

Paris, Climate and Soil Health

OCC

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Environmental
Commissioner
of Ontario



Overview

- **Paris – COP 21**
- 4/1000
- Soil Health and ECO

May I assume you know?

- Climate change is:
 - Real
 - Human-caused
 - Moving incredibly fast
 - Last 12 months “off charts”
 - Immensely important
 - Trillion dollar financial threat
- Huge challenge to governments, infrastructure, agriculture

Paris: COP 21

- Latest stage of UNFCCC processes (since Rio, 1992)
- Huge success as these things go
 - Almost all countries
 - 188 INDCs
 - Huge financial pledges
 - Launchpad for hundreds of initiatives
 - Paris Agreement and Decision

Why was it different?

- Irrefutable science
- Worldwide impacts
 - CA, India, China, UK, etc.
 - \$5 B in floods while we worked
- Strong non-state and subnational participation
- Great leadership and diplomacy
 - **Esp. France, US, Peru and UNFCCC staff**
 - Also China, EU, Panama, Canada, EDF, IETA, etc.

What else helped?

- Energy / transport technology advances
- Civil society
- SDGs
- Sympathy after Paris attacks
- Low oil price / Keystone
- Migrant crisis
- Venezuela election?
- RMB at the IMF?
- Nelson Mandela quote

How did Canada help?

- Trudeau's statement - "Canada is back"
- Major oil / coal producing country
- \$2.65 B pledge
 - Including Adaptation Fund (differentiation)
 - Paying our old \$300 MM pledge
- Championing "well below 2 with a view to 1.5°C" and indigenous and human rights
- McKenna's facilitation on cooperative approaches and mechanisms (ETS)
- Working the halls
- Organizations like EDF, IETA, CAN

Paris Agreement Ambition

- Target
 - Well below 2 °C, 1.5 if possible
 - Carbon peaking “asap”, later for developing co.
 - Net zero second half of century
 - Needs huge cuts in emissions, huge increase in sinks and sequestration

Ambition 2

- But
 - Emissions are rising fast
 - Alberta wants another 32 GT/ year for oil sands
 - China, India, Africa, South America, Vietnam intend to grow
 - Current INDCs inadequate (3.2°C per model)
 - Must improve them later
 - The later we wait the more it will cost, in mitigation, adaptation, loss and damage, etc.
 - Missing emitters, esp. aviation, shipping

Can we increase ambition?

- Target review for developed co. in 2018
- Global Stock-take in 2023 and every 5 years
 - Promises kept?
 - Impact?
 - Remaining gap?
- Can improve INDCs at any time
- No backsliding!

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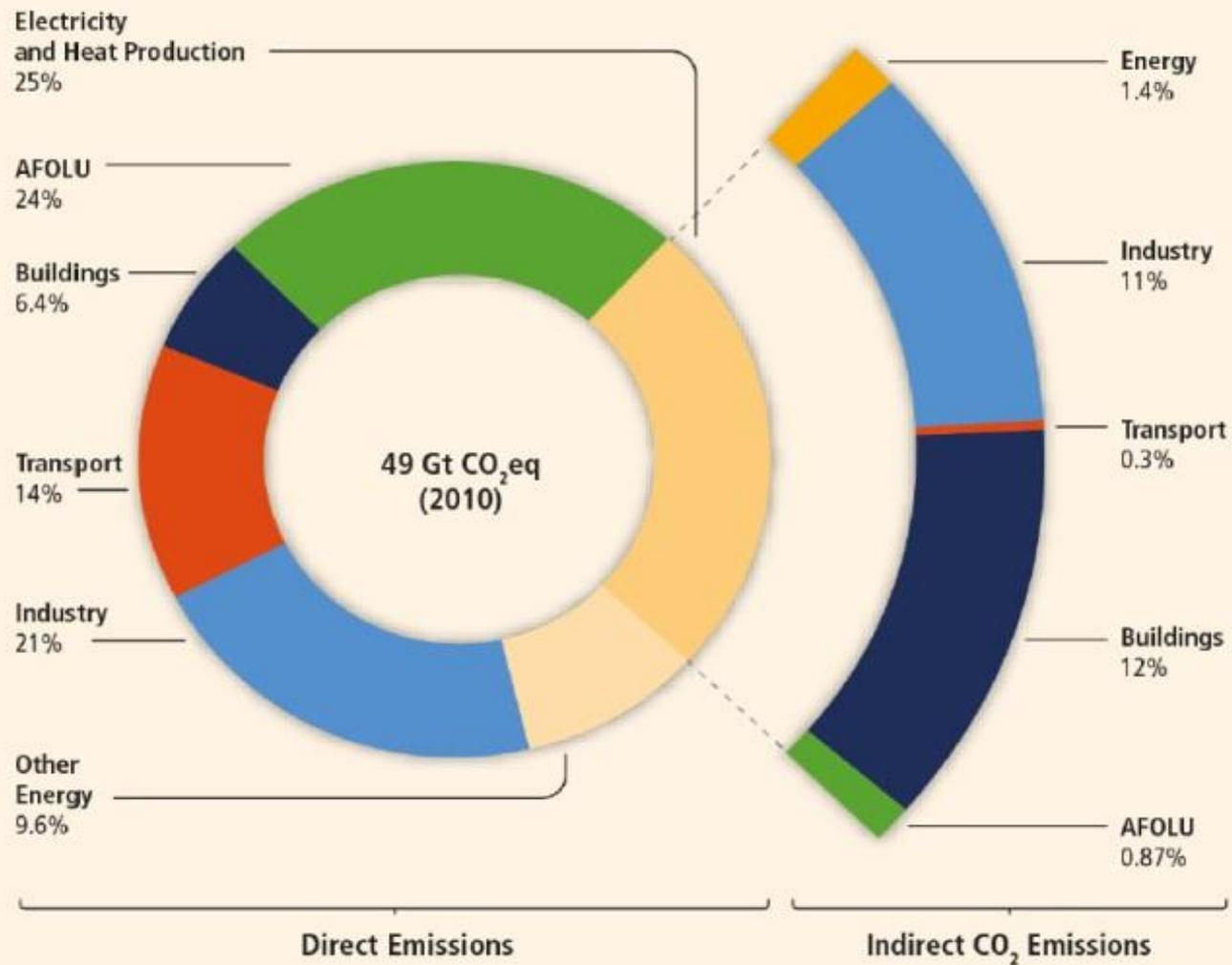
4 per 1000

