First "4 per 1000" Initiative North America Regional Meeting

11 to 15 May 2020, online

REPORT & OUTCOMES

This event has been organized

in partnership with RÉGÉNÉRATION CANADA

https://regenerationcanada.org

&

with the financial support of La France aux Etats-Unis, Ambassade de France à Washington, D.C.

the **French Embassy**, Washington DC, USA

Videos from the 5 sessions are available on

www.4p1000.org

&

on the

"4 per 1000" YouTube channel:

https://www.youtube.com/channel/UCvBmNtaHxi3PcvbUkkL_UQg/playlists

Presentations are also available for Members and Partners

on the collaborative platform of the **"4 per 1000" Initiative.**

Report prepared by the "4 per 1000" Executive Secretariat.
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Please address comments, questions and suggested changes to
beatrice.breton-askar@4p1000.org

I. About the regional meeting

The first "4 per 1000" North America Regional Meeting took place online from 11 to 15 May 2020, due to the unprecedented global situation related to the pandemic of CoVid19, which led the Executive Secretariat to postpone the face to face meeting that was to be held on 17 and 18th March in Montreal, Canada. The evolution of the pandemic has confirmed that it was the right decision to make. The main objective was to gather a maximum of partners and members of the "4 per 1000" Initiative in Canada (7) and USA (58), and to capitalize on 5 times 90-120 minutes of electronic meetings to elaborate a regional roadmap of concrete action on the ground, for storing carbon in the soils with the help of agriculture and forestry.

The "4 per 1000" Initiative has jointly organized the meeting in partnership with Regeneration Canada. Financial support has been provided by the French Embassy in Washington DC, USA.

Almost **200 participants**: national and international practitioners, experts and decision makers, attended virtually the 5 sessions of 90 to 120 minutes, each day from 11 to 15 May, to listen, comment and ask questions while sharing experiences with the speakers, on the relationship between soil and climate and the benefits of soil health, more specifically in Canada and in the USA. How to move from a Pilot Project to a Large-Scale Development was the question raised through presentations of concrete results in each of the categories of actors and stakeholders (farmers, scientists, NGOs, private sector companies) present at the meeting.

On Day 1, on 11 May 2020, the first "4 per 1000" North America Regional Meeting was opened by Dr. Paul Luu, Executive Secretary of the "4 per 1000" Initiative and Mr. Antonious Petro, Scientific Director of Regeneration Canada. **The situation of the "4 per 1000" Initiative, 4 years after its creation at COP 21 of UNFCCC in Paris, has been presented by Dr. Luu.**

Then, four governmental speakers made presentations dedicated to **policies on soil health and soil carbon sequestration at the national and regional levels in North America**.

The following days of the Regional Meeting, from 12 to 15 May, were organized around four round tables:

- RT1_Round Table n°1: **Farmers' experiences and proposals from the ground**
- RT2_Round Table n°2: **Science point of view**
- RT3_Round Table n°3: **Civil society and the point of view of NGOs**
- RT4_Round Table n°4: **Experience of businesses (production, value chains, etc.)**

with a balance between experiences and success stories from the ground, scientific evidence and advances, examples of advocacy for soil health, and progress in characterizing carbon sequestration.

At the end of each Round Table, an online survey in the form of a Multiple-Choice Questionnaire (MCQ) has been proposed to attendees, in order to gather their opinion on a few targeted questions. The results of these on-line polls are described in point IV.

II. Conclusions & key issues to address

a. POLICIES

The first session helped to have an overview of public policy action on soil health and soil carbon storage, both from a legislative and regulatory point of view, in terms of public policies in favor of agricultural practices preserving and/or improving soil health and soil organic carbon (SOC). In Canada and in the USA, California or Quebec, officials consider that public policies have been developed and implemented for many years in favor of soil health, through agricultural practices (e.g. no tillage) or forestry. Depending on the administrative organization of the countries, states and provinces, the public authorities consider that they have put in place an adequate body of legislation and/or regulations or are in the process of developing them for implementation in the near future. In the same way, they also consider that significant budgets have been allocated to support these public policies, aimed at a variety of audiences, starting with farmers for the adoption of appropriate practices, but also scientists for increasing knowledge, and the general public for raising collective awareness of the importance of soil health and SOC issues, particularly among consumers. Not all stakeholders share that point of view starting with farmers and civil society representatives.

Nevertheless, it is clear that strong domestic policy initiatives are necessary to commit local, federal and territorial governments. In the USA, very few specific soil health policy tools exist but a strong cooperation at the governance level of all agencies (federal, state and local) allows the consideration of soil health by policy makers. This cooperation seems also present in Canada between the federal level and the Provincial level.

Participants and speakers insist on supportive programs as key to help producers to implement actions to help the adaptation to climate change. Dedicated local governance and action plans deeply encourage responsible soil health practices and improve climate change mitigation at farmers' level.

In complement, strong investments at regional levels allow to change the role of agriculture in the fight to preserve natural and working lands. And a strong coordination between public and private efforts are necessary to scale up healthy soils practice.

But, to get a better recognition of the impact of agricultural practices in favor of soil health and SOC storage and the significant role that farmers and soils can play in removing CO2 from the atmosphere (climate mitigation), advocacy and outreach to policy makers are essential. Policies should support climate actions through various programs that help producers address soil and water conservation and adapt to climate change (climate adaptation).

The general perception seems to be that soil health (soil productivity and nitrogen efficiency; water infiltration and retention; soil resistance to erosion) should be in the loop of policy makers regarding agricultural lands and forests, with the support of science and innovation to advance sustainable farming systems. Efforts made, even if there are tangible and real, need to be strengthened and develop in close collaboration with all stakeholders acting on the ground: farmers, of course, scientists, NGOs and businesses. Existing measures, policies and programs could be more advertised, and a global coherence should be promoted.
In general, farmers are seen by all groups as the main actors of change, except for the NGO workshop, which puts civil society and consumers in the first position. Public authorities are generally cited in second place, except for the business workshop, which considers that this place belongs to consumers and civil society. The third position is more divided as no workshop provided the same answer, but on average out of all the workshops, consumers and civil society occupy this third place. It is interesting to note in this respect that companies (including the distribution sector) are not seen as one of the key actors of change, even coming fifth after scientists. Overall, there is a great deal of reliance on farmers to change their practices, as well as on governments to promote this change, perhaps with the support of civil society and consumers.

b. FARMERS/ PRODUCERS

The second session opened the floor to farmers and soil conservation stakeholders. It clearly showed that pioneer farmers and ranchers in North America have been implementing practices for several decades to improve soil health and sequester carbon in their soils. From conservation agriculture to holistic grazing management, these practices have proven their worth in this part of the world and offer real hope for the development of agriculture and livestock (at least cattle) on a larger scale.

From the producers' point of view, it is necessary to provide **financial and technical support** when changing the economic model.

For the moment, according to these same producers, there are no **incentives to overcome the critical period** of the first years of conversion. Producers are very much confronted to low economic support during transition, when shifting from a conventional agriculture model to a regenerative agriculture one, which can take years. This partly explains the low rate of conversion to more sustainable and regenerative agricultural practices, a trend that could be accelerated by the introduction of taxes on the use of soil-destroying agricultural practices and the creation of a direct link to the carbon market to pay farmers to sequester carbon. Ideas of compensation mechanisms (like subsidies for environmental services provided to society, etc.) and better prices for locally produced agricultural items of primary importance should be at the epicenter of dialogs between policy makers, farmers representatives/organizations, retailers and agri-food businesses.

The other challenge, in addition to financial support for the transition phase, would be the establishment of **effective networks for skills training and advice** to increase the adoption of good practices by producers. Among the vectors mentioned in the context of these networks was the exchange of information through field days, workshop discussions and online networks. It was clear to the speakers that technology transfer is essential to improve the quality, quantity and access to information on soil health and conservation available to producers and agricultural professionals in Canada. Capacity building is essential to train farmers and producers. The ones involved in regenerative agricultural practices since decades master technical solutions but feel alone, unique and sometimes forgotten in their daily practices.

According to the questionnaire results, close to 97% of respondents would be **ready to submit to regular checks to verify the reality of agricultural practices** with a preference for checks in the presence of the farmer (38%), but also to a lesser extent indirectly (satellite, drones, sensors) (29%), bearing in mind that 29% of the answers are in favor of both means of control: directly and indirectly. Moreover, **concerning expected compensations for producers**, like during the debate, the farmers' workshop was in favor of better prices for products and subsidies for services rendered to society (68% answering: "both" and 13% in favor of subsidies alone and 7% in favor of better prices alone), with a total citing one or both answers of 87%.

c. SCIENCE

The diversity of presentations and exchanges during the fourth session devoted to civil society and NGOs showed the **range of points of influence that civil society can use to try to impact not only public policies, but also agricultural practices, particularly through consumers**. This is the key role of civil society NGOs in **raising the awareness of policy makers**, providing information to producers and raising the awareness of the general public. This is particularly the field of action of international NGOs that think and propose at the global level, in particular on how to reduce human pressure on ecosystems and land resources by protecting ecosystems, restoring degraded land, modifying agricultural practices, considering waste treatment and providing information on the impact of diets.

In North America, **lobbying to promote soil health appears to be essential in trying to change agricultural practices**, as well as for the establishment of a carbon tax to support the change in the economic model of agriculture through a financial incentive to producers on the basis of each ton of carbon sequestered. In addition, NGOs are also working **with consumers for better recognition of regenerative agriculture products,** increased skills and incentives for farmers to develop regenerative farming practices. There is no longer any doubt for civil society in North America that science, policy (through the creation of an enabling environment including incentives) and producers (through the use of adapted practices) that support soil restoration and soil carbon storage are absolutely essential to combat climate change.

According to the questionnaire, respondents considered that "**raising awareness of policy makers**" (31%), "**information to farmers and producers**" (24%) and "**raising awareness of the general public**" to be the actions needed to promote soil health and soil carbon storage and fell within the role of NGOs, far ahead of "scientific evidence and knowledge" (14%). To help **monitoring changes in soil health and carbon sequestration**, more than two thirds (71%) of the responses to this question went almost equally to "**a local and global dashboard to monitor progres**s" (37%) and "local and regional networks of actors" (35%), ahead of "monitoring programs controlled by NGOs" (20%).

d. CIVIL SOCIETY & NGOs

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e. PRIVATE SECTOR

The last session gave the floor to the economic actors, and showed that they were very present in the field of carbon storage in soils to fight climate change, with a complementary asset through the link that can be created with the carbon market, thus making it possible to pay for ecosystem services.

Some actors focused on data collection and algorithms, which would reduce the cost of soil sampling, in order to release the potential for soil organic carbon sequestration. Others, again to improve accuracy and reduce the cost of sampling, have focused on soil carbon measurements and predictive mapping to assess relationships between soil properties and covariates. Thus, affordable quantification methods implemented by private sector actors for their supply chain, through their contract with their producers, are one of the key ingredients for scaling up soil-based solutions.

At the North American level, a public-private partnership with the private sector involved in agriculture (the commodity food supply chain and the manufacturers' agricultural value chain) can stimulate the design of the R&D tools needed to create markets for advanced ecosystem services, designed to encourage producers to improve soil health and thus the health and quality of food for final consumers.

According to the questionnaire, in order **to help farmers change their farming practices in favor of soil health**, 51% of respondents believe that economic actors should "**bring about change at the level of farmers by raising standards and prices**" (27%) and by "**adapting the value chain to farmers' best practices**" (24%). To a lesser extent (a total of 40%), responses also concerned "the adaptation of the price scale in relation to the way products are grown" (15.6%), "the use of external labelling and certification schemes" (13.3%) and "the development of in-house labels and best practice marks" (11.1%).

To the question of whether the **implementation of labels and certifications by companies intended to verify the effectiveness of practices by producers** was **useful**, the answers were affirmative ("yes, of course useful") at 83% against 17% to "No, not useful".
In North America, 56% of answers were in favor of "voluntary actions by actors (mainly farmers and economic actors)" and **44% in favor of "compulsory actions** involving policy makers and civil society".

f. CROSS-CUTTING THEMES

1) Main drivers to change agricultural practices while supporting soil health and carbon storage in North America?

In general, farmers are seen by all groups as the main actors of change, except for the NGO workshop, which puts civil society and consumers in the first position. Public authorities are generally cited in second place, except for the business workshop, which considers that this place belongs to consumers and civil society. The third position is more divided as no workshop provided the same answer, but on average out of all the workshops, consumers and civil society occupy this third place. It is interesting to note in this respect that companies (including the distribution sector) are not seen as one of the key actors of change, even coming fifth after scientists. Overall, there is a great deal of reliance on farmers to change their practices, as well as on governments to promote this change, perhaps with the support of civil society and consumers.

2) What are the most important critical success factors for scaling up? (Multiple Choices)

Unlike the previous question, the responses from each workshop were not unanimous in distinguishing the factors for success in scaling up. "Effective skills training and advisory services to increase the adoption of good production practices by other farmers" came first overall with more than a quarter of responses (25.1%), followed by "Market recognition through prices, promoting the adoption of good practices" with 20.5%, followed by "Scientific support to understand and monitor the evolution of SOC (Organic Carbon in Soils) and soil health" (19.7%) and "Economic support during the transition (through offsets, subsidies, the carbon market, etc.)" (19.7%).)" (18,5%). Direct support through technical advice, better prices, scientific support appear to be necessary, without forgetting economic support during the transition period. On the other hand, the legal environment does not appear to be an important issue in the context favorable to a change of scale. Responses by workshop are more "expected", because:

- The farmers' workshop places more emphasis on economic support during the transition (27.9%) and skills training services (23.5%)
- The science workshop prioritizes skills training services (31.3%) and scientific support (29.7%)
- The NGO workshop considers economic support during transition (25.0%) and skills training services (23.6%) as essential
- The business workshop places market recognition first (25.5%), followed equally by skills training services (21.8%) and scientific support (21.8%), followed by economic support during the transition (20.0%).

3) What are the main barriers for scaling up?

In terms of obstacles to scaling up, the first two at the general level are "a market mechanism and unfavourable prices" (29.1%) and "the lack of economic support during the transition" (26.7%), followed by "the low level of adoption of good practices by other farmers, and the lack of consideration for these practices by professionals" (17.8%). "Insufficient scientific support to understand and monitor the evolution of SOC (Soil Organic Carbon) and soil health" and "the legal environment" lag far behind.

The responses per workshop are much more homogeneous than for the previous question, because:

- Farmers' workshops, NGOs and companies make the same classification: 1. "a market mechanism and unfavorable prices" (27.9% to 32.6%) - 2. "lack of economic support during the transition" (25.4% to 26.2%)
- The scientific workshop ranked the first two inversely: 1. "lack of economic support during the transition (29.0%) - 2. "market mechanism and unfavorable prices". (26,1%)
- "The low level of adoption of good practices by other farmers, and the lack of consideration for these practices by professionals" is still in third position in all the workshops (15.2% to 21.3%), only tied with "insufficient scientific support to understand and monitor the evolution of SOC (Soil Organic Carbon) and soil health" for the workshop undertaken (15.2%).

4) What do you expect from the “4 per 1000” Initiative, in this context, to facilitate these changes?

The heterogeneity of responses to this question across the workshops shows the different expectations of the Initiative by different groups of respondents. Nevertheless, "advocacy with policy makers to obtain a better recognition of practices in favor of soil health" comes first in the general plan (23.7%) as well as for 3 workshops (farmers, scientists and NGOs) and in second place for the workshop undertaken, which comes first for "raising awareness among the general public on the importance of healthy soils and SOM (Soil Organic Matter)". This same expectation is in second place overall (19.6%) followed ex aequo by "facilitating information exchange through success stories, best practices, decision support tools, etc." and "initiating, promoting and facilitating international multi-stakeholder partnerships and projects to stimulate soil health" with 16.3%. Responses by workshop are more pronounced:

- For the farmers' workshop, the Initiative should focus on advocacy (26.7%), partnerships in international projects (18.6%) and international scientific cooperation (16.3%)
- For the scientific workshop, the Initiative should focus more on advocacy (22.3%), facilitation of information exchange (19.1%) and ex aequo, public awareness and partnerships of international projects (17.0%)
- For the NGO workshop, the Initiative's action should mainly concern advocacy (25.3%), public awareness (24.0%) and partnerships in international projects (14.7%)
- The workshop on enterprises hopes that the Initiative will work primarily on raising public awareness (24.6%), ex aequo information exchange facilitation and advocacy (19.3%), and international project partnerships (14.0%).

