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Chair

Mr. Pat Finnigan

Standing Committee on Agriculture and Agri-Food

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● (1530)

[*Translation*]

The Chair (Mr. Pat Finnigan (Miramichi—Grand Lake, Lib.)): Good afternoon. Welcome to our committee's last meeting.

[*English*]

Pursuant to Standing Order 108(2), we continue with a study of climate change and water and soil conservation issues. Today we have a video conference with the Research and Development Institute for the Agri-environment, and Aubert Michaud, soil and water conservation scientist.

[*Translation*]

Good afternoon.

[*English*]

As well, we have as an individual Elena Bennett, associate professor, natural resource sciences, also by video conference.

[*Translation*]

She is speaking to us from Sainte-Anne-de-Bellevue, Quebec.

Welcome, Dr. Bennett. Can you hear us?

[*English*]

Dr. Elena Bennett (Associate Professor, Natural Resource Sciences, As an Individual): Yes, I can hear.

[*Translation*]

The Chair: Great.

To begin, I will give each person seven minutes.

Dr. Bennett, go ahead.

[*English*]

Dr. Elena Bennett: That's great. I can start.

As mentioned, my name is Elena Bennett. I am an associate professor at McGill University, based here in Sainte-Anne-de-Bellevue.

I have been studying agriculture, especially soil and water quality with respect to fertilizer use, for 20 years. For the last 10 years my research has increasingly focused on land management in agricultural areas and understanding the multiple benefits that communities receive from agricultural lands, which include not only food production and its concomitant economic benefits, but other benefits as well: places to recreate, flood control, water quality, climate regulation through carbon storage, and more.

We call those benefits “ecosystem services”, a term that has become of great interest to the research and management communities for the past 10 years. I'll be talking about that today.

I want to start by thanking you very much for the invitation to speak. I'm really pleased to see that the government is taking climate change seriously and is considering how that's going to affect important Canadian sectors.

I want to share one overarching idea today that leads to two recommendations you might consider. The overarching idea is this: that we have to think beyond food production when we think about agricultural landscapes. While it's undoubtedly true that Canada's agricultural landscapes are important for food production and for Canada's economy, it's also true that these landscapes provide many other benefits to Canadians that are undervalued, if they're even considered at all.

If you think about your favourite Canadian agricultural landscape, it might be potato fields of P.E.I. or canola in the Prairies; it might be corn soy here in Quebec, or maybe fruit orchards in British Columbia. If you picture that landscape in your mind and try to list the benefits we get from those landscapes, the ecosystem services, probably the first ones you think about are things like food and water, or maybe fuel wood and maple syrup around here. If I push you to think about it a little longer, you might also consider aesthetic beauty, opportunities for hiking and recreation, or maybe the inspiration they deliver for people to make art or other things of cultural significance.

If I really push you further than that, then you might finally recognize that these landscapes are providing flood control, that they're regulating climate, that they're storing carbon in their trees and soil, and that they're providing high-quality water for drinking and fishing and swimming.

The problem is that thus far our fairly single-minded focus on increasing efficiency of food production in these landscapes creates dramatic declines in these other ecosystem services that are provided in agricultural landscapes. To explain that a little bit, there are trade-offs between ecosystem services. For example, if I want to produce more food or produce more food more efficiently, I might increase the rate of fertilizer use, but that's probably going to lead to declines in water quality, and those sorts of trade-off interactions are the case across a great many agricultural landscapes.

A few years ago the Millennium Ecosystem Assessment, which was a UN-sponsored, five-year, 1,000-plus-person effort to assess the state of the planet in terms of its ecosystem services, found that services of food and fibre production are increasing, but other services, especially those that have trade-offs with agriculture, such as flood control or water quality or recreation, are declining. At the same time, this Millennium Ecosystem Assessment found that demand for all types of services is increasing.