- Soils for Security and Climate
 - December 1, 2015, COP 21
- Voluntary action plan plus research to increase soil carbon
- <http://agriculture.gouv.fr/agriculture-et-foret/environnement-et-climat>

Why Soil Carbon?

- 2-3 times more carbon in soil organic matter than in atmospheric CO₂ [IPCC, 2013]
- Soil degradation threat to >40% of land
 - Accelerated by climate change
- Half of world agricultural soils are degraded,
 - Grain losses \$1.2 billion [FAO, 2006]
- Degrading soils a *source* of CO₂

Global greenhouse gas emissions by economic sectors, 2010



Climate Change 2014: Mitigation of Climate Change, IPCC Working Group III

Why 4/1000?

- 4‰ annual growth rate of soil carbon could stop the increase in atmospheric CO₂
- 1.4 billion metric tons carbon could be stored annually in agricultural soils, equivalent to a storage rate of 0.48%/year in top soil [after IPCC, 2007, 2014]

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Why ECO cares about soil

- Affects many of our responsibilities:
 - Greenhouse gas mitigation
 - Emissions from soil and agriculture
 - Climate adaptation / resilience
 - Storms, drought
 - Pesticide use (and effects)
 - Soil erosion
 - Water quality (e.g. Lake Erie)
 - Air quality
 - Biodiversity, etc.