5) Biochar

In North America, there are some considerations about the use of biochar. But biochar is not something that is really part of formal agricultural policy in the (Canadian) Federal Government ; several research projects on the benefits of biochar are conducted but the various jurisdictions of the country are the one that will determine what practices they would like to see. In Quebec, there have been some projects for the production of biochar, but the costs of the material remain prohibitive for large-scale use. In California, biochar is one of the tools that has cross benefits for vegetation management, and they are in early stages of research and are very interested in exploring opportunities. On the top of this, biochar, its chemical and its physical attributes need to be better characterized ; as well as the longevity of the stored carbon in biochar. It should be included in carbon markets. It is important to agree on the criteria for characterizing and ensuring its longevity.

III. Suggested implementation plan for a Roadmap 2020-2021 for North America on "Soils for Food Security and Climate" (related to the "4 per 1000" Strategy)

A regional vision and roadmap of concrete actions on the ground, to enhance healthy soils and carbon sequestration in soils via agriculture and forestry.

#	Road map of Actions	Description of Actions for North America	Related to which goal of the "4 per 1000" Strategy?	Related to which objective of the "4 per 1000" Strategy?	Who is in charge?	Deadline
1	**Action 1**	Impulse and share ideas of compensation mechanisms (like subsidies for environmental services provided to society, etc.) and better prices for locally produced agricultural items of primary importance. Compensation and also support during transition should be at the epicenter of dialogs between policy makers, farmers representatives/organizations, retailers and agri-food businesses.	Goal A: Inception & Conceptualization	Objective A5 Screen, compile and share the best Carbon market mechanisms and compensation schemes on C sequestration	North America Regional Partners and Members of the "4 per 1000" Initiative with the assistance, if needed of the Executive Secretariat and the STC	TBD
2	**Action 2**	Direct more scientific research efforts, in North America, towards bridging relations with farmers and policy makers on scientific aspects, in order to facilitate changes in agricultural practices (including biochar).	Goal B: Implementation	Objective B3 Develop and implement science-based regional helpdesks for: (a) the planning of local actions on good AFOLU management practices (b) the establish-ment and use of compensation schemes for carbon sequestration (c) provision of ecosystem services at appropriate levels (principle of subsidiarity)	North America Regional Partners and Members of the "4 per 1000" Initiative with the assistance, if needed of the Executive Secretariat and the STC	TBD

#	Road map of Actions	Description of Actions for North America	Related to which goal of the "4 per 1000" Strategy?	Related to which objective of the "4 per 1000" Strategy?	Who is in charge?	Deadline
3	**Action 3**	Emphasize advocacy and outreach to policy makers to get a better recognition of the impact of agricultural practices in favor of soil health and SOC storage; insist on the significant role that farmers and soils can play in removing CO2 from the atmosphere (climate mitigation).	Goal C: Promotion	Objective C1 Advocate for soil health and the importance of soils for climate and food security and raise the general awareness on the central role of the "4 per 1000" Initiative	North America Regional Partners and Members of the "4 per 1000" Initiative with the assistance, if needed of the Executive Secretariat and the STC	TBD
4	**Action 4**	Deliver a mapping study of existing strategies and initiatives related to food systems, implemented by major Northern American agri-food businesses to scale up agricultural regenerative practices in their value chains. Identify key success factors.	Goal C: Promotion	Objective C2 Promote the paradigm shift from "soil exploitation" to "soil regeneration" through agroecology and sustainable land management practices at the level of producers and businesses along value chains.	North America Regional Partners and Members of the "4 per 1000" Initiative with the assistance, if needed of the Executive Secretariat and the STC	TBD
5	**Action 5**	Enhance Public-Private-Partnerships with the private sector involved in agriculture, meaning: the retailers, and their supply chain, for commodity food products and the manufacturers, and their value chain, is essential to create advanced ecosystem service markets, designed to incentivize producers, who improve soil health and thus food health and quality, for the final consumers. Cost-effective quantification methods implemented by the private sector in their supply chain, through their contract with their producers, is a key ingredient in taking soil-based solutions to scale.				TBD

#	Road map of Actions	Description of Actions for North America	Related to which goal of the "4 per 1000" Strategy?	Related to which objective of the "4 per 1000" Strategy?	Who is in charge?	Deadline
6	**Action 6**	Capitalize on the 4 per 1000 Collaborative Platform as a useful tool to exchange knowledge and experiences for Northern American partners and members. Identify good practices, involving C market actors and engage in technical discussions on soil carbon management, share opportunities and announcements, and find partners for developing projects in Northern America.	Goal D: Collaboration	Objective D1 Facilitate, encourage, enhance and strengthen collaborations and exchanges among stakeholders within and around the Initiative.	North America Regional Partners and Members of the "4 per 1000" Initiative with the assistance, if needed of the Executive Secretariat and the STC	As of mid-2020
7	**Action 7**	Organize a second edition of the "4 per 1000" North America Regional Meeting.	Goal D: Collaboration	Objective D2 Contribute to the inception, development and outreach of regional networks.	the Executive Secretariat in partnership with Regeneration Canada.	Q1/Q2-2022

IV. Content of the meeting

SESSION 1 : Introduction and General presentation of the regional context vis-à-vis the "4 per 1000" Initiative

Overview of the session

The objective of this session was to recall the general context of the "4 per 1000" regional meeting in the framework of the International Initiative. A reminder of the objectives and achievements since its inception allowed all participants, including the speakers, to have the same level of information. The second objective of this session was to have an overview of public policy action on soil health and soil carbon storage, both from a legislative and regulatory point of view, in terms of public policies in favor of agricultural practices preserving and/or improving soil health and soil organic carbon (COS). For information, Canada and California are partners and/or members of the Initiative.

The general feeling that emerged from this session (presentations and answers to participants' questions) is that, whether in Canada or the USA, California or Quebec, public policies have been developed and implemented for many years in favor of soil health, through agricultural practices (e.g. no tillage) or forestry. Depending on the administrative organization of the countries, states and provinces, the public authorities consider that they have put in place an adequate body of legislations and/or regulations or are in the process of developing them for implementation in the near future. In the same way, significant budgets have been allocated to support these public policies, aimed at a variety of audiences, starting with farmers for the adoption of appropriate practices, but also scientists for increasing knowledge, and the general public for raising collective awareness of the importance of soil health and COS issues, particularly among consumers. The questions put to the speakers show a different view of things from the point of view of both farmers and civil society.

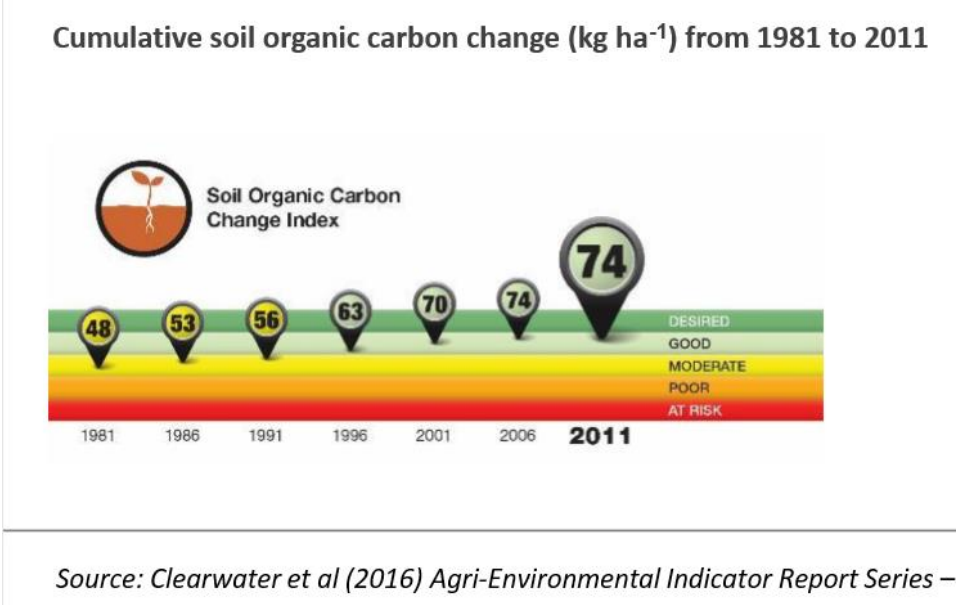
Content & Outcome

Session 1 brought a **general introduction** and a presentation of **where the 4 per 1000 Initiative stands** since its inception. Then, four governmental speakers made presentations dedicated to **policies on soil health and soil carbon sequestration at the national and regional levels in North America.**

- Two presentations, at the national level, were released by Ms. Lucy CLEARWATER from Agriculture and Agri-Food Canada (AAFC) for Canada, and by Mr. Sylvain MAESTRACCI, Agricultural Attaché at the French Embassy in Washington DC, for the synthesis of US policy.
- Two presentations, at the regional level, were released by Ms. Hélène BOURASSA of the Ministry of Agriculture, Fisheries and Food of Quebec (MAFFQ) and by Ms. Jenny LESTER-MOFFITT, Undersecretary of the California Department of Food and Agriculture (CFDA).

Mrs. **Lucy Clearwater**, Strategic Policy Branch - **Agriculture and Agri-Food Canada (AAFC)**, shared her presentation named: "Carbon Sequestration in Canada: Trends and Policy Direction in Agriculture and Forestry". She started with an overview of Canada's forest and agricultural sectors. The forest sector accounts for 347 million hectares of forest (35% of Canada, 9% of world forest cover) ; this sector sequesters 14 Mt CO2 / year in managed forest and associated harvested wood products (2018). On the other side, the agricultural sector accounts for : 64 million hectares of farmland (>7% of Canada, ~1.3% of world agricultural extent) ; >38 million hectares of cropland ; the sector sequesters 6.2 Mt CO2 / year from agricultural soils (2018), contributes 73 Mt CO2 / year in emissions. In 2018, in Canada, agriculture accounted for 10%

of total national emissions and for nearly half of total net carbon removals. She insisted on the fact that farmers have moved away from conventional tillage with more than 80% of land prepared for seeding, now under moderate or zero tillage. Here are some positive results that can be seen on the graph:



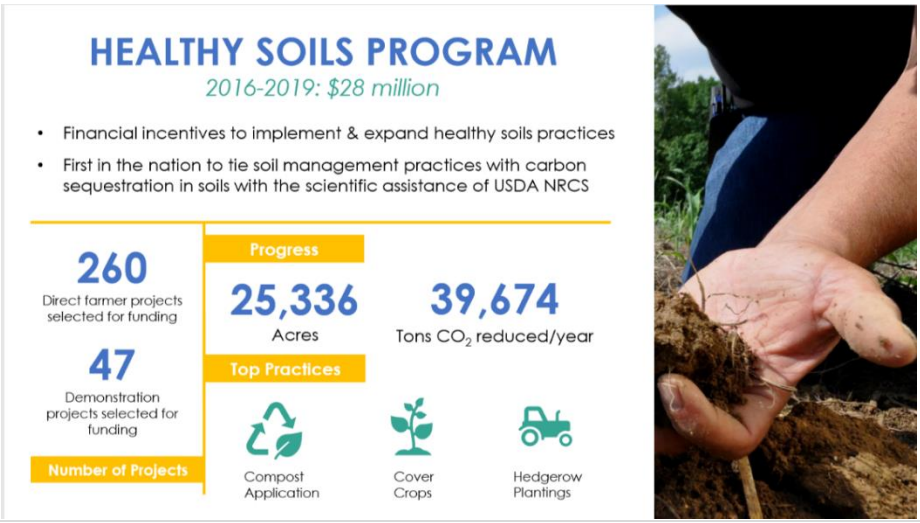
Part of the success lays in the fact that the significant role that farmers and soils can play in removing CO2 from the atmosphere is recognized in major domestic policy initiatives: 1. The Pan-Canadian Framework on Clean Growth and Climate Change commits federal, provincial, and territorial governments to work together to protect and enhance carbon sinks, including in forest and agricultural lands ; 2. The Canadian Agricultural Partnership "Innovate. Grow. Prosper." supports climate actions through various programs that help producers address soil and water conservation, reduce GHG emissions, and adapt to climate change. This approach adopted combines financial support for on-farm actions (like the Low Carbon Economy Fund, etc.) with science and innovation to advance sustainable farming systems (like the departmental research focused on soil carbon, etc.). The Government of Canada has also made commitments to increase carbon sequestration to meet emission reduction targets since end of Dec. 2019. → **Strong domestic policy initiatives are necessary to commit local, federal and territorial governments. Supportive programs are key to help producers implement actions to adapt to climate change.**

Mrs. **Hélène Bourassa**, of the **Ministry of Agriculture, Fisheries and Food of Quebec (MAFFQ)** shared her presentation about "Quebec Policies, Programs and Actions on Soil Health". The MAFFQ is composed of 1,600 employees of which 200 are dedicated to Agro-Environment. In Quebec, Agriculture stands for 9.8% of the total Carbon emissions in Quebec. Agricultural land in Quebec represents 2% of the total soils of Quebec and are submitted to limited resource and increasing pressure: - Conflict/competition of use (urban sprawl) - Change in crop species - Intensified tillage. In Quebec, there are 2 key policies related to soil health :

1. The Bio-food Policy 2018-2025 : CAD 11. 5 million are invested over 5 years to encourage responsible soil health practices. The main actions are the following: a. Strengthen initiatives to reduce the bio-food sector's greenhouse gas emissions and its vulnerability to climate change ; b. Develop and support collaborative approaches to improve water quality, soil health and biodiversity protection ; c. Continue the growth of the organic sector ; d. Strengthen the reduction of risks associated with the use of pesticides ; e. Encourage the circular economy and add value to co-products.

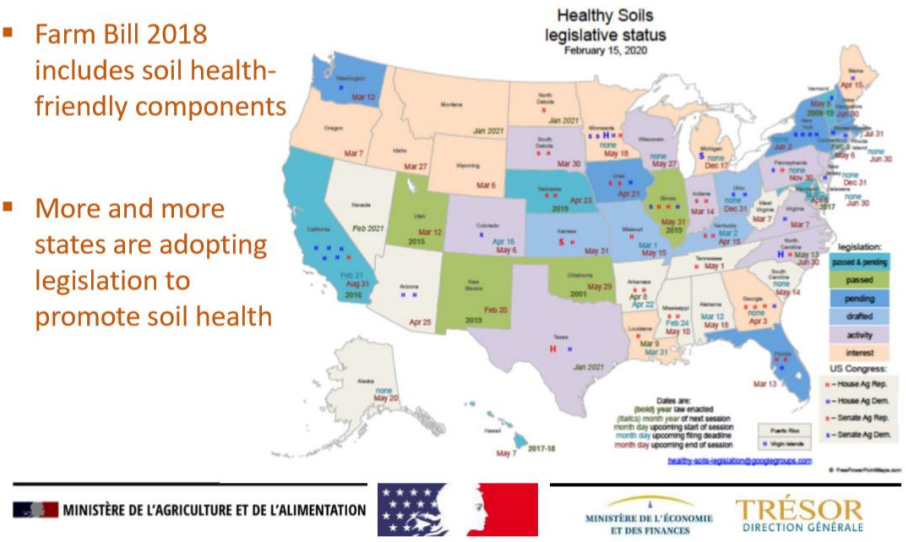
2. The Climate Change Action Plan 2013-2020 : Soil health (soil productivity and N efficiency ; water infiltration and retention ; soil resistance to erosion) is addressed in 2 actions: Action 22: *Equipping farmers to better manage GHG emissions from crops and livestock production* and Action 27 of this plan: *Supporting vulnerable economic actors (adaptation).* Many actions are implemented, like information, awareness-raising and accompaniment ; development of knowledge ; innovation to monitor changes in soil health; promotion of the practice of sustainable agriculture despite the pressures. → **Dedicated local governance and action plans deeply encourage responsible soil health practices and improve climate change mitigation at farmers' level.**

Ms. **Jenny Lester-Moffitt**, Undersecretary of the **California Department of Food and Agriculture (CFDA)**, presented the "Healthy Soils Initiative". California agriculture accounts for 13% of total US agricultural production and 8% of carbon emissions. The State of California has set an ambitious vision for 2030: reduce greenhouse gas emissions (GHG) to 40% below 1990 levels. One of the goals is clearly set: carbon storage in the land base because they intend to maintain their natural and working lands as a carbon sink. California, thus, strives to double the pace and scale of land restoration and management activities through 2030. The California Department of Food and Agriculture has introduced in 2016 its Healthy Soils Program described hereafter:



This program requires: 1. a strong technical assistance; 2. a strong coordination of public and private efforts to scale up healthy soil practices across California’s farm, ranch, natural, and state managed lands and 3. a good regulatory alignment. USD 28 million have been invested so far during the 2016-2019 period. In 2020 the budget for one single year is USD 28 million. The CDFA and USDA NRCS (Natural Resources Conservation Service) are also working together to develop a soil organic carbon map for the state as a key indicator of soil health for the state; completion is planned for 2021. → **Strong investments at regional levels allow to change the role of agriculture in the fight to preserve natural and working lands**.

