoods.
Adaptability: They thrive in a wide range of soil types and environmental conditions, making them suitable for various locations where black ash trees once flourished.

Conclusion: A Step Towards Ecological Recovery

The introduction of Freeman Maple as a replacement for black ash trees offers hope in our battle against the emerald ash borer. By planting these resilient hybrids, we not only restore the lost green canopy but also contribute to the biodiversity and beauty of our natural and urban landscapes.

Read More (Photos Silver and Red Maple)

https://arboretum.uoguelph.ca/thingstosee/trees/redxsilvermaple#:~:text=website%20cookie%20policy.-,Freeman's%20Maple%20%2D%20Acer%20rubrum%20x%20saccharinum%20or%20Acer%20x%20freemanii,mind%20getting%20its%20feet%20wet!

A Word About Climate Change (2023 Worldwide)

- Record year for coal use.
- Record year for oil use.
- Record year for jet aircraft sales orders.
- Canadians among the largest per capita producers of carbon dioxide

More than 1.5 degree C of warming is recognized as a worldwide target to avoid as it could potentially pass a tipping point where climate warming could become out of control.

One of the possible tipping points is the release of methene encapsulated in ice – "fire-ice" or methane hydrate.

So how are we doing?

Frozen methane under the seabed is thawing as oceans warm – and things are worse than we thought.

https://theconversation.com/frozen-methane-under-the-seabed-is-thawing-as-oceans-warm-and-things-are-worse-than-we-thought-216054

Published: December 8, 2023 11.37am EST
Author: Richard Davies, Pro-Vice Chancellor: Global and Sustainability, Newcastle University

Buried beneath the oceans surrounding continents is a naturally occurring frozen form of methane and water. Sometimes dubbed "fire-ice" as you can literally set

light to it, marine methane hydrate can melt as the climate warms, uncontrollably releasing methane – a potent greenhouse gas – into the ocean and possibly the atmosphere.

Colleagues and I have just published research showing more of this methane hydrate is vulnerable to warming than previously thought. This is a worry as that hydrate contains about as much carbon as all of the remaining oil and gas on Earth.

Releasing it from the seabed could cause the oceans to become more acidic and the climate to warm further. This is a dangerous set of circumstances.

The massive venting of methane from similar ancient marine hydrate reservoirs has been linked to some of the severest and most rapid climate changes in the Earth's history. There is even evidence that the process has started again near the east coast of the US.

I have worked on hydrates for over a decade, mainly looking at the methane hydrate offshore of Mauritania, West Africa. Recently I have taken 3D seismic data intended to reveal oil and gas and repurposed it to map out the hydrates under the ocean floor. Ultimately, I wanted to work out if climate change is causing methane to bubble to the surface.

3D seismic is the geologist's equivalent of the doctor's CT scan. It can cover hundreds of square kilometres, and can reveal hydrates a few kilometres below the seabed. Hydrate is easily identified in these giant surveys because the sound waves created by a source of seismic energy towed by a ship reflect off the bottom of the hydrate layers.

Looking for methane using 3D seismic imagery

As I settled into a new way of life during the first COVID lockdown in early 2020, I reopened the much-studied dataset and started mapping again. I knew there were many examples of hydrate that had thawed as a result of warming since the last glacial period peaked some 20,000 years ago, and I knew we could detect this on the 3D datasets.

But what was the fate of the methane? Did it reach the oceans and atmosphere? Because if it did, this is a major clue that it could happen again.

Around continents, where the oceans are relatively shallow, hydrate is only just cold enough to remain frozen. So it is very vulnerable to any warming, and that is why these areas have been the focus of most scientific investigations.

The good news is that only 3.5% of the world's hydrate resides in the vulnerable zone, in this precarious state. Most hydrate is instead deemed to be "safe", buried hundreds of metres below the seabed in deeper waters tens of kilometres further from land.

But frozen methane in the deep ocean may vulnerable after all. In oceans and seas where the water is deeper than around 450 metres to 700 metres are layer upon layer of sediment that contains the hydrate. And some of it is deeply buried and warmed geothermally by the Earth so, despite being hundreds of metres below the seafloor, it is right at the point of instability.

Some layers of sediment are permeable and create a complex underground plumbing for the gas to move through if it's liberated during climatic warming. Just like holding a football underwater methane gas wants to push upwards because of its buoyancy and burst through the 100s of metres of sediment layers.

Imposed upon this complex geology has been the seven glacials (or ice ages) and interglacials, which warmed and cooled the system repeatedly over the last million years.

Methane is migrating

During this first lockdown of 2020 I found spectacular evidence that during warm periods during the last million or so years methane migrated laterally, upwards and landwards toward Africa and leaked in much shallower water. Beneath a layer of up to 80 metres of sediment are 23 giant craters on the ancient seabed, each one kilometre wide and up to 50 metres deep, big enough to be filled with multiple Wembley stadiums.

The seismic imaging provides the tell tale signs of methane immediately below the craters. And similar craters elsewhere form due to prolonged or explosive release of gas at the seabed.

These craters are not located in the vulnerable zone where all the attention has been – they are landward of it at about 330 metres water depth. With the discovery in hand, I gathered an international team of scientists (modellers, physicists,

geoscientists) to work out what caused the formation of these remarkable things and when they formed. Our results are now published in Nature Geoscience.

We believe they formed as a result of repeated warming periods. These periods impacted hydrate in the deep ocean and the released methane migrated up to 40km towards the continent, to be vented beyond the shallowest hydrate deposits. So during a warming world the volume of hydrate that will be vulnerable to leaking methane is more significant than previously thought.

The positive outlook is that there are many natural barriers to this methane. But be warned, we expect that in some places on earth, as we warm the planet, methane from the deep will escape into our oceans.

Other reading
https://phys.org/news/2023-12-natural-gas-migrating-permafrost-methane.html

https://www.frontiersin.org/articles/10.3389/feart.2023.1277027/full

Annual General Meeting - Save the Date

Central Algoma Freshwater Coalition
March 13, 2024 - 3:00-4:30 pm - In Person
Location to be Announced.
Presentations on recent activities and "Sense of Place" by Bob Kellum

Become a Member

Your annual membership fee will provide a base budget for work of CAFC and demonstrate the commitment of local partners working towards a common goal. A strong diverse group is an essential component in meeting the goals of the Central Algoma Region. Support us at https://www.centralalgomafreshwatercoalition.ca/