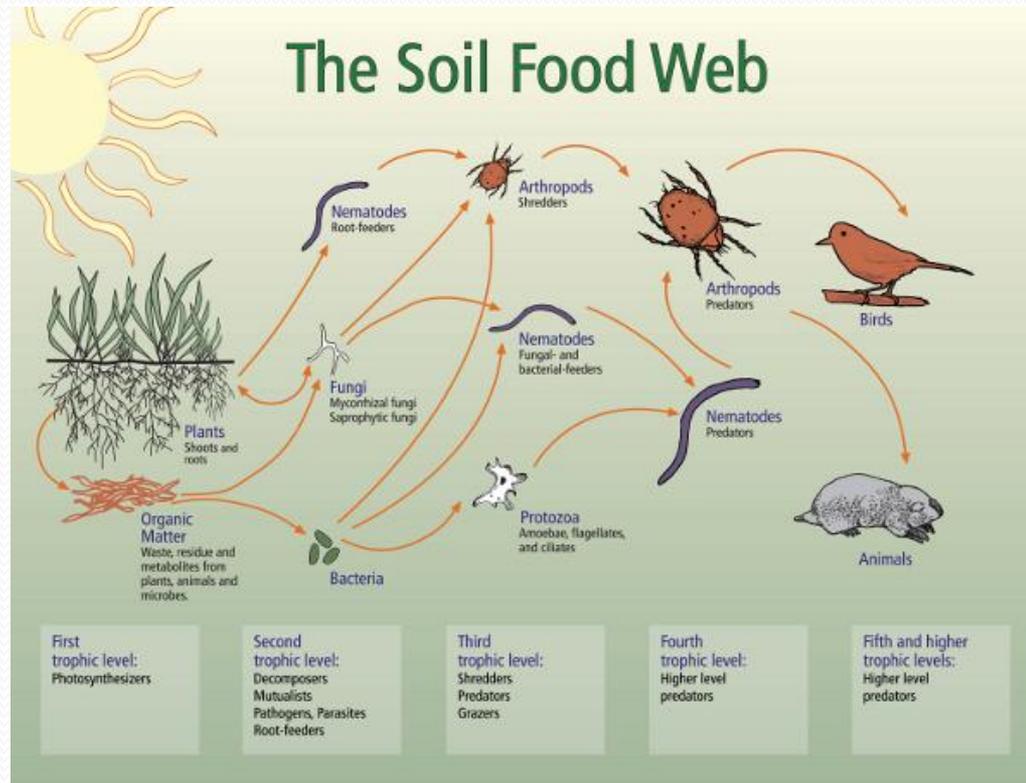
We're worried because

- Declining carbon in Ontario soils
- Changes in agriculture:
 - More leased lands
 - Very large farms/ equipment
 - Loss of rotation crops
- Climate change accelerating, storms worsening, cumulative damage to natural systems
- Loss of government science capacity

Soil needs attention

- Complex, fragile biological ecosystem
- Essential to life, easy to damage
- Chemical inputs allowed the needs of that ecosystem to be ignored for a while
- Result: declining soil health

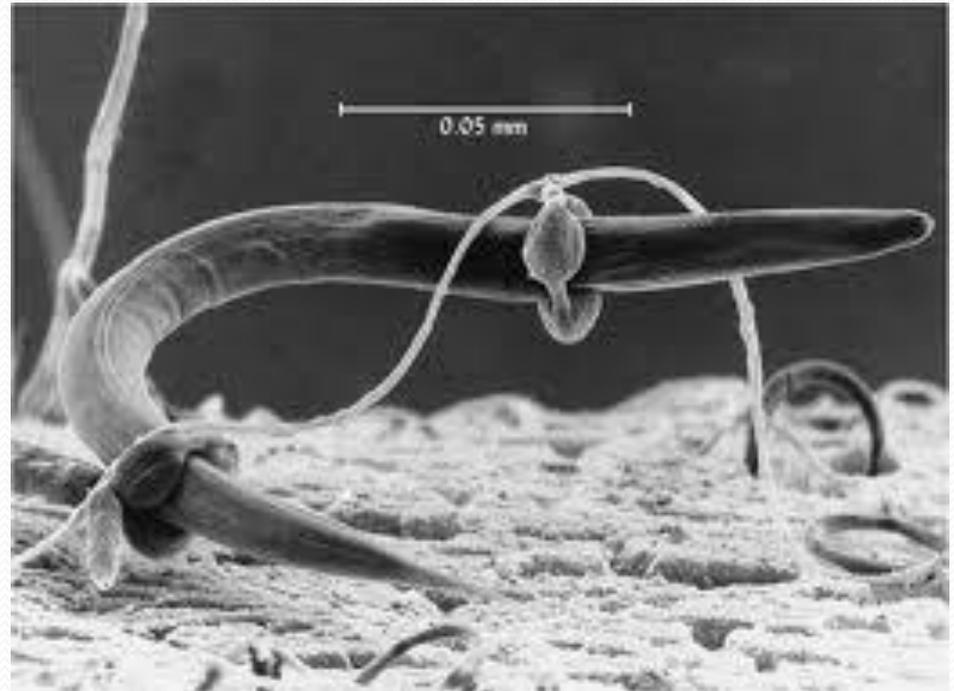
Soil as a biological system



The level of soil health is virtually synonymous with the condition (size, diversity, optimal functioning) of the soil food web (ECO CC Report, 2014)

A healthy soil food web means

- Plant health
- Soil conservation
- Reduced inputs
- Carbon sequestration
- Better water quality
- Reduced flooding
- Climate resilience, *etc.*



Electron micrograph of a nematode-trapping fungus

ECO reports on Soil

Annual Report

- **2008/09:** “Soil: Our Eroding Asset”
- **2009/10:** “Compost: Appreciating Nature’s Sense of Humus”
- **2010/11:** “The Roots of Sustainability: Engaging the Soil Carbon Solution”



ECO reports on Soil (2)

Annual Report

- 2012/13: “From Peak P to P Soup: The Phosphorus Challenge on Ontario Farms”
- 2013/14: “Healthy Soils Yield Benefits for Ontario Farmers”



Konzelmann Farms Inc., Wyoming, ON

ECO reports on Soil(3)