Mr. **Sylvain Maestracci, Agricultural Attaché at the French Embassy in Washington DC**, presented a synthesis of US policy on soil health and carbon sequestration in soils related to agriculture and forestry. He insisted on the fact that there are few specific soil health policy tools which are implemented, but very often a defined strategy of approach is set: • soil health is one of the environmental policy goals of a program • a specific approach also exists with a dedicated team, and specific strategy/communication/outreach tools • Carbon sequestration incentives are still implemented in tools and programs provided by USDA. All this is also implemented through local governance through a creation of local soil conservation districts (they now exist in all 50 States) and a strong cooperation of Federal, State and local agencies on the policy strategies (and funding). On the following mapping, the current legislative status is presented (updated on 15 Feb. 2020):



→ **In the USA, very few specific health policy tools exist but a strong cooperation at the governance level of all agencies (federal, state and local) allows the consideration of soil health by policy makers**.

Questions raised during Session 1

In North America, is there any consideration about the use of biochar? How is it involved in policies? "Biochar is not something that is really part of formal agricultural policy in the (Canadian) Federal Government. We are, at the Department, funding several research projects on the benefits of biochar; So, I think as we have some more conclusive findings at how it performs throughout the country. It may, at some point, make its way towards federal policy. A lot of on-farm actions in various jurisdictions of the country are the one that design the program and determine what practices they would like to see." L. Clearwater.

"Concerning biochar, several studies have been carried out on the potentials of land use. There have been some projects for the production of biochar in Quebec, but the costs of the material remain prohibitive for large-scale use. The target market is mainly horticulture. We do not have programs which will encourage the use of biochar." H. Bourassa.

"California is a very arid state. We have forest fires. We have big conservations about biochar. It is a way to look at forestry management, to maintain biodiversity and forest health. Biochar is one of the tools that has cross benefits for vegetation management. We have 1.2 million acres of almond of which generate shells every year. We have lots of sources of biochar. Regarding research, we have some climate change research fellows allocated to analyzing biochar. We have also a fertilizer education program where biochar is part of that program more on aspects like water quality and water retention. We are in early stages of that research, but we are very interested in exploring opportunities for biochar." J. Lester-Moffitt.

Is there a distinction to be established between areas planted with trees, almost monoculture, and areas started with regenerative diversified forests, especially in the south of Canada? "Regarding areas planted with trees as a monoculture versus areas stewarded as regenerative diversified forests, I do believe that Natural Resources Canada has distribution maps on managed and unmanaged forests. Please go to link: https://www.nrcan.gc.ca/maps-tools-and-publications/maps/22020." L. Clearwater.

This question concerns more the MFFP, the Ministry of Forests, Wildlife and Parks: https://www.quebec.ca/en/government/ministere/forets-faune-parcs/." H. Bourassa.

Is there a project to recognize agro-forestry in Quebec's agricultural policy? What is the status of agro-forestry? Agro-forestry would have its place in a new sustainable agriculture plan, but that plan is being built. Agro-forestry and biodiversity are all important elements that are part of sustainable agriculture, so yes to some extent agro-forestry will be included in the sustainable agriculture plan." H. Bourassa.

What is the estimated market value of one sort of carbon credit that would make the difference to widen significantly Californian farmers adoption of soil, water conservation and restoration practices? "Our Healthy Soils Program is very much modelled after partnering with the US Department of Agriculture Natural Resources Conservation services. We take the practices they have in their program. We have partnered with the Colorado State University and Keith Paustian's team on the COMET model. That model take GHG reduction is for these practices. We base our payment rates on. We do have our own practices because of circular economies: compost practices, conservation agriculture practices, sequestration models for the GHG reduction. Our program is a grant program, not a carbon credit program. I don't have the estimated market value. We can say that based on the payment rates we had a high rate of interest from farmers, with a lot of applications, and are enough to incentivize growers". J. Lester-Moffitt.

Are there any techniques available for garden growers to measure the carbon contents of our soils? "I don't know what tools are available for home gardeners; there is a program for master gardeners at Colorado State University." J. Lester-Moffitt.

What kind of dialog exists between California and Quebec? "We share an auction on our climate program. The partnership we have is very progressive." J. Lester-Moffitt.

How do you explain in the US the total dichotomy between the USDA policy and what NRCS (National Resources Conservation Service) proposes from some of the videos that are circulating? "The NRCS represents a component of US policy that is effectively the link between agriculture and the environment. There is also, including at the NRCS, the goal of an American agriculture that is competitive, that is able to feed its own population and that is able to export goods in a sustainable manner. It's not a dichotomy; we have a greater focus at NCRS on the environment than we see in other jurisdictions. To take the case of France, the integration between economic policies and environmental policies is now moving in the same direction; but 10 years ago, there were a lot of distinctions internally. It is rather a logic of reorienting agriculture towards a little more environmental protection while at the same time having a set of policies that promote competitiveness. I saw a question on soil health and the use of pesticides. It is one of those points. There are no targets from USDA to reduce pesticide use; there are pesticides as a tool in the big toolbox to help improve soil health by increasing carbon and organic matter." S. Maestracci.

- *SESSION 2: Round Table n°1: Farmers' experiences and proposals from the ground*

Overview of the session

This round table, which opens the floor to farmers and soil conservation stakeholders, clearly shows that pioneer farmers and ranchers in North America have been implementing practices for several decades to improve soil health and sequester carbon in their soils. From conservation agriculture to holistic grazing management, these practices have proven their worth in this part of the world and offer real hope for the development of agriculture and livestock (at least cattle) on a larger scale. From the producers' point of view, it is necessary to provide financial and technical support when changing the economic model. For the moment, according to these same producers, there are no incentives to overcome the critical period of the first years of conversion. This partly explains the low rate of conversion to more sustainable agricultural practices, a trend that could be accelerated by the introduction of taxes on the use of soil-destroying agricultural practices.

The other challenge, in addition to financial support for the transition phase, would be the establishment of effective networks for skills training and advice to increase the adoption of good practices by producers. Among the vectors mentioned in the context of these networks was the exchange of information through field days, workshop discussions and online networks. It was clear to the speakers that technology transfer is essential to improve the quality, quantity and access to information on soil health and conservation available to producers and agricultural professionals in Canada.

Content & Outcome

Session 2 has been dedicated to **producers** with four different presentations:

- Feedbacks from a farmer involved in soil conservation agriculture, Mr. Jocelyn MICHON, and from a farmer practicing holistic pasture management, Mr. Paul SLOMP.
- A presentation of the activities and point of view of Mrs. Tori WAUGH from the "Soil Network in Ontario" and Mr. Jim TOKARCHUK, Executive Director of the "Soil Conservation Council of Canada".

Mr. **Jocelyn MICHON** has been in agriculture since 1974 and leads a farm of 236 ha. Concerned about improving the health of the soil, he has succeeded in setting up an efficient no-till system (reduced tillage since 1976, no-till since 1986) through direct seeding, combined with the use of cover crops, since 2003. His agricultural practices enhance the restoration of soil biology and soil characteristics. Starting SOM (Soil Organic Matter) level: 1.5% (~0.75% C). Today SOM level: 3-3.5% (~1.5-1.75% C) → Increase of SOM of ~2 % (~1% C = 45 Tons C / ha) since conversion to no-till. His results also show good yields with a significant reduction in chemical inputs. (Rotation cultures: soy → maize – soy → green legumes / Cover crops: rye, oats, false flax, fava bean, flax, lentil, brown mustard, phacelia, peas, reddish, buckwheat.)

→**Producers need to be assisted and monitored when changing their economic model. There are no incentives to overcome the critical period during the first years of conversion**.

Mr. **Paul SLOMP** was raised on his family’s dairy farms, first in the Netherlands, then in Alberta, Canada - farms that were at the forefront of the grass-based dairy movement. After his years of College in Alberta, he returned to Canada to work in Canadian food policy and later to start his own farm to develop and showcase the ability of alternative models of agriculture to produce food for people in a way that regenerates soil and rejuvenates ecosystems, while being economically viable with the aim of providing a different model on which to base agricultural development. He currently runs a farm with a herd of 200 bovines and a sounder of 70 pigs and chicken on 370 acres. His 10-year old of grazing practices involve rotational grazing and mob grazing. The herd is moved across fields 2 to 8 times a day and always eats fresh grass aiming at 50% plant consumption so they get the best energy from the plants and the plants can still rejuvenate through photosynthesis. He insists on the fact that these animals play an enormous role in maintaining a healthy ecosystem at the farm. The organization of the farm is highly dependent on the migration patterns that the herd will follow. Usually 7 rotations are made to each field. He thinks a lot about new methodologies to improve the system and to teach to other farmers. "We share and learn a lot on an informal exchange basis, for example, YouTube Videos and personal exchange". Paul thinks that property tax could be a way to diminish destructive farming and encourage good practices. → **The conversion rate towards more sustainable agricultural practices could be accelerated through taxes which divert from destructive farming practices**.

Mrs. **Tori WAUGH** is the Principle Consultant of Conservation Ag Consulting, an agricultural sustainability company driving innovative solutions to conserving soils in Ontario. Conservation Ag Consulting provides event planning, research coordination, organizational development and designs, delivers & evaluates projects and programming for Conservation Authorities and Environmental NGO's. She also leads OSN, Ontario Soil Network, which is a farmer-led network aiming at improving the quality of soils in Ontario. Unfortunately, healthy soil practices are not yet the norm. OSN is mainly a behavioral change network ; they have created a social value toolbox in which one of their important tools is the "Theory of planned behavior". The question is not to adopt or not adopt the right behavior, but implementation and adoption are key. The mechanisms for the success of the community rely in shared experiences, in finding mentors who have insight and can influence others and help define the gap farmers need to bridge. OSN supports exchange of information for farmers through field days, shop talks and the use of an on-line platform, through social norm educational marketing to better connect members of the network. Waugh says that the barriers to adoption of healthy soil practices are related to unfavorable market mechanisms.

→ **Effective skill-learning and advisory networks to increase adoption of good practices by farmers are essential to scale-up (like exchange of information through field days, shop talks and on-line networking)**.

Mr. **Jim TOKARCHUK** studied and worked within the agriculture and agri-food industry in Canada for nearly 40 years. After his retirement in 2015, he became the Executive Director of the Soil Conservation Council of Canada (SCCC), working for soil conservation and soil health in Canada. The role of SCCC lays in advocating for soil health by reaching farmer-based organization (farmers and industry), increasing quality and access to information on soil health and soil conservation techniques, lobbying for soil health towards politics, and creating public awareness like the Soil Week (every year in April): distribution of undies to farmers, buried in April and un-buried in autumn, to visualize microbial decay (indicator for soil microbial activity / soil health).
SCCC leads a project in partnership with Compost Council of Canada called “Optimization of Carbon in Canada’s Managed Soils”. Here is the description of the project: Goal: More people

putting more carbon into soils ; Deliverables: Roadmap Tools Commitments National leadership ; Project status: 43 interviews Key findings categorized Toolkit success stories under development. The project is funded by the Metcalf foundation and should be closed end of 2020.

→ Technology transfer is key to increase the quality, quantity and access to soil health and conservation information available to producers and agriculture professionals in Canada.

Questions raised during Session 2

What prevents other producers to copy your methods? "I try to convince my peers for 23 years. Adoption is slow. Some try but most give up after 3 years." J. Michon.

What has made destructive agriculture work so well around the world? "Studying the success of the Green Revolution, there are lessons we can learn. Advocacy was made by knowledge institutions, universities, extension agencies to use fertilizers and pesticides. (...) How do we contrast this healthy form of agriculture, that sequesters carbon, with the conventional form of agriculture. How do we use governmental institutions and extension agents to bring information into the countryside (...) are the key questions?" P. Slomp.

What about market drivers?" "I think farmers who chose to use destructive practices should pay enormous amounts of property taxes. For example, farms who practice regenerative practices should get breaks on their property tax, and even be paid for it." P. Slomp.

Will it not be necessary to offer financial support to agriculture that would be conditional on the achievement of soil quality (cross-compliance / "éco-conditionnalité" in French)?" "What about economics and incentivization? In order to link economics and incentivization, the scientific community needs to be on the same page in terms of soil health assessment. Our ministries of agriculture, our research institutions and private companies should come to a consensus." T. Waugh.

How are you communicating the financial impact of the conversion for costs and revenue perspective and how do you frame it in a lifetime (investments versus cost savings)? "At OSN, we studied how conversion to healthy soil practices has balanced it financially. We ran them through a costs/benefits analysis projected usually over 5 to 7 years. (...) We are looking to create a better risk modelling and cross-benefits analysis tools, not only on the farm scale, not only on a 5-year scale but inter-generationally. Certainly, time and long-term are essential to understand the economics of conversion." T. Waugh.

What do you think about the fact to offer financial support to agriculture to push farmers to have a better quality of soils? "The question is about transition funding for farmers to undertake conservation practices. A case-study has been made about the cost of soil degradation (SOM, erosion, everything that decreases the production) : around 4 billion CAD a year, in Canada. All this creates an argument for a pool of money to support the conversion to conservation measures. There is a strong case to be made for public support in a transition towards more sustainable practices." J. Tokarchuk.

Describe your experience, if any, with biochar as additional carbon into soil. Do you see biochar as something to advocate for soil enhancement? Why or why not, and how? "We have such an amazing biology in the soils that can do so much to sequester carbon (…) soil microbiology is underutilized ; we should maximize microbiology in soils." Mr. Slomp.

"There are a lot of research in biochar, but we have to look at a larger scale." Ms. Waugh.

"We need to do more than a single practice." J. Tokarchuk.

Results of the Polls (Round Tables 1 to 4)

Questions common to all workshops

1. Main drivers to change agricultural practices while supporting soil health and carbon storage in North America?

In general, farmers are seen by all groups as the main actors of change, except for the NGO workshop, which puts civil society and consumers in the first position. Public authorities are generally cited in second place, except for the business workshop, which considers that this place belongs to consumers and civil society. The third position is more divided as no workshop provided the same answer, but on average out of all the workshops, consumers and civil society occupy this third place. It is interesting to note in this respect that companies (including the distribution sector) are not seen as one of the key actors of change, even coming fifth after scientists. Overall, there is a great deal of reliance on farmers to change their practices, as well as on governments to promote this change, perhaps with the support of civil society and consumers.

2. What are the most important critical success factors for scaling up? (Multiple Choices)
Unlike the previous question, the responses from each workshop were not unanimous in distinguishing the factors for success in scaling up.
"Effective skills training and advisory services to increase the adoption of good production practices by other farmers" came first overall with more than a quarter of responses (25.1%), followed by "Market recognition through prices, promoting the adoption of good practices" with 20.5%, followed by "Scientific support to understand and monitor the evolution of COS (Organic Carbon in Soils) and soil health" (19.7%) and "Economic support during the transition (through offsets, subsidies, the carbon market, etc.)" (19.7%).)" (18,5%). Direct support through technical advice, better prices, scientific support appear to be necessary, without forgetting economic support during the transition period. On the other hand, the legal environment does not appear to be an important issue in the context favorable to a change of scale.
Responses by workshop are more "expected", because:

- The farmers' workshop places more emphasis on economic support during the transition (27.9%) and skills training services (23.5%)
- The science workshop prioritizes skills training services (31.3%) and scientific support (29.7%)
- The NGO workshop considers economic support during transition (25.0%) and skills training services (23.6%) as essential
- The business workshop places market recognition first (25.5%), followed equally by skills training services (21.8%) and scientific support (21.8%), followed by economic support during the transition (20.0%).