We're facing a very intense pressure right now to expand agriculture, to intensify agriculture, to increase production for economic reasons, for reasons of food security. Because we can very easily quantify the economic value of food production, I think we sometimes get caught up in policies and decision-making that focus only on that food aspect of agricultural landscapes, but it's incredibly important to Canadians that we remember all of these other things of value, all of these other ecosystem services that are provided in these landscapes, before it's too late.

How can we do this? This question leads to my first recommendation to you, which is to think about enacting policies and creating funding for and generally taking steps that encourage the following four things: measuring the biophysical production of these other non-food delivery services; measuring demand for those, measuring how much are people wanting from their landscapes; estimating the benefits that are delivered to people in agricultural landscapes from more than just food; and then finally, ensuring that farmers and farm communities have a way to benefit from the fact that they are providing these services to other Canadians.

● (1535)

Any efforts to measure this or to ensure that farmers are benefiting will help to make sure that we remember that those benefits also come from agricultural landscapes and that these agricultural communities continue to take the kinds of actions they're taking now that ensure we can keep benefiting from these things that our agricultural landscapes do.

Let me move on to my second recommendation, which touches on the issue of resilience more directly, and it's in many ways related.

A lot of our efforts go toward sustainably optimizing crop production while taking sustainability into account. However, that's not enough. When I talk about this, it's strategies like more crop per drop, which aims to get more crop growth per water irrigation, or increased yield per unit input of fertilizers, or reduced greenhouse gas emissions per unit of product produced. Those are important and necessary, but it's not going to be sufficient, and it is probably going to reduce the resilience of these communities to climate change in the long run.

In other words, we've been very good at increasing agricultural productivity in areas with access to fertilizers and with access to technology, but there's a lot of evidence that these steps we're taking, which increase this narrow-sense efficiency of agricultural production without thinking about resilience, are leading to highly damaging fluctuations in food production and food costs and environmental outcomes.

For example, native pollinators of crops are declining around the world, including in Canada, because of land-use change, because of pesticide use and other changes that are happening, but managed honey bees aren't adequately compensating for that loss.

What I would encourage instead is that we think about aiming for resilient agriculture. How can we meet demand for agricultural products and economic growth over the short and long term without undermining—

● (1540)

The Chair: Madam Bennett, we're running out of time. I will give you a chance to conclude, if you can.

Thank you.

Dr. Elena Bennett: Okay. Yes, that's great.

I will just conclude by saying that if we want to think in that way about resilience, we need to think not just about persistence, which we're quite good at, but also about adaptation and transformation. In other words, how do we help the communities on these lands to have the capacity to create entirely new types of agriculture that are resilient to climate change?

Thank you.

The Chair: Thank you very much, Madam Bennett.

[*Translation*]

We will now go to Aubert Michaud, who has seven minutes.

Dr. Aubert Michaud (Soil and Water Conservation Scientist, Research and Development Institute for the Agri-environment): Thank you, Mr. Chair.

Good afternoon.

First, I would like to thank the members for their invitation, and I would like to thank them for their interest in the research activities of our institute. My name is Aubert Michaud. I have been a soil and water conservation researcher at the Research and Development Institute for the Agri-environment, the IRDA, since the institute was founded in 1998.

The IRDA is a research institute that has about a hundred regular employees. Eighteen research teams work on various issues relating to soil and water conservation, air quality, and biodiversity in the agricultural sector.

My team and I work mainly to support concerted actions of rural communities focused on water quality management issues.

Our first finding follows from climate projections, and it is obviously the longer growing season. Of course, this has many opportunities and benefits for the farming community.

Climate change is also an issue, particularly in terms of the distribution of water surpluses and deficits.

I will now present four major issues that deserve our attention and, most certainly, adjustment measures.

Our first issue is related to increased winter rains. Clearly, the season will be longer and the spring will be earlier, but large amounts of runoff will be managed because of the effect of precipitation on frozen and snow-covered soils. We need only think, for example, of the 2011 floods in the Richelieu Valley and, more recently, those of spring 2017, which occurred in several regions of Quebec. Unfortunately, this has shown the devastating effects of rains on abundant snow cover. Ground frozen or saturated with water is then vulnerable to surface runoff.