Climate Report

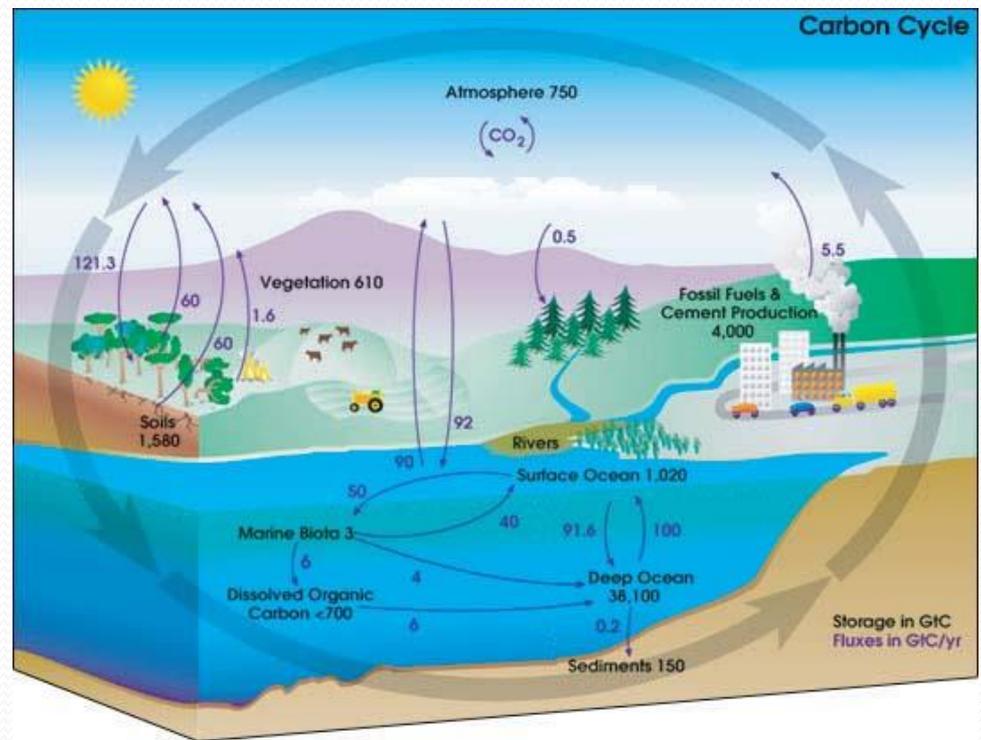
- **2011:** “Soil Carbon Opportunities“
- **2014:** “Removing C from Atmosphere Requires healthy Soils”; and
- “Is Soil Health a Priority for OMAF?”

Carbon Sequestration and the 2020 Gap

Sector	BMP	% by 2020	CO _{2e} /ha/yr (doc)	Ann Seq by 2020	% of 30 MT 2020 gap
Crop	BMPs	40	2	2.9	9.6
	Organic	10	3.6	1.3	4.3
	Compost	5	5	0.9	3
Pas-ture	BMPs	25	5.5	1.0	3.4
Energy Crop	switch-grass, etc	10	5.2	2.7	9
TOTAL				8.6	29.3

Soil-Carbon Roundtable 2012

- Needs:
 - Metrics
 - Protocols
 - Research
 - “Launch and learn”



From Reports to Action

- Request for review: Key EBR tool for public participation
- Grew out of soil-carbon round table
- Filed in January, 2015
- Accepted by OMAFRA on March 31, 2015
- Triggered working group
- ECO will monitor, evaluate and report on results

But how?

- How do we start restoring a healthy soil food web?
- It's not rocket science, but it takes attention and effort
- Some farmers are way ahead
- Can be low-tech or high-tech

The Basics are simple

- Minimize disturbance
- Maximize diversity
- Keep soil covered
- Live roots in the ground all year
- Don't kill good bugs
- Organic amendments (especially compost)
- Use synthetic fertilizers and pesticides judiciously



Details can be complex

- What do farmers need?
 - Research
 - Technical support
 - Education
 - Financial support?
- How to reconcile soil food web health with inputs?

A Good Start

- Very pleased with increased soil-health emphasis at OMAFRA
- Incentive programs like GLASI
- Growing awareness near Lake Erie



Research Priorities

- Estimate current /potential changes in soil carbon
- Strategies for soil carbon sequestration
- Co-benefits for food security and climate adaptation
- Barriers and incentives
- Monitoring, reporting and verification (MRV) of soil carbon sequestration and its social, economic, environmental impacts

Thanks and Learn More

At eco.on.ca:

- ECO Reports
- ECO blog
- Topic pages
- Ministry pages
- Key EBR Posts



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