3. What are the main barriers for scaling up?

In terms of obstacles to scaling up, the first two at the general level are "a market mechanism and unfavorable prices" (29.1%) and "the lack of economic support during the transition" (26.7%), followed by "the low level of adoption of good practices by other farmers, and the lack of consideration for these practices by professionals" (17.8%). "Insufficient scientific support to understand and monitor the evolution of COS (Soil Organic Carbon) and soil health" and "the legal environment" lag far behind.
The responses per workshop are much more homogeneous than for the previous question, because:

- Farmers' workshops, NGOs and companies make the same classification: 1. "a market mechanism and unfavorable prices" (27.9% to 32.6%) - 2. "lack of economic support during the transition" (25.4% to 26.2%)
- The scientific workshop ranked the first two inversely: 1. "lack of economic support during the transition (29.0%) - 2. "market mechanism and unfavorable prices". (26,1%)
- "The low level of adoption of good practices by other farmers, and the lack of consideration for these practices by professionals" is still in third position in all the workshops (15.2% to 21.3%), only tied with "insufficient scientific support to understand and monitor the evolution of COS (Soil Organic Carbon) and soil health" for the workshop undertaken (15.2%)

4. What do you expect from the “4 per 1000” Initiative, in this context, to facilitate these changes?

The heterogeneity of responses to this question across the workshops shows the different expectations of the Initiative by different groups of respondents. Nevertheless, "advocacy with policy makers to obtain a better recognition of practices in favor of soil health" comes first in the general plan (23.7%) as well as for 3 workshops (farmers, scientists and NGOs) and in second place for the workshop undertaken, which comes first for "raising awareness among the general public on the importance of healthy soils and MOS (Soil Organic Matter)". This same expectation is in second place overall (19.6%) followed ex aequo by "facilitating information exchange through success stories, best practices, decision support tools, etc." and "initiating, promoting and facilitating international multi-stakeholder partnerships and projects to stimulate soil health" with 16.3%.

Responses by workshop are more pronounced:

- For the farmers' workshop, the Initiative should focus on advocacy (26.7%), partnerships in international projects (18.6%) and international scientific cooperation (16.3%)
- For the scientific workshop, the Initiative should focus more on advocacy (22.3%), facilitation of information exchange (19.1%) and ex aequo, public awareness and partnerships of international projects (17.0%)
- For the NGO workshop, the Initiative's action should mainly concern advocacy (25.3%), public awareness (24.0%) and partnerships in international projects (14.7%)
- The workshop on enterprises hopes that the Initiative will work primarily on raising public awareness (24.6%), ex aequo information exchange facilitation and advocacy (19.3%), and international project partnerships (14.0%).

Specific Questionnaire to Round Table 1 of Farmers

Would you be ready to submit to regular checks to verify the reality of your agricultural practices?

The answer to this question is generally positive (96.8%), with a preference for checks in the presence of the farmer (38.7%), but also to a lesser extent indirectly (satellite, drones, sensors) (29.0%), bearing in mind that 29% of the answers are in favor of both means of control: directly and indirectly.

What could be the expected compensations for you?

Unsurprisingly, the farmers' workshop was in favor of better prices for products and subsidies for services rendered to society (67.7% for the answer: "both" plus 12.9% in favor of subsidies alone and 6.5% in favor of better prices alone), with a total citing one or both answers of 87.1%.

- *SESSION 3: Round Table n°2: Science point of view*

Overview of the session

The richness and diversity of the presentations in this session devoted to science showed very clearly that research is well developed in North America today in the field of soil health, COS (Soil Organic Carbon) storage and carbon quantification, even if some knowledge gaps need to be filled as soon as possible (as everywhere else). Scientists stressed the importance of promoting both scientific research and the adoption of beneficial practices, particularly in areas where the potential for soil carbon sequestration is greatest. Robust and affordable quantification methods are, they said, a key element in enabling a change of scale in soil-based solutions.

They believe that the Global Assessment of Soil Health is designed for farmers, gardeners, agricultural service providers, landscape managers and researchers who want to go beyond the simple analysis of nutrient levels in their soils. However, in their view, efforts in North America on the science side should be more focused on building relationships with farmers and policy makers to facilitate changes in agricultural practices. Regarding data sharing, the scientific community believes it is important to develop an operational and legal framework that meets the requirements of universities, governments and industry while respecting privacy. There is a need for up-to-date and harmonized data sets that are open to researchers and interoperable with national and international soil repositories. The long-term data management is at stake and depends on the funding that can be mobilized to support soil data at the continental level.

Content & Outcome

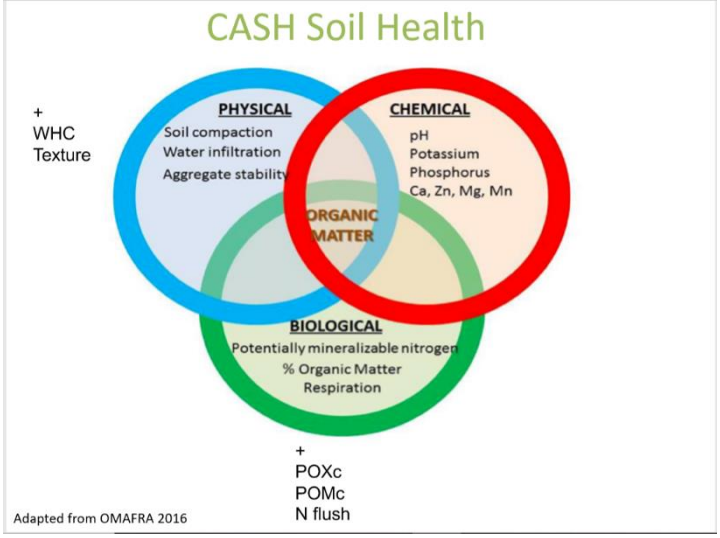
Session 3 has been dedicated to **science** with five different presentations:

• The visions and perspectives of two renowned Professors on soil carbon storage in Canada and the United States, Prof. Derek LYNCH from Dalhousie University and Prof. Keith PAUSTIAN from Colorado State University.

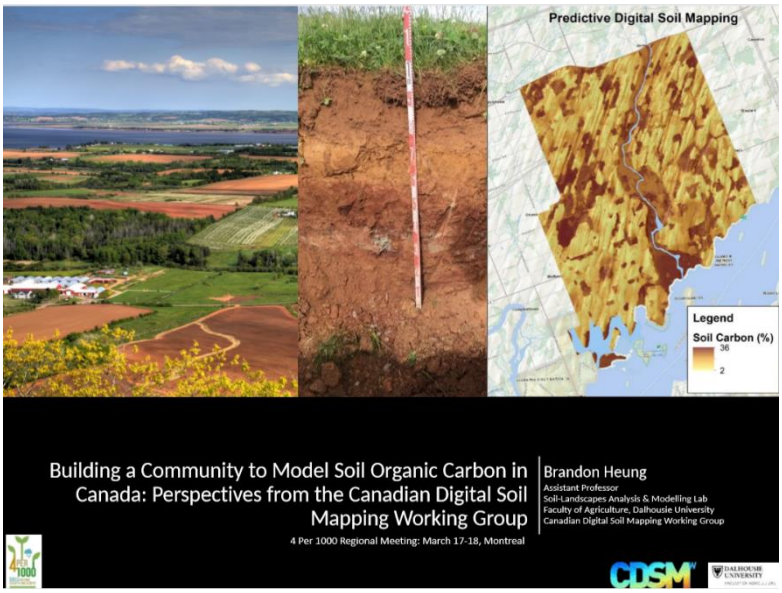
• An extremely comprehensive review of the scientific work in Canada on the modelling of soil carbon storage, its accumulation potential and the influence of soil biodiversity on soil carbon storage, by Dr. Brandon HEUNG of Dalhousie University, Dr. Emilie MAILLARD of Agriculture and Agri-Food Canada in Quebec and Dr. Louis-Pierre COMEAU of Agriculture and Agri-Food Canada in New Brunswick.

Professor **Derek LYNCH**, Professor of Agronomy and Agroecology in the Department of Plants, Food and Environmental Sciences in the Faculty of Agriculture at Dalhousie University shared his presentation entitled "Various initiatives to measure soil health in Canada and North America". He explained that intensification of agriculture is leading to a reduction of SOC (Soil Organic Matter) despite conservation measures. He presented: Soil health test development efforts • Regional databases • Test of robustness and sensitivity • Spatial and temporal variability. Then he presented the CASH Soil Health Framework (Comprehensive Assessment of Soil Health). Cornell Soil Health Testing Laboratory is the home of the CASH Soil Health Framework. The work is based on: https://soilhealth.cals.cornell.edu/ Total and active carbon (POX) on SOM are differentiated. Active carbon has a tipping point. It disappears once total carbon is below 1%. He, then, concluded in insisting on the fact that farmers are sensitive to soil

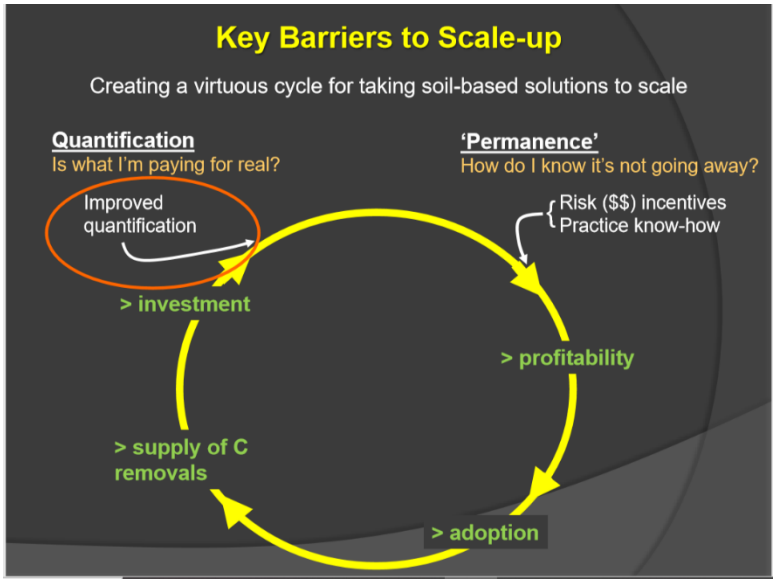
health. → **The Comprehensive Assessment of Soil Health is designed for farmers, gardeners, agricultural service providers, landscape managers and researchers who want to go beyond simply testing the nutrient levels of their soils**.



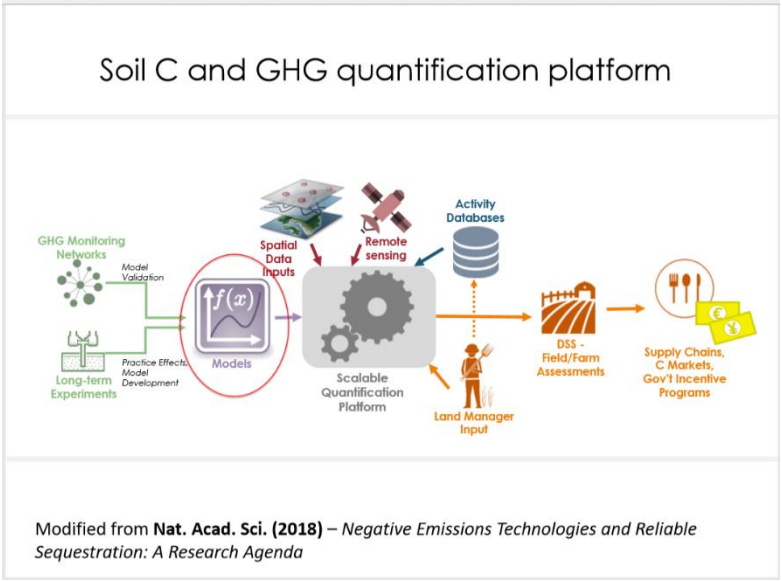
Dr. **Brandon HEUNG**, Assistant Professor Soil-Landscapes Analysis & Modelling Lab Faculty of Agriculture, also from Dalhousie University ; part of the Canadian Digital Soil Mapping Working Group presented an approach to carbon stock modelling : "Building a Community to Model Soil Organic Carbon in Canada: Perspectives from the Canadian Digital Soil Mapping Working Group". He insisted on the crucial importance of soil data but by pointing out the remaining challenges to proceed in this way: → **Develop a data sharing framework that meets the requirements of academia, government, and industry while respecting privacy rights. The need for updated and harmonized data sets, open to researchers and interoperable with national and international soil repositories. Long-term data management. Funding to support soil data**.



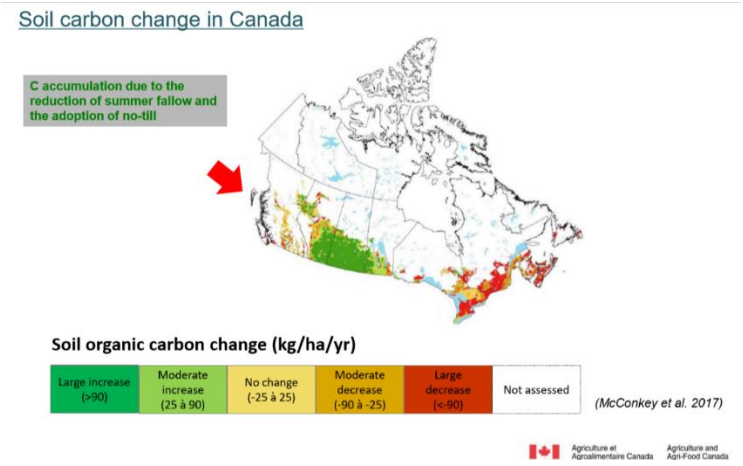
Professor **Keith PAUSTIAN** from the Department of Soil and Crop Sciences and Natural Resource Ecology Lab of Colorado State University made a presentation entitled "Reflections on Opportunities, Barriers, and the Future of Soil Carbon Solutions". Despite a good attractiveness of soil-based CO2 removal to the business sector in the USA, there are still key barriers to scale-up: quantification and permanence.



Indeed, effective policies and market-based solutions, need reliable metrics to quantify and verify net change in soil carbon storage and soil GHG (Green House Gazes) emission reductions. But quantifying soil carbon stocks changes and GHG emissions is difficult because: 1. Emissions/sinks are dispersed, non-point source – spatially & temporally variable. 2. Low signal-to-noise ratio for annual changes. 3. Rates of carbon stock change are controlled by many interacting processes. 4. Direct measurement with ‘Gold Standard’ methods, is too expensive for routine deployment in most mitigation projects. He went through the different steps of the following quantification platform and concluded in insisting that: comprehensive quantification platforms that leverage field experiments and monitoring network data, integrated with dynamic models supported by remote sensing and the ‘crowdsourcing’ power of agricultural producers. → **Robust, cost-effective quantification methods are a key ingredient in taking soil-based solutions to scale**.



Dr. **Emilie MAILLARD**, Research Scientist (**Agriculture and Agri-Food Canada, Québec**) presented an "Overview of the potential for carbon accumulation in soils after different agricultural practices (establishment of grasslands, cover crops, fertilization, agroforestry, etc.)". She reminded that: 1. Soil carbon sequestration is a temporary solution 2. The rate of soil C sequestration differs with practices and soil/climate conditions. 3. There is the necessity of considering all GHG (greenhouse gas) emissions (including CH4, N2O) when assessing if a practice can mitigate climate change. It is important to define in which conditions the practices offer the better potentials of soil carbon accumulation. The sensitivity to climatic events must be also determined.



The end of the presentation has been devoted to the need to promote the adoption of beneficial management practices while pursuing research with two different examples: Living Laboratories Initiative (Agriculture and Agri-Food Canada, Chrétien et al.) and Living Laboratory in Quebec. → **It is essential to promote both research and the adoption of beneficial practices where there is a greater potential of soil carbon sequestration.**

Dr. **Louis-Pierre COMEAU**, Research Scientist (**Agriculture and Agri-Food Canada**) shared his presentation about "Soil Carbon & Biodiversity in Atlantic Canada: Overview of the FRDC Soil Carbon Team Research Program" ; please follow this link: https://soilcarbon.org/ Atlantic Canada is the size of Japan on the Eastern coast of Canada. This project evaluates the diversity and the abundance of soil microbial communities and their relationships with soil carbon and land-use on biogeographical scale to perform management climate change effects monitoring. He reminded us about the different techniques to estimate net carbon lost/gain from ecosystem soils: see graph hereafter:

Eddy covariance technique

Photo Berkeley.edu

Flux balance approach

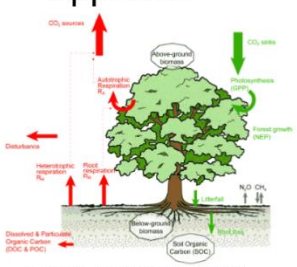


Photo forestry.gov.uk

Soil C mass balance

and he pursued with the presentation of numerous results: • Results per Ecoregions in New Brunswick • Results per land-use • Soil carbon in spruce budworm outbreak and control area in Eastern Canada (larger project lead S. Heard) • Improving soil organic matter with willow chip application & Erosion prevention terrace to improve soil organic matter (both from larger project lead S. Li lead) • Use of compost to improve soil organic matter level (larger project lead B. Zebarth) • etc. → **Scientific research efforts, in North America, should be directed towards filling the knowledge gaps concerning soil health and SOC storage.**

Questions raised during Session 3

Looking at how these crops have changed over time towards commodity types, how does that correlate with diet? Has the Canadian diet changed, and if so, are there systemic efforts to educate the market on those linkages? "Market recognition and food choices are key to support the adoption of improved practices for soil health." D. Lynch.