For 20 years, our hydrometric monitoring with small watersheds, tested in Quebec, show that, every other year, the largest runoff volumes are actually observed in winter and early spring. As a result, there is a real need to adapt our hydrological criteria for the design of agricultural structures to this situation.

It should be noted that the current criteria are mainly focused on peak flows generated by intense precipitation in the summer. In addition, many investments are made each year in Quebec to maintain 30,000 kilometres of watercourses. In some regions, particularly in Montérégie, the recurrence of work is worrying.

Several municipalities are expressing concerns about increasing peak flows or increased sedimentation. This is an opportunity to do things differently and to act in a concerted manner, not only in terms of watercourse development, but also in shoreline and farmland development. The techniques are known. The challenge arises especially on a human scale, in the co-operation of stakeholders and in the technical, financial and regulatory support of these interventions.

Long-term conservation of soil quality is another major issue for climate change. It is particularly a question here of preserving the physical condition of our soils and ensuring the conservation of its principal fertility capital, its organic matter.

Soil compaction and drainage problems are high on the list of concerns of Quebec field crop producers. Currently, several agricultural companies are doubling agricultural drains in their fields. In fact, this concern is not new. Already in the late 1980s, a large inventory of soil degradation resulted in a degradation of the soil structure on more than 400,000 hectares.

More recently, the portrait of the grain industry in Quebec shows an average decline of 15% in the organic matter content over just 10 years, between 1998 and 2009. In central Quebec, the average decrease for the same period reached 30%. And this problem has motivated the funding by the Quebec ministry of agriculture, fisheries and food, or MAPAQ, of a province-wide soil health study. The study began this year and is coordinated by IRDA.

A longer growing season offers a great opportunity to restore the physical condition of our soil and to ensure the preservation of organic matter. The introduction of cover crops is certainly one of the most effective ways. Cover crop is a crop that is grown with or after the main crop. It has the advantage of improving the soil structure, bringing organic matter, storing nutrients and protecting the soil against erosion. These benefits are particularly important when cover crops are planted with a small grain, such as wheat, for instance.

● (1545)

This crop allows the cover crop to have more time to grow, compared to corn or soybeans, which accounts for the central interest in bringing small grains back into the corn-soy rotation in Quebec, which currently dominates the landscape of major crops.

As for water quality, one of the main issues facing the agricultural sector is the eutrophication of water bodies and the proliferation of cyanobacteria. Several bodies of water in rural areas are affected by swimming bans or by contamination of intakes. So it's an important public health issue. Phosphorus intake is considered the main factor behind these phenomena. In agricultural areas, runoff and land drainage generally contribute the largest share of diffuse phosphorus inputs to water bodies.

In concrete terms, the first line of defence for retaining phosphorus on our farmland is the control of soil enrichment. As such, let's remember that the issue is first of all in terms of farm manure. In fact, farm manure constitutes 65% of the phosphorus used in agriculture in Quebec, which is about 95,000 tonnes, compared to 35% for mineral fertilizer. Overall, phosphorus intake is about 30% higher than crop removal. So the soil is enriched.

For example, in livestock concentration zones in Montérégie, the critical soil fertility rate, namely, 7.7% phosphorus saturation, is reached for 40% of crop acreage. Disposing of farm manure becomes problematic. An effective solution to the problem is to reduce phosphorus slurry content at the source by separating solid and liquid fractions in livestock buildings. The techniques, which are known and effective, are widely used in Europe. They have been evaluated in Quebec by some of my colleagues at IRDA. The nitrogen-rich liquid fraction can then be used on phosphorus-rich soils.

The fact that the majority of farm fertilizer applications occur during periods when runoff may occur, in the spring and fall, is another aspect of the problem. Because of wet soils, these run-offs contribute to soil compaction. Here again, the cultivation of small grain makes it possible to use our farm manures, to reduce soil compaction and, as a bonus, to store nutrients.