What factors determine the accuracy of digital soil mapping and how much more? / What type of data is needed to create accurate soil maps for carbon sequestration baselining? Can a concentrated effort be completed in a specific region? "Quality of the data, analytical methods, accuracy of special positioning are key. Identify places to go sampling more. Take stock of what data we need, what data are available. Generating predictive mapping, generating maps of uncertainty should help define where to go to sample in the future." B. Heung.

Could offers of subsidies for carbon sequestration for specific farms allow for more labor-intensive evaluation on a small scale that would be accurate with compensation based on performance? Applying for a subsidy would require a starting data set to evaluate future gains. Big companies like Nori, Indigo Ag. are trying to go into the carbon market space. They work on a platform to use both models and measurements together. Nori participates at the option of using direct measurements approach, which means bear higher costs for direct measurements. We definitely need a certain percentage of farms engaging in adoption of practices to get ecosystem services payments. We should take a sample of those and make a direct monitoring over time. We definitely need more direct measurements, data on farm monitoring systems ; more investments from governments to monitoring changes over time in soil health ; we want to see the changes overtime." K. Paustian.

For wood chip study, any consideration to include carbonization of some of the wood chip for biochar comparison. No measurements so far. Could the willow wood chips be easily become stable biochar for centuries of benefits? "No experiment so far." LP. Comeau.

Do we know what is the impact of tree-based intercropping systems on crop yield? "Some farmers get a better yield thanks to tree-based intercropping systems. Scientists need to conduct measures." E. Maillard.

How much time is necessary to obtain results for farmers? When farmers will benefit from science? "Farmers want place-based specific information about their operations. They want systems to leverage the data they already collect. Change is the key thing. The question is: am I gaining or losing carbon? Methods are operational. There are big projects by big companies. Their protocol has been designed but it is still in early days. We need to interphase more with the info the farmers already have and make further improvements in systems, get a better reliability and attract more stakeholders." Mr. Paustian. "Farmers' organizations are very engaged. There is a policy role to the best management practices. A multi-stakeholder support is needed to help track changes all the time." D. Lynch.

Questions common to all workshops (see page 24)

Specific Questionnaire to Round Table 2 of Scientists

In what domains research should be directed to facilitate changes in agricultural practices?

The answers to this question from the scientific workshop are shared with a third overall for each of the three proposals, namely:

- 34% for "Develop and improve a protocol to monitor, report and verify progress on soil health and COS storage".
- 34% for "Building relationships with farmers and policy-makers on science issues".
- and 29.8% for "Filling the knowledge gaps on soil health and COS (Soil Organic Carbon) storage".

Do you think that the International scientific cooperation on soil carbon storage and soil health, is …?

For the scientific workshop, international scientific cooperation is "necessary" (36.4%), "indispensable" (29.5%) and "useful" (27.3%), i.e. 97.7% of responses if we add "coherent" (4.5%).

- *SESSION 4: Round Table n°3: Civil society and the point of view of NGOs*

Overview of the session

The diversity of presentations and exchanges during this session devoted to civil society and NGOs showed the range of points of influence that civil society can use to try to impact not only public policies, but also agricultural practices, particularly through consumers. This is the key role of civil society NGOs in raising the awareness of policy makers, providing information to producers and raising the awareness of the general public. This is particularly the field of action of international NGOs that think and propose at the global level, in particular on how to reduce human pressure on ecosystems and land resources by protecting ecosystems, restoring degraded land, modifying agricultural practices, considering waste treatment and providing information on the impact of diets.

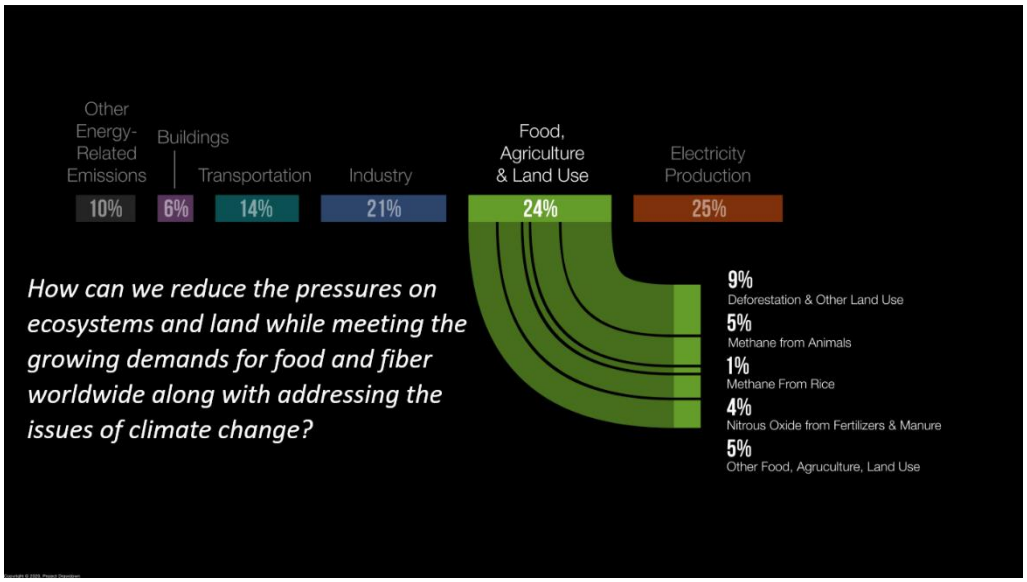
In North America, lobbying to promote soil health appears to be essential in trying to change agricultural practices, as well as for the establishment of a carbon tax to support the change in the economic model of agriculture through a financial incentive to producers on the basis of each ton of carbon sequestered. In addition, NGOs are also working with consumers for better recognition of regenerative agriculture products, increased skills and incentives for farmers to develop regenerative farming practices. There is no longer any doubt for civil society in North America that science, policy (through the creation of an enabling environment including incentives) and producers (through the use of adapted practices) that support soil restoration and soil carbon storage are absolutely essential to combat climate change.

Content & Outcome

Session 4 has been dedicated to **civil society and the point of view of NGOS** with five different presentations:

- Global considerations and concrete proposals from two NGOs acting globally with Dr. Mamta MEHRA from Project Drawdown and Mr. Seth ITZKAN from Soil4Climate.
- A presentation of the work and numerous fields of action of two Canadian organizations working mainly at the national and regional level, with Mrs. Gabrielle BASTIEN of Regeneration Canada and Mrs. Karen ROSS of Equiterre.
- And finally, Mr. Klaus MAGER of Business Climate Leaders detailed the influential work that his organization is doing to change the regulatory and legislative context of the United States of America in terms of carbon tax.

Dr **Mamta MEHRA** Senior Fellow Bio-sequestration Modeling at **Project Drawdown** presented the "Role of Land and Agriculture Solutions in Achieving Drawdown". Drawdown is the future point in time when levels of GHG in the atmosphere stop climbing and start to steadily decline. Currently, Food, Agriculture & Land Use account for 24% of global GHG emissions (see details hereafter).



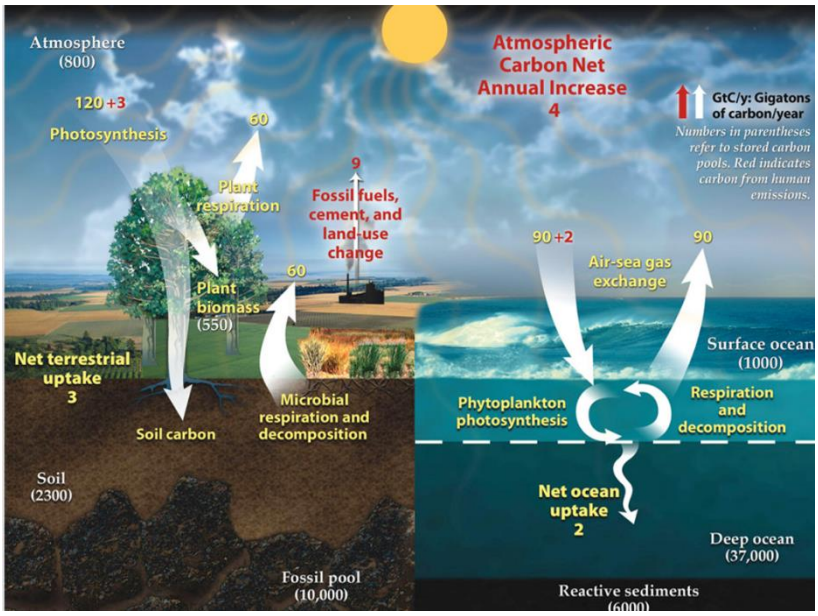
They have developed a scientific and complete Land Use and Food Sector framework that identifies the possible requested actions. Dr. Mehra also explained that Land + Food account for 10 of the Top 20 solutions identified by Project Drawdown to fight climate change. Some of the key insights she shared were the followings: • Drawdown is possible / • Savings of climate solutions significantly outweigh costs. The whole Project Drawdown team is involved through different tools and entities: Drawdown Research - Drawdown Learn - Drawdown Labs - Drawdown Communities and key partnerships. For more information: www.projectdrawdown.org → **The way to reduce pressures on ecosystems and land is the following: 1. by protecting ecosystems ; 2. by restoring degraded land ; 3. by shifting agriculture practices and 4. by addressing waste and diets**.

Mrs. **Gabrielle BASTIEN**, co-founder of **Regeneration Canada** shared her point of view in a presentation called : "Building a movement for soil regeneration in Canada". The mission of Regeneration Canada is to promote regenerative land management in Canada, in order to

mitigate climate change and foster healthy food systems. Their goals are: 1. Awareness: For all Canadians to know what regenerative means and its link to climate change. 2. Education: To provide more in-depth information to all stakeholders for them to know how to contribute. 3. Network building: To connect stakeholders of the regenerative movement to facilitate knowledge-exchange and build a movement. 4. Mobilization: To stimulate Canadians to act and contribute to soil regeneration. Year on year, they grow their network through their annual Living Soils Symposium, they share a lot of Communications (social media, websites, newsletters, etc.), they spend time on Education (workshops, web seminars, educational materials, etc.). → **The recognition of regenerative products, skills training and incentives for farmers are key to develop regenerative agricultural practices. Policies that enable incentives are essential**.

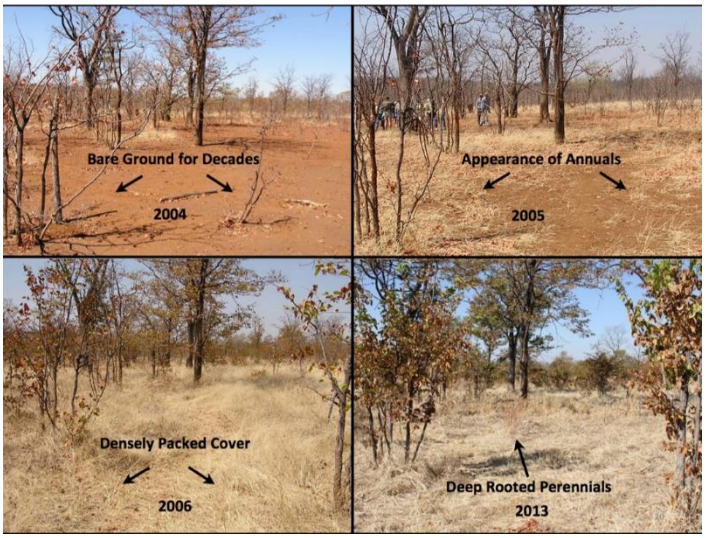
Mr. **Klaus MAGER** from **Business Climate Leaders** (BCL) shared his presentation named "Focus Agriculture”. BCL is part of Citizens' Climate Lobby, a nonpartisan grassroots advocacy group with more than 180,000 members throughout the world. They are solution focused and advocate for Carbon Fee and Dividend through Fee on fossil fuels, Revenue for all households and Border adjustment. BCL advocate for the need for carbon sequestration and are heavily promoting regenerative agriculture that will help a/ building organic matter in soil ; b/ increasing the nutritional value of food ; c/ restoring life and habitats ; d/ retaining water and e/ preventing soil runoff. They support added incentives for industrial farmers to change their practices, such as payment for carbon sequestration on a per ton basis, already available or in process like NORI, Terraton by Indigo Ag. or some USA Initiatives. They also support for Carbon Pricing through the "Economic Case to Support Carbon Fee and Dividend Legislation". → **Participation in lobbying activities to promote soil health is key to change agricultural practices. In parallel, supporting the change of the economic model of farming through the payment of a carbon price on a per ton basis of carbon sequestration is also key**.

Mr. **Seth ITZKAN,** co-director and co-founder of **Soil4Climate** presented "Hope Below Our Feet: Soils as a Climate Solution". Soil4Climate is a global movement made up of people who are championing soil as a climate solution. They communicate the science, policy, and practices of restoring soil to capture carbon, replenish water tables, produce healthy food, reverse desertification, mitigate conflict in dryland areas, and, in general, provide promise for a bountiful and life affirming future. Seth Itzkan, as a preamble, presented the global fluxes taking place at the planet level:



Then, he reminded us about a quote from IPCC report dated 2013: “A large fraction of anthropogenic climate change resulting from CO2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO2 from the atmosphere over a sustained period". According to him, restoring soil to reverse global warming is the solution. Many concrete and very good examples of soil restoration, supported by Soil4Climate, globally, were then presented (Africa_Maasai Lands Restoration Project ;

Mexico ; North Dakota, USA). → **The science, policy, and practices of restoring soil to capture carbon are absolutely essential for a climate solution**.



Mrs. **Karen ROSS**, Policy and Program Manager - Agriculture at **Equiterre** shared her presentation about "Climate Agriculture: the barriers and opportunities to enhancing soil health in Canadian agriculture". She shared about what should be the role of NGOs in promoting soil health and C sequestration and which role Equiterre plays in this field: 1. Public policies ; 2. Engagement with diverse stakeholders ; 3. Communications - storytelling to greater public ; 4. Outreach and demonstration - peer-to-peer leadership and support ; 5. Collaboration for collective impact - farmer-led voice on policy change. She insisted on the fact that the message must be global and complete: "Don’t lose sight of other Green House Gazes (GHGs) for Carbon!; We must also prioritize emissions reductions, not only carbon sequestration". What is necessary to scale up change? 1. Target setting for Canada’s GHGs, for agriculture & for soil sequestration; 2. Public policy roadmap – set and measured against target and not forgetting about: 3. Leadership from scientists, because targets and performance-based policies require good data; 4. Support from economic actors. Her opinion about the support of the "4 per 1000" Initiative:

Questions raised during Session 4

How can you support a plant-based diet while still wanting regenerative agriculture to include cattle production? "By plant rich diet we don't mean to stop livestock production, it is basically defined as "Project Drawdown defines a plant-rich diet as the individual dietary choice: to 1) maintain a 2,250 calories per day nutritional regime; 2) meet daily protein requirements while decreasing meat consumption in favor of plant-based food items; and 3) purchase locally produced food when available. This solution replaces projected regional dietary trends." So, it's more about a healthy and nutritious diet for every human being in this world." M. Mehra.

Rodale Institute implemented a Certification of Regenerative Organic Label. Another market mechanism which costly impacts and logistics of management and paperwork burden on small farms with local and short commercial chains of values. What if the so-called conventional agro-industry had to certify itself about its carbon imprint, instead of having the burden on farmers? "Recognition of regenerative products is an important issue. Certification is one way to go about this. We are glad to see initiatives like the Regenerative Organics certification arrive; they will contribute to drive the movement. There are still many barriers: cost, bureaucratic, papers, small amounts of farms may be certified. We are far from having the conventional sector certified their carbon footprints. Other ways are possible to have recognition of regenerative products, to allow more farms to get a kind of certification. We believe more in the example of the US Soil Carbon Initiative which is a good example and is based on a collaborative approach that gathers industries, etc.". G. Bastien.

With the average household emissions being compensated by equal distribution (average) of carbon fees, do you think it motivates households to lower their emissions? "Yes, it increases the cost of energy products of all kinds. It stimulates the economy because the dividend is being paid back on an average basis and HIH High Income Households consume more energy than LIH Low Income Households; so, the dividend disproportionally favors LIH. So LIH are proportionally getting more money back than they spend on the additional energy; they can save money by exiting the energy consumption. That is the theory behind the carbon field dividend, we have in our bill." K. Mager.

What caused the desertification in the first place? Animal grazing? "It is the lack of animals that create desert; (...) animals restore desert in their natural habitat or when livestock are managed properly (…)." S. Itzkan

Is there a US group that does what Farmers for climate solutions is doing? "Yes absolutely. We are very inspired by the US "NSAC: National Sustainable Agriculture Coalition". Go to the link: https://sustainableagriculture.net/ " K. Ross.

Questions common to all workshops (see page 24)

Specific Questionnaire to Round Table 3 of NGOs

What actions do you think are needed to promote soil health and soil carbon storage and role of NGOs?

The NGO workshop considered "Raising awareness of policy makers" (30.8%), "Information to farmers and producers" (24.4%) and "Raising awareness of the general public" to be the actions needed to promote soil health and soil carbon storage and fell within the role of NGOs, far ahead of "scientific evidence and knowledge" (14.1%).

What instruments would you consider useful to help monitor changes in soil health and carbon sequestration?

More than two thirds (71.4%) of the responses to this question went almost equally to "a local and global scoreboard to monitor progress" (36.7%) and "local and regional networks of actors" (34.7%), ahead of "monitoring programs controlled by NGOs" (20.4%). Other" responses represent only 8.2% of the total.

- *SESSION 5: Round Table n°4: Experience of businesses (production and value chains, carbon accountability, etc.)*

Overview of the session

This last session gave the floor to the economic actors, and showed that they were very present in the field of carbon storage in soils to fight climate change, with a complementary asset through the link that can be created with the carbon market, thus making it possible to pay for ecosystem services.

Some actors focused on data collection and algorithms, which would reduce the cost of soil sampling, in order to release the potential for soil organic carbon sequestration. Others, again to improve accuracy and reduce the cost of sampling, have focused on soil carbon measurements and predictive mapping to assess relationships between soil properties and covariates. Thus, affordable quantification methods implemented by private sector actors for their supply chain, through their contract with their producers, are one of the key ingredients for scaling up soil-based solutions.

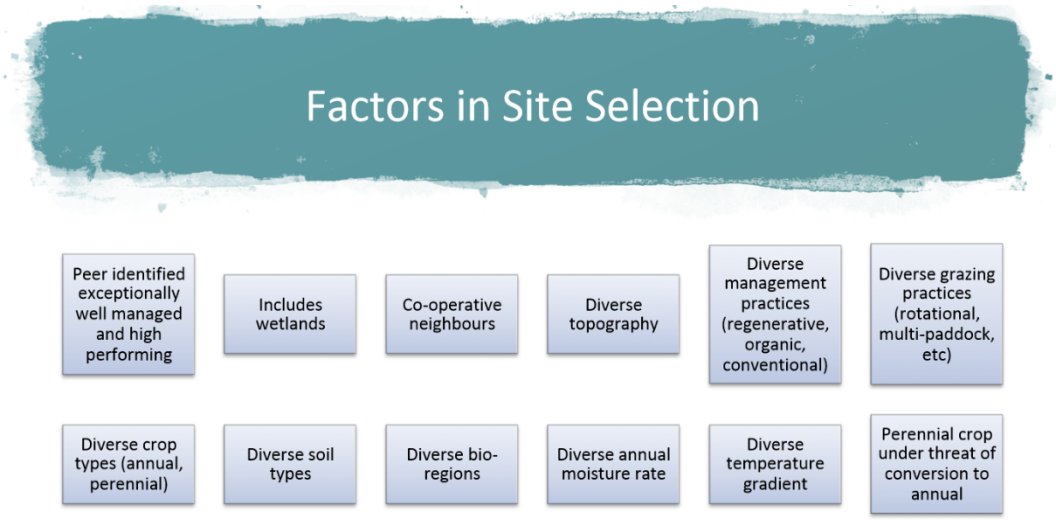
At the North American level, a public-private partnership with the private sector involved in agriculture (the commodity food supply chain and the manufacturers' agricultural value chain) can stimulate the design of the R&D tools needed to create markets for advanced ecosystem services, designed to encourage producers to improve soil health and thus the health and quality of food for final consumers.

Content & Outcome

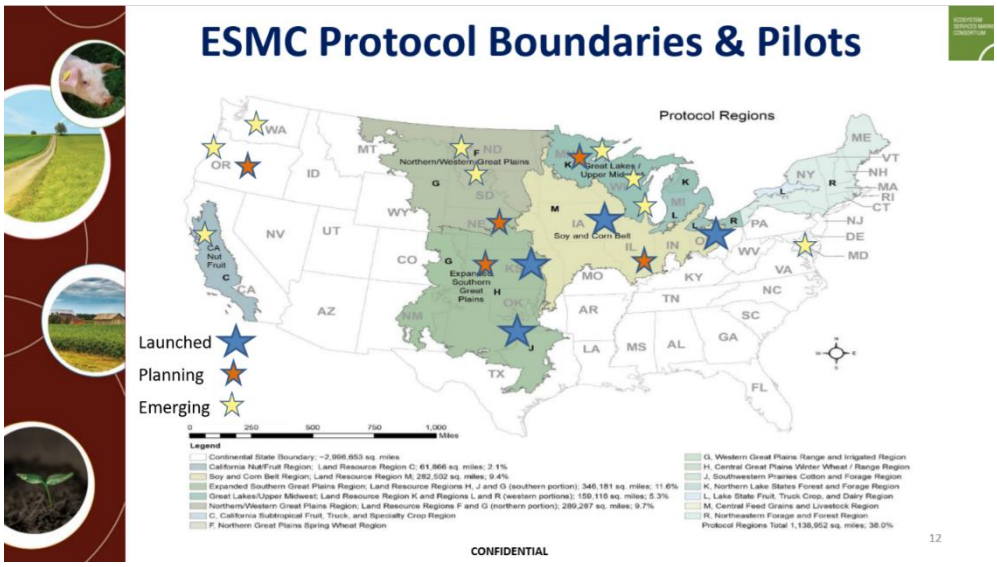
Session 5 has been dedicated to the experience of **businesses** (production and value chains, C accountability, etc.) with three different presentations:

- “Soil Carbon Measurement and Predictive Mapping by Mrs. Kimberly CORNISH, Director of the Food Water Wellness Foundation
- “Indigo Ag’s Commercial and Experimental Carbon Initiatives” by Mr. Dan HARBURG, VP and Head of Carbon Quantification at Indigo Ag.
- Experience from Ecosystem Services Market Consortium by Mrs. Debbie REED, Executive Director.

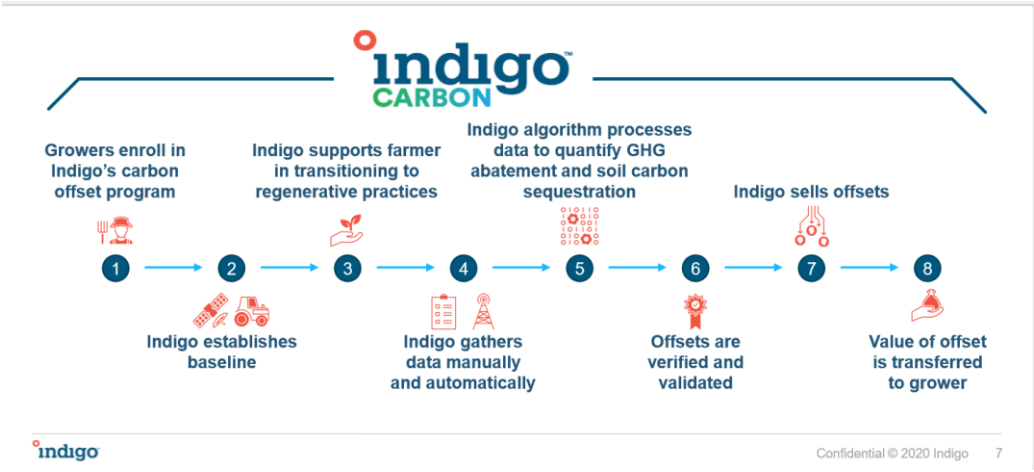
Mrs. **Kimberly Cornish,** Director of the **Food Water Wellness Foundation**, insisted on the role of the Food Water Wellness Foundation: Advancing practice of Regenerative Agriculture & Helping farmers, ranchers and researchers to understand how soil can be used to mitigate climate change, drought and flood, increase biodiversity and, most importantly, produce healthy food. In her presentation named: "Soil Carbon Measurement and Predictive Mapping Using Remote Sensing and Machine Learning - Alberta Pilot Project”, she also presented the source of this predictive mapping developed by Dr. Alex McBratney (pioneer in digital soil mapping), and presented at the GSOC (Global Symposium on Organic Carbon) 2017. It is called: The Method of Farm Scale Carbon Auditing, which formed the basis of Soil Carbon of Emissions Reduction Fund (ERF). Since then, further advancements have been made: • Ichsani (Ish) Wheeler, Tomislav Hengl, Majid Iravani, Kris Nichols. Indeed, machine learning correlates relationships between soil properties and co-variates – density 4 core per 1km2 ; and there are an improving accuracy and further reduce sampling cost. → **Soil carbon measurements and predictive mapping are essential to evaluate relationships between soil properties and co-variates and, also, to improve accuracy and further to reduce sampling cost.**



Mrs. **Debbie Reed**, Executive Director of **Ecosystem Services Market Consortium (ESMC)**, presented The ESMC Program: "A Public-Private-Partnership with US Agriculture Supply Chain & Value Chain". She reminded that ESMC's mission is the following: Advance ecosystem service markets that incentivize farmers & ranchers to improve soil health systems that benefit society. She explained how they have developed their own market: through a public-private partnership which has invested collectively in R&D to build a technologically-advanced system & tools conceived & designed exclusively for agriculture • Innovative, tiered, modular protocols stack benefits: soil C, net GHG, water quality & water quantity markets. Their timeline has been the following: 2017: market assessment phase – 2018: market design phase – 2019-2021: soft launch, buildout and testing phase with full agricultural supply chain, including buyers and sellers, USDA, US DOE – 2022: full national market launch. For this launch, ESMC will: •Invest in RDD&D •Pilot in new regions & production systems •Refine program through continuous feedback loop with members •Pursue certification of program, protocols, assets: Gold Standard & Sustain CERT. → **A Public-Private-Partnership with US Agriculture private sector: Supply Chain (retailers) & Value Chain (manufacturers) has allowed to boost the conception of R&D tools necessary to create advanced ecosystem service markets, designed to incentivize farmers & ranchers who improve soil health.**

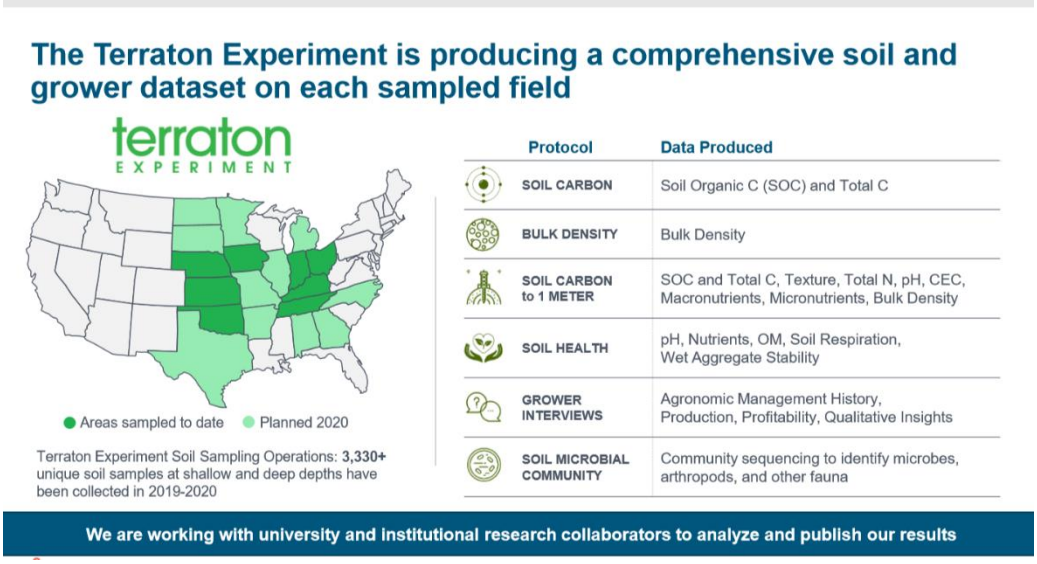


Mr. **Dan Harburg,** the Vice President and Head of Carbon Quantification at **Indigo Ag**, presented Indigo Ag’s Commercial and Experimental Carbon Initiatives. Indigo Ag. is building a new system of agriculture where growers and buyers interact and transact in their grain, transportation and carbon credit marketplace. Indigo also provides services that facilitate adoption and use of their marketplaces. Dan Harburg, then, explained how Indigo Ag seeks to unlock the full potential of agricultural carbon abatement and sequestration by: 1. Utilizing Indigo's technology, investments, and data collection & algorithms to drive scale and reduce costs ; 2. Reducing soil sampling, resulting in lower labor and analytical costs ; 3. Using data science and microbiology to replace chemicals and fertilizers ; 4. Accelerating the adoption of regenerative agriculture practices by creating a carbon market to pay farmers to sequester carbon.



The Terraton Challenge was launched in 2019 by Indigo Ag. Through their Indigo Carbon Program: their wish is to pay growers to sequester 1 trillion tons of carbon dioxide. Late Jan. 2020, 17 million acres have been committed. Payments will be financed partially through the sale of offsets which go for USD 20 per Ton. Satellite technology allow to monitor farming practices, like cover crop usage and tillage. Indigo is gathering data from selected fields, then using it to calibrate a digital model that helps predict carbon sequestration rates in other locations. Indigo has also formed partnerships with two carbon standards bodies, Verra

and Climate Action Reserve. → **Unlocking the full potential of soil organic carbon sequestration can be achieved through the use of data collection & algorithms ; by reducing the cost of soil sampling. → Creating a carbon market to pay farmers to sequester carbon can accelerate the adoption of regenerative agriculture practices.**



Questions raised during Session 5

Great efforts, but will 4 cores per square km (did I hear that right?) be dense enough to track changes? "Because the sampling design is not coming randomly. The soil samples validate what the mapping and the remote sensing data are already saying. This is why we are able to track changes in that sense." K. Cornish.

Will ESMC be able to work with the agroforestry sector? "Our protocols and methodologies do allow more agroforestry but not forestry systems, because we build markets; and protocols for forestry systems are pretty robust internationally. In North America, we are not seeking to include forestry, but agroforestry absolutely." D. Reed.

The CAR protocol allows for only one production practice to be changed and the entire system to be ran by a project aggregator. How does this meet your farmer principles presented? "The question is that it allows only one practice change? Yes. The protocol actually only requires that a grower make a single practice change to demonstrate additionality. But the protocol itself, will reward growers for any change relative to their baseline, they are making. So, the hope is that they are making many practices change simultaneously and seeing an impact on GHG (Green House Gaz) emissions and soil carbon sequestration from that stag. We tried to set the bar the lowest possible to allow many growers to participate with that requirement. The question is a bit misguided, but I hope it clears it up." D. Harburg.

Many farmers lease the land they farm. Will the landowner or the farmer be paid for the carbon sequestered?

"Traditionally in the Alberta system, it has been paid to the land owner but it can be negotiated ; it is really the contract with the aggregators: land owners / lease owners ; they can split it or develop their own contract ; because we are still very much in the carbon measurements, monitoring space." K. Cornish.

"Because we are selling assets, we require ownership to be established upfront. We do have contracts that farmers can use, that they use to negotiate. But we let them come to that negotiation with land holders/owners." D. Reed.

"Our contracts are set up exclusively with the operators: directly with the farmers. We have the opportunity for a farmer who transitions or for a new operator coming to continue practices that were previously implemented, for example, the payments to the next land operator ; but given the complication of the ownership, leases and so on … it is the grower himself who is implementing the practice changes ; the protocol allows direct participation with the land owner". D. Harburg.

Is there a specific reason why there isn't a presence of ESMC in the southern US? "We have been building our protocol region by region based largely on member demand, more largely the demand of the buyer. We will get to the South East but first to the Pacific; but definitely yes to the South East." D. Reed.

We are desperate for a pricing signal. The various soil carbon efforts seem to be incredibly fragmented with each offering "their" carbon token. Is there any planning to unify these emerging units into a coherent market?

"We are really looking at working with existing structures that exist like with the Alberta Framework and the Canadian national government which is also looking at building a national offset system. Given that Canada has put a price on carbon, we will take the biggest pain from the back of the producers in the long run." K. Cornish.

"We have been assessing the market structure and price variability. Right now, carbon credits sell for about 3 to 20 USD per ton of CO2 equivalent. We know that soil carbon in particular, and other ecosystem services from agriculture are undervalued and we hope that, in an outcome-based, income, and impact-based approach, we can do two things: 1. continue to better valuate the true value of those impacts and move the market in this direction. 2. we are actually paying for the true value of these services. I think it will take time. Soil carbon and other credits/assets from agriculture are increasing in demand because of the multiple ecological assets associated with just the carbon attributes. We will do a better job in showing the true economic impact of the outcomes as we put them out into this marketplace." D. Reed.

"It's an important area. We are working with the registries. The nationally and internationally recognized registries are a critical component here and have a number of different methodologies we are working with (...) there will be clearly refinements as technologies will evolve (…). We will continue converging that way on the best approaches because of the public and open approach they are taking. We are learning the best we can from each other and are looking for opportunities for partnerships. I definitely see convergence as we continue to move forward." D. Harburg.

How do you take into consideration that the farmers can use Biochar because it may change the measurements and the quantity of carbon they can store in the soil?

"I am myself a biochar addict. I think there are two ways to do it. I think we have to continue to better characterize biochar and its chemical and its physical attributes; as well as the longevity of the stored carbon in biochar. It is incredibly essential for it to be included in carbon markets. We are not going to measuring the longevity of the biochar when it is put in the soil. I think once when we have a better approach and ensure transparency the longevity of the biochar products we can better value it and include it carbon markets and other markets. It is important for credibility and transparency that we all agree on what these criteria are for characterizing and ensuring the longevity. It is a huge tool in our tool kit." D. Reed.

"I completely agree I think biochar is in a class of other emerging technologies, whether that enhancing the root structure of plants or decompose less quickly, increasing nitrogen use efficiency through microbes (...). There will be all kinds of new things we need to develop and the holistic carbon picture, first quantification approaches and we have to look at the holistic carbon picture farms pre-production. A grower who is using a lot of manure into their fields. We also need to consider where the manure is coming from, its carbon footprints. I am confident we

will develop a good carbon quantification approaches for each of these technologies. We have to be holistic in the way we develop it." D. Harburg.

"I agree we need to quantify this. I think it has to be made in partnerships. (…). " K. Cornish.

"It is important to evaluate it quickly. Farmers are very enthusiastic; scientists are more reluctant." P. Luu.

Questions common to all workshops (see page 24)

Specific Questionnaire to Round Table 3 of Business

What roles should economic actors play to help farmers change their farming practices in favor of soil health?

On this important issue, the Business workshop, at 51.1% in total, believes that economic actors should "bring about change at the level of farmers by raising standards and prices" (26.7%) and by "adapting the value chain to farmers' best practices" (24.4%). To a lesser extent (a total of 40%), responses also concerned "the adaptation of the price scale in relation to the way products are grown" (15.6%), "the use of external labelling and certification schemes" (13.3%) and "the development of in-house labels and best practice marks" (11.1%).

The implementation of labels and certifications intended to verify the effectiveness of practices by producers?

To the question of whether this implementation by companies was useful, the companies workshop answered in the affirmative ("yes, of course useful") at 83.3% against 16.7% to "No, not useful".

Would you be in favor of voluntary or mandatory actions in this area in North America?

Responses to this question at regional level were more divided with 56.0% in favor of "Voluntary actions by actors (mainly farmers and economic actors)" and 44.0% in favor of "Compulsory actions involving policy makers and civil society".

5. Agenda:

Monday 11th May (10:30 AM Montreal time and 7:30 AM Los Angeles time)			
Slot	**Subject**	**Speakers**	**Time**
7:30 to 9:00 PT --------- 10:30 to 12:00 ET --------- 16:30 to 18:00 CET	Introduction and welcome speech of the Regional meeting and presentation of the objectives of the meeting **by Dr. Paul LUU, Executive Secretary of the "4 per 1000" Initiative** **Mr. Antonious PETRO, Scientific Director of Regeneration Canada**	"4 per 1000" Executive Secretariat Regeneration Canada	5 min 5 min
	Situation of the "4 per 1000" Initiative 4 years after its creation at COP 21 of UNFCCC in Paris by **Dr. Paul LUU, Executive Secretary of the "4 per 1000" Initiative**	"4 per 1000" Executive Secretary	10 min
	General presentation of the regional context vis-a-vis "4 per 1000" Initiative: • Canadian policy on soil health and carbon sequestration in soils related to agriculture and forestry by **Mrs. Lucy CLEARWATER**, Strategic Policy Branch - **Agriculture and Agri-Food Canada** • Québec Policy on soil health and carbon sequestration in soils, related to agriculture and forestry by **Mrs. Hélène BOURASSA**, Directrice des Pratiques agroenvironnementales - Direction générale de l’appui à l’agriculture durable, **Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec** • California policy on soil health and carbon sequestration in soils related to agriculture and forest by **Mrs. Jenny LESTER-MOFFITT, Undersecretary of the California Department of Food and Agriculture** • Synthesis of US policy on soil health and carbon sequestration in soils related to agriculture and forestry by **Mr. Sylvain MAESTRACCI, Agricultural Attaché at the French Embassy in Washington DC** (USA).	Representatives of Canadian and US Ministries of Agriculture <u>Chair and Moderator</u>: **Dr. Paul LUU** (“4 per 1000” Initiative)	4 x 15 min

<u>Presentation of speakers:</u>

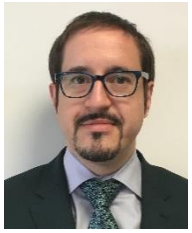
Mrs. Lucy CLEARWATER is a policy analyst with the Environmental Policy Division at Agriculture and Agri-Food Canada (AAFC). She worked in the Department’s Science and Technology Branch for over 12 years in a series of roles including watershed analyst with the Watershed Evaluation of Beneficial Management Practices (WEBs) program, editor of AAFC’s National Agri-environmental Indicator Report, and science policy advisor for agro-ecosystem resilience. In her current role, Lucy explores innovative policy and programming approaches to increase the adoption of on-farm beneficial management practices. Her main files include the use of natural climate solutions to mitigate climate change and climate change risk and adaptation in the agricultural sector. She also manages the Federal-Provincial-Territorial Agri-Environmental Policy Working Group.

Originally from Norfolk, England, Lucy lives in rural New Brunswick on a small acreage with her husband and two teen children, where they maintain a large vegetable garden, a small flock of chickens and two beehives.

Mrs. Hélène BOURASSA holds a bachelor's degree in engineering physics from Laval University and a certificate in computer science from the University of Montreal. She began her career as an engineer in the private sector, then joined the government apparatus (Government of Quebec) where she had the opportunity to work in various departments, before being appointed manager in the agri-environmental practices branch of the Sustainable Agriculture Support Branch, at the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ), where it is responsible for the agri-environment sector, including management of the Prime-Vert program and support for innovation projects related to the agri-environment. Ms. Bourassa contributes to the development of prosperous, sustainable and innovative agricultural businesses and, with her multidisciplinary team, promotes agri-environment in Quebec's bio-food sector, particularly by encouraging the adoption of good agricultural practices. She also coordinates MAPAQ's agri-environmental action to foster the development of sustainable agriculture.

Mrs. Jenny LESTER-MOFFITT is a 5th generation California farmer and Undersecretary at the California Department of Food and Agriculture, where she was Deputy Secretary from January 2015 – February 2018. Her original appointment by Governor Jerry Brown was confirmed by Governor Gavin Newsom in early 2019. Jenny engages stakeholders on issues that affect ranchers and farmers, including climate change, biodiversity, land use, water policy, and food security.

Prior to joining CDFA, Jenny spent 10 years as Managing Director at Dixon Ridge Farms, her family’s organic walnut farm and processing operation. Growing up on the farm she would later help manage, Jenny learned firsthand the importance of taking care of the land and the people who farm it – and the value of fostering economic growth and well-being. As a farmer and policymaker, Jenny believes that agriculture is critically important to sustaining our environment, rural communities and economy.



Mr. Sylvain MAESTRACCI has been the Agricultural Counselor at the Embassy of France in the United States, with regional competence over Canada, since March 2017. From 2014 to 2017, he was in the French Ministry for Agriculture and Food in charge of the subsidies allocation policy to farmers in the framework of the Common Agricultural Policy of the European Union as project leader and Deputy to the Director of Common Agricultural Policy subsidies management. He handled negotiations on European agriculture, sanitary and food policies, as Inter-ministerial Coordinator (office of the Prime Minister) for these policies between 2011 and 2014, and as head of the European Union unit at the Ministry of Agriculture between 2007 and 2010. Previously, he worked in the French Ministry of Finance, where he was in charge of economic analysis of agricultural and environmental policies, then of budgetary monitoring of European policies regarding agriculture, food and the environment.

Tuesday 12th May (10:30 AM Montreal time and 7:30 AM Los Angeles time)			
Slot	**Subject**	**Speakers**	**Time**
7:30 to 9:00 PT --- 10:30 to 12:00 ET --- 16:30 to 18:00 CET	Introduction by **Dr. Paul LUU**	Chair and Moderator: **Dr. Paul LUU** (“4 per 1000” Initiative) Question and Answer through the chat	2 min
	Round table n°1: Farmers' experiences and proposals from the ground • Experience from a **Canadian farmer involved in Conservation agriculture - Mr. Jocelyn MICHON** • Experience from a **Canadian farmer involved in Holistic grazing techniques - Mr. Paul SLOMP** • Showcase of **Ontario Soil Network - Mrs. Tori WAUGH** • Presentation of activities of the **Soil Conservation Council of Canada - Mr. Jim TOKARCHUK**, Executive Director		4 x 15 min 15 min

Presentation of speakers:

Mr. Jocelyn MICHON has been in agriculture since 1974. Quickly he applied himself to reduce the number of interventions in field crops. Concerned about improving the health of the soil, he has succeeded in setting up an efficient no-till system (direct seeding) combined with the use of cover crops over the past 26 years. The ultimate goal is to cover the soil permanently and not to disturb it with tillage tools. The results show some of the best yields with a significant reduction in chemical inputs.

Mr. Paul SLOMP was raised on his family’s dairy farms, first in the Netherlands, then in Alberta—farms that were at the forefront of the grass-based dairy movement. His love of mathematics and science led him to study engineering at the University of Alberta. After volunteering near the Zambia-Malawi border with Engineers without borders for four years, he returned to Canada to work in Canadian food policy and later to start his own farm to develop and showcase the ability of alternative models of agriculture to produce food for people in a way that regenerates soil and rejuvenates ecosystems while being economically viable with the aim of providing a different model on which to base agricultural development. Paul, his partner Josée and two kids are currently breathing new life into the abused soil of a recently acquired farm in St-André-Avellin, QC. Their farm is called Grazing Days and they mob graze a herd of 200 bovines and a sounder of 70 pigs on 370 acres and market the meat from 70 cattle and 70 pigs per year directly to households in the Ottawa, Gatineau and Montreal areas.

Mrs. Tori WAUGH is the Principle Consultant of Conservation Ag Consulting, an agricultural sustainability company driving innovative solutions to conserving soils in Ontario. Conservation Ag Consulting provides event planning, research coordination, organizational development and designs, delivers & evaluates projects and programming for Conservation Authorities and Environmental NGO's. Tori WAUGH 's background lies in agricultural and conservation industries. she completed her bachelor's degree at the University of Guelph and is currently pursuing her master’s degree in environmental sciences at the University of Guelph. Tori Waugh has spoken at a number of Conservation conferences including the South West Agricultural Conference, Latornel and Ontario Soil and Crop Improvement Association.

Mr. Jim TOKARCHUK studied and worked within the agriculture and agri-food industry in Canada for nearly 40 years. Most of his career has been in the public service, which provided him with broad experience across Canada and the privilege of working with many ag professionals in all areas of the industry. He was born, raised and have lived in the great City of Winnipeg, Manitoba all his life. His studies at the University of Manitoba ultimately led him to complete a master’s degree in Soil Science in 1982.

He began working for the Public service in 1986 with Manitoba Agriculture holding several positions related to soils. In 1986 he moved to the federal government and joined the Prairie Farm Rehabilitation Administration (PFRA) where he worked on many rural issues from infrastructure to soil conservation to agri-environmental programs.

After his retirement from Agriculture Canada in 2015 he became the Executive Director Soil Conservation Council of Canada (SCCC) and to this day, enjoying working with SCCC and serving their passion for soil conservation and health in Canada.

Wednesday 13th May (10:30 AM Montreal time and 7:30 AM Los Angeles time)			
Slot	**Subject**	**Speakers**	**Time**
7:30 to 9:00 PT --- 10:30 to 12:00 ET --- 16:30 to 18:00 CET	Introduction by **Dr. Paul LUU**	Chair and Moderator: **Dr. Paul LUU** (“4 per 1000” Initiative) Question and Answer through the chat	2 min 5 x 15 min 15 min
	Round table n°2: Science point of view • ***"Various Canadian and North American soil health monitoring initiatives"*** - **Dr. Derek LYNCH**, Professor, Agronomy and Agroecology (Department Plant, Food and Environmental Sciences at Faculty of Agriculture, Dalhousie University) • ***"A carbon stock modelling approach"*** - **Dr. Brandon HEUNG** • **Point of view of an US scientist – Prof. Keith PAUSTIAN**, Colorado State University • ***"Overview of the potential for carbon accumulation in soils after different agricultural practices (establishment of grasslands, cover crops, fertilization, agroforestry, etc.)"*** - **Dr. Emilie MAILLARD**, Research Scientist (Agriculture and Agri-Food Canada, Québec). • ***"Soil biodiversity and carbon storage in Canada"*** – **Dr. Louis-Pierre COMEAU**, Research Scientist (Agriculture and Agri-Food Canada, Québec).		

Presentation of speakers:

Dr. Derek LYNCH Ph.D., P.Ag

Professor of Agronomy and Agroecology at Dalhousie University Faculty of Agriculture, Derek held the position of Canada Research Chair in Organic Agriculture from 2005-2015. He has worked with many farms and producer groups across Eastern Canada to tackle both production challenges and assess the ecological and environmental footprint of these systems, including field crop, dairying, and blueberry production. Current research projects in Atlantic Canada and Quebec are examining farming system, and management practice, impact on soil carbon, soil health and soil biota. Derek has published over 70 peer-reviewed papers and book chapters. In 2014-15 he was president of the Canadian Society of Agronomy.

Dr. Brandon HEUNG

Dr. Brandon Heung joined Dalhousie University in 2017 as an Assistant Professor in Geospatial Informatics, where his primary research interests are in the field of digital soil mapping (DSM). His research interests are focussed around these themes: (1) the use of DSM techniques for mapping soils at local-, regional-, and national-scales; (2) the development of digital soil assessment techniques to support land management decisions and policy; and (3) the development of spatiotemporal approaches for modelling soil processes across a landscape. Currently, Dr. Heung is the co-chair of the Canadian Digital Soil Mapping Working Group, a national network of soil mappers that are tasked with coordinating and developing national-scale mapping products. The working group was established by the Canadian Society of Soil Science in 2016 and includes collaborators from five academic institutions, Canadian Forest Service, Agriculture and Agri-Food Canada, and multiple provincial government agencies. The working group was also responsible for developing and delivering a preliminary Canadian Soil Organic Carbon Map (CSOCmap) as part of Canada’s contribution to the Global Soil Organic Carbon Map (GSOCmap) compiled by FAO in 2017.

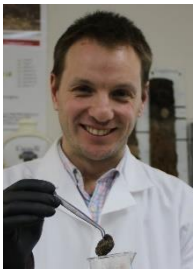
Prof. Keith PAUSTIAN

Prof. Keith Paustian is University Distinguished Professor in the Department of Soil and Crop Sciences and Senior Research Scientist at the Natural Resource Ecology Laboratory at Colorado State University. A major focus of his work involves modeling, field measurement and development of assessment tools for soil carbon sequestration and greenhouse gas emissions from soils. He has published over 280 journal articles and book chapters. Previous and current research activities include development of models and inventory methodology used to estimate US soil C and N2O emissions that are reported annually by EPA to the UNFCCC; development of a web-based tool (COMET-FarmTM) for estimating on-farm greenhouse gas (GHG) emissions and carbon sequestration used by USDA (http://cometfarm.nrel.colostate.edu/) and project-scale systems for GHG assessment of sustainable land management projects in developing countries (http://www.carbonbenefitsproject.org/). He also serves as project director for the Bioenergy Alliance Network of the Rockies (BANR – http://banr.nrel.colostate.edu/) which is a consortium of universities, industry and the US Forest Service, researching the potential for sustainable bioenergy production from beetle-kill trees and forest residues. Professional service activities include Coordinating Lead Author for the IPCC 2006 National Greenhouse Gas Inventory Methods and the IPCC 2003 Good Practice Guidance for Land Use, Land Use Change and Forestry (LULUCF) and two National Academy of Science committees (in 2010 and 2018) related to land use, greenhouse gases and climate change mitigation. He served as a member of the US Carbon Cycle Science Steering Group, which provides expert input to Federal Agencies involved in climate and carbon cycle research. He also served on the Voluntary Carbon Standard Steering Committee for Agriculture, Forestry and Other Land Use (AFOLU) and on numerous other national and international committees involving climate and carbon cycle research. He is a Fellow of the Soil Science Society of America and 2015 recipient of the Soil Science Society of America’s Outstanding Research Award.

Dr. Emilie MAILLARD

Dr. Emilie Maillard started carrying out research projects on soils and carbon cycle during her master's and doctoral studies at Laval University from 2006 to 2014. She is now a research scientist with Agriculture and Agri-Food Canada in Quebec City since fall 2019. Her main research activities aim to determine the effects of various cropping systems and agricultural practices on soil carbon accumulation and to better understand the mechanisms to stabilize soil organic matter. She also has an interest in determining the carbon footprint in agroforestry systems (intra-plot systems, riparian strips) and in better understanding the impact of different cropping systems in organic farming production on soil carbon accumulation.

Dr. Louis-Pierre COMEAU



Dr. Louis-Pierre Comeau is a research scientist with the Federal Government of Canada. His research focus on landscape and soil carbon. Specifically, he is investigating ways to replenish soil organic matter from agricultural and forest lands.

Dr. Louis-Pierre Comeau started his Research Scientist appointment with AAFC after his postdoctoral fellowship at the Chinese University of Hong Kong. Dr. Comeau previously completed a B.Sc. in Biology at the National Autonomous University of Mexico; a M.Sc. in Soil Science at the University of Saskatchewan; and a PhD. in soil Science at the University of Aberdeen UK (with the field work done in Indonesian forests).

Dr. Comeau currently lead national projects that investigate the relationship between soil biodiversity and carbon storage. His long-term scientific goal is to contribute to knowledge about why some carbon molecules can remain stable in the soil for thousands of years.

Thursday 14th May (10:30 AM Montreal time and 7:30 AM Los Angeles time)			
Slot	**Subject**	**Speakers**	**Time**
7:30 to 9:00 PT --- 10:30 to 12:00 ET --- 16:30 to 18:00 CET	Introduction by **Dr. Paul LUU**	Chair and Moderator: **Dr. Paul LUU** (“4 per 1000” Initiative) Question and Answer through the chat	2 min 5 x 15 min 15 min
	Round table n°3: Civil society and the point of view of NGOs • *"**Role of Land and Agriculture Solutions in Achieving Drawdown**"* - **Dr. Mamta MEHRA**, Senior Fellow Bio-sequestration Modeling - **Drawdown Project** • Point of view from **Regeneration Canada** - **Mrs. Gabrielle BASTIEN** • ***“Focus Agriculture”*** - **Mr. Klaus MAGER** from **Business Climate Leaders** • ***"Hope Below Our Feet: Soils as a Climate Solution."*** - **Mr. Seth ITZKAN**, co-director and co-founder of **Soil4Climate** • *"**Climate Agriculture: the barriers and opportunities to enhancing soil health in Canadian agriculture**"* - **Mrs. Karen ROSS,** Policy and Program Manager - Agriculture at **Equiterre**.		

Presentation of speakers:

Dr. Mamta MEHRA is an environmental professional with expertise in climate change, agriculture, and natural resource management. She has more than ten years’ experience working in these sectors.
Dr. Mehra joined Project Drawdown in 2015. Currently, in her role as a Senior Fellow, she is focusing on Drawdown solutions in the Land Use and Food sectors. She is also presenting Project Drawdown at various conferences and creating awareness of Drawdown solutions.
She is also working as an independent consultant and working with various national and international organizations on climate change issues and is one of the senior analysts of the Keeling Curve Prize. Previously, Dr. Mehra worked in different research capacities for Swiss Aid, UNDP-Australian Aid, and World Bank on projects involving community-based agriculture insurance, capacity-building of civil servants on climate change issues, resource conservation, and diversified farming systems. Dr. Mehra is very passionate about application-based research and in the next phase of work she wants to work on the implementation of Drawdown solutions at various scales.
Dr. Mehra has a master's degree in Water Resource Management and Ph.D. in Sustainable Resource Use Management from TERI University, India. She has authored many peer reviewed papers and is one of the contributors to the New York Times bestseller book, “Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming”.

Mrs. Gabrielle BASTIEN founded Regeneration Canada in 2017 and led the team that launched the first Living Soils Symposium in Montreal. Driven by the mission to promote regenerative land management ever since her Master’s degree in Sustainability and Environmental Management at Harvard University, Gabrielle is convinced that carrying out large-scale efforts to regenerate soil health is our best shot at reversing climate change all the while fostering healthy food systems.
Prior to her graduate studies, she obtained a Bachelor of Business Administration in Marketing at HEC Montréal and gathered years of work experience in communications, project management and event planning.

Interested in diving in deeper in the practical aspects of permaculture, Gabrielle did an apprenticeship on Ben Falk’s Whole Systems Design farm in Vermont in 2015 and focused her master’s thesis on the economic viability of permaculture-inspired farms in Quebec.

Mr. Klaus MAGER has been a volunteer for Citizen Climate Lobby for 5 years. He is a core team member of the Agricultural Action team, an advisory group to the board, and food and agriculture sector co-leader for Business Climate Leaders, an initiative of CCL.
Klaus has 40+ years of international work experience in F&B, including 21 years as a Director for the Walt Disney Co. developing a wide range of concepts for F&B operations in the Theme Parks and Hotels in California and Hong Kong. He then worked 5 years for Metro C&C, a self-service wholesaler based in Germany, in a corporate marketing position responsible to set strategy for Hospitality sales in 30 countries.

Mr. Seth ITZKAN is one of the world’s leading voices for soil restoration as a climate solution. With his colleague, Karl Thidemann, Seth is co-founder and co-director of Soil4Climate. The Soil4Climate Facebook group has 16,000+ members from over 100 nations, hosting discussions with scientists, practitioners, policy activists in the field. Soil4Climate was one of the original “civil society” organizations in the French 4p1000 soil carbon initiative and Seth will be speaking at the North American 4p1000 symposium in Montreal later this year. Soil4Climate has a chapter in Kenya working with members of the Maasai tribe to implement Holistic Planned Grazing as a means of environmental, social and economic enhancement. Seth Itzkan and Soil4Climate are closely assigned with the Savory Institute. Seth is Climate Advocacy Advisory with the Savory Institute and has appeared many times at public events with Allan Savory. Seth considers himself an “environmental futurist” and has a degree in Studies of the Future Studies of the Future Program at University of Houston-Clear Lake. He is a TEDx speaker on restoring grasslands and with planned grazing. Seth has consulted for The Boston Foundation, the Massachusetts Technology Collaborative and the US Bureau of the Census.

Dr. Karen ROSS is Policy and Program Manager - Agriculture at Équiterre, where she is currently leading a pan-Canadian project on soil health. Karen has a Ph.D. from Western University and comes to Équiterre as a former faculty at King’s University College, a policy advocate and researcher on sustainable food systems in Canada, and a project manager on a federally funded project in Rwanda and Burundi.
From Équiterre’s Ottawa office, Karen works at a federal level, advocating for policies that encourage soil health, as a means to improve climate resilience and mitigation, biodiversity and water quality for farmers and all Canadians. Karen manages a vegetable, fruit and flower "fermette" with her partner, selling their produce directly to daycares and at farmers markets.

Friday 15th May (10:30 AM Montreal time and 7:30 AM Los Angeles time)			
Slot	**Subject**	**Speakers**	**Time**
7:30 to 9:00 PT -------- 10:30 to 12:00 ET --------- 16:30 to 18:00 CET	Introduction by **Dr. Paul LUU**	Chair and Moderator: **Dr. Paul LUU** (“4 per 1000” Initiative) Question and Answer through the chat	2 min 3 x 15 min 15 min
	Round table n°4: Experience of businesses (production and value chains, C accountability, etc.) • ***“Soil Carbon Measurement and Predictive Mapping Using Remote Sensing and Machine Learning - Alberta Pilot Project”*** - **Mrs. Kimberly CORNISH,** Director - **Food Water Wellness Foundation** • ***“Indigo Ag’s Commercial and Experimental Carbon Initiatives”*** - **Mr. Dan HARBURG**, Head of Carbon Quantification - **Indigo Ag** • Experience from **Ecosystem Services Market Consortium – Mrs. Debbie REED, Executive Director**.		

Mrs. Kimberly CORNISH has worked internationally in the areas of vocational training and food security drawing on her educational background in political science and international development. Since returning to Canada, she has headed up Food Water Wellness Foundation to advance agricultural practices that are environmentally regenerative. Her focus has been to find a cost-effective way to measure and monitor soil carbon sequestration. She maintains a number of roles:

- Executive Director and Founder of Food Water Wellness Foundation
- Member of the United Nations FAO Working Group on Soil Carbon Sequestration
- Member of the Advisory Board of Rural Routes for Climate Solutions, Alberta
- Co-Chair of the Organic Value Chain Round Table Carbon Sequestration Task Force

Mr. Dan HARBURG is a scientist and entrepreneur working at the intersection of agriculture, robotics, electronics, materials, chemistry and biology to develop disruptive technologies. He is an engineer and a physicist by schooling and deeply enjoy using his problem-solving skills to generate meaningful solutions for the world's greatest needs. He can read patents, build spreadsheets, and write code or go deep with art critics or Spanish chefs. Dan fundamentally believes that success in startups comes from building teams of multi-lingual experts who share a common language of human-centered design and never stop questioning their assumptions.

Mrs. Debbie REED has been selected to guide the new ESM Consortium as its Executive Director. Debbie has been working on this project and its activities since its inception. She has focused on GHG mitigation and ecosystem services from the agricultural sector since 1997, having worked at the White House Council on Environmental Quality as the Director of Legislative Affairs and Agricultural Policy; and in the U.S. Senate as a Senior Staff on natural resource and agricultural issues for U.S. Senator Robert Kerrey of Nebraska. Prior to that she held numerous leadership positions at the U.S. Department of Agriculture, including special assistant to the Deputy Under Secretary for Research, Education and Economics (REE), and special assistant to the Administrator of the Agricultural Research Service (ARS). Her work at USDA included serving on multiple bi-national commissions on agricultural science and technology; and as the USDA Executive Secretariat for the US Dietary Guidelines for Americans. She has graduate and undergraduate degrees in human nutrition/dietetics, chemistry, and communications.

Concerning the organizers of the Regional meeting:

Dr. Paul LUU is an agronomist specialized in tropical agronomy, graduate from AgroParisTech, the Institute of tropical areas of Montpellier, the National High School of Agricultural Applied Sciences of Dijon, and the University of Montpellier (PhD in “population biology”).
He began his career in the field, with six years in the heart or at the head of agronomic research projects in the Caribbean (St. Lucia), Indian Ocean (Sri Lanka) and the Pacific (Tonga), before joining the international Relationship Department of the French Ministry of agriculture.
During the following 7 years, he was in charge of multilateral relationship with FAO, the World Bank and the CGIAR, of bilateral relationship with the countries in Africa and the Mediterranean area, as well as the management of the French food aid (200 000 t of grain per year), as Head of Mission and then as Head of Department.
Then comes 9 years spent in developing the agriculture of French overseas departments and territories, 3 years as Technical Advisor "Agriculture, Fisheries and Forestry" of the Minister of Overseas, then 6 years as Director of ODEADOM (the Board in charge of agricultural development of overseas areas that pays European (CAP) and national subsidies to agriculture of those regions).
In 2011, Paul LUU was appointed Director of Agropolis International, the international association that represents the scientific community "Agronomy - Environment - Biodiversity - Water" of the Occitanie area (one of the largest in the world with over 10,000 scientists). He contributed in particular to the installation of the CGIAR Consortium in Montpellier, International organization dedicated to agricultural research for the benefit of the poorest people on the planet. He joined the organization in September 2013 as Liaison Officer with the French Authorities, then as Protocol Officer.
From September 2016, Paul is Executive Secretary of the ***“4 per 1000 Initiative: Soils for food security and climate”***, launched at COP 21 in Paris.

Mrs. Gabrielle BASTIEN founded ***Regeneration Canada*** in 2017 and led the team that launched the first Living Soils Symposium in Montreal. Driven by the mission to promote regenerative land management ever since her Master’s degree in Sustainability and Environmental Management at Harvard University, Gabrielle is convinced that carrying out large-scale efforts to regenerate soil health is our best shot at reversing climate change all the while fostering healthy food systems.
Prior to her graduate studies, she obtained a Bachelor of Business Administration in Marketing at HEC Montréal and gathered years of work experience in communications, project management and event planning.
Interested in diving in deeper in the practical aspects of permaculture, Gabrielle did an apprenticeship on Ben Falk’s Whole Systems Design farm in Vermont in 2015 and focused her master’s thesis on the economic viability of permaculture-inspired farms in Quebec.

Mr. Antonious PETRO is the Scientific Director at ***Regeneration Canada*** and master's candidate in soil sciences at UQAT. He also has a diploma in biology and in community economic development. Antonious is interested in soil carbon sequestration in agricultural soils and in ecological services of urban soils. His specialty is scientific vulgarization in ecology and agri-food, sustainability project management, and citizen mobilization around climate change.

V. A Special Thank You from Dr Paul Luu, Executive Secretary of the "4 per 1000" Initiative

"In closing, I would like to say a big **thank you**:

- to our **21 speakers** over the course of our five sessions
- to our **translators** who have followed us in this adventure in sometimes borderline technical conditions
- **to all of you for your participation, your questions and for answering the 4 questionnaires from sessions 2 to 5**. In total, you were almost **200 people** registered to attend our event.

Thanks to all these contributions, you have collectively made this North American regional meeting a success beyond our expectations. The special circumstances that led us to organize this meeting in a dematerialized way nevertheless made it possible to increase the audience of this regional event and to enlarge the network of the "4 for 1000" Initiative. This is one of the reasons for the existence of our Initiative, and if you belong to an organization, an institution, an administration, a company, a group of producers interested in joining us, do not hesitate to do so. You can find the necessary information on our website www.4p1000.org or contact the Executive Secretariat: secretariat@p1000.org

Together we are stronger than alone!

Before saying "goodbye" to you, as it is very likely that we will be organizing other North American regional meetings in the years to come, I would like to salute the professionalism of the Regeneration Canada team with whom our "4 for 1000" Initiative team collaborated for the organization of this event. It is thanks to you Antonious, Sarah and of course Gabrielle that we were able to do it in excellent conditions. Beatrice and I would like to publicly thank you. **Good day to all of you, thank you again for your participation, take care of yourself, your loved ones and the health of our soils**."

Dr. Paul Luu, Executive Secretary of the “4 per 1000” Initiative.

https://ww.4p1000.org

https://regenerationcanada.org

www.4p1000.org

Social networks

Facebook page: **4p1000 Initiative**

www.facebook.com/4p1000 or fb.me/4p1000

Facebook Group: **All 4p1000**

www.facebook.com/groups/all4p1000

LinkedIn: **4p1000 Initiative**

https://www.linkedin.com/company/4p1000initiative/

Twitter: **@4per1000 #4p1000**

www.twitter.com/4per1000

YouTube:

https://www.youtube.com/channel/UCvBmNtaHxi3PcvbUkkL_UQg/playlists