Finally, the anticipated climate changes will result in larger water deficits during the growing season. Two factors are at play: warmer seasons and more intense rainfall. This will ensure that a lower proportion of the rains are stored in soils.

With regard to the water supply for agricultural production, a long-term vision needs to be developed and should take into account the availability of surface and ground water, as well as the consumption of all users—

The Chair: Dr. Michaud, you will have to finish your presentation.

Dr. Aubert Michaud: Okay.

The Chair: You can wrap it up quickly.

Dr. Aubert Michaud: In addition, there are currently gaps in the technical support of farm businesses for water management. So we need to develop technical and vocational training for agricultural advisers, in order to help companies use irrigation water more wisely.

Thank you for your attention.

The Chair: Thank you, Dr. Michaud.

We will move on to questions, but first I would like to welcome Mr. Deltell, who is replacing Mrs. Boucher.

[*English*]

and thank Mr. Falk as well for being here today.

Mr. Ted Falk (Provencher, CPC): Thank you.

The Chair: We'll now start with a six-minute round of questions.

Mr. Barlow, you have the floor. Please indicate who you want to the question to go to, because we're on video conference.

Mr. John Barlow (Foothills, CPC): Certainly. Thank you.

Thank you very much, Mr. Chair.

I appreciate the time of the witnesses today and their great information. I look forward to hearing some more details from you.

I'm going to start with Mr. Michaud, please.

A witness in a previous meeting talked about some of the concerns with our water use in Canada. I'm from Alberta, and I have to apologize for not being familiar with every other provincial jurisdiction. I know that in Alberta and some of the other western provinces, we have a real problem with what's called “first in time, first in use”, which means that whoever had the original water licence can hold on to that water licence in perpetuity, whether they use it or not, while there are farms, ranches, or other users that are really struggling.

Is this a missed opportunity for us or something that we as a federal government have to start taking a look at in terms of who has the water licences and who has access? Do we have to take a stronger look at best use and best practice for those finite water resources?

● (1550)

[*Translation*]

Dr. Aubert Michaud: I understand that the problems in western Canada are very different from the ones in Quebec, for instance.

Water licences aren't yet in use in Quebec. We don't really know the extent of the problem. A link needs to be made between the availability of surface and ground water, and future irrigation needs.

There is definitely a potential conflict of water use. Moreover, IRDA is currently participating in a major study on potential water use conflicts for all of Quebec's agricultural regions. This is the RADEAU 2 project, rolled out almost a year ago.

In concrete terms, the tools are not in place. Knowledge about needs is lacking when we talk about developing visions in this regard. The basic data have not yet been collected in Quebec.

What is more problematic logistically speaking is that technical data or technical support are not present to ensure the judicious use of irrigation water. I am thinking of some irrigated crops, such as vegetable production and a part of potato production.

[*English*]

Mr. John Barlow: That leads me into my next question, as it seems they may be intertwined. Again, Mr. Michaud and Ms. Bennett, if you want to add something, please do so.

The Soil Conservation Council of Canada told us that one of the most important things we should be looking at in this study is the fact that a detailed, in-depth analysis of the soil situation across Canada has not been done since the late 1980s. Obviously a lot has changed in the last 30 years, not to mention our growing season, the crops we grow, water usage, and those types of things. It's hard to say where we want to go if we don't know exactly where we're starting from. Should we be looking at a national in-depth analysis of the status of our aquifers as well as the status of our soils?

[*Translation*]

Dr. Aubert Michaud: Your question is quite relevant.

An inventory of the state of soil health has just been started in Quebec. This initiative is coordinated by my colleague Marc-Olivier Gasser, from IRDA, and is entirely funded by MAPAQ.

The concern is clearly there. I agree with you on the relevance of documenting the state of the health of our soils. As I mentioned, Quebec agricultural producers in the field crop sector are expressing concern about the problem of compaction and degradation of soil structure. We see it in the doubling of agricultural drains, among others. The concern is there, and I think it's relevant to quantify the problem.

On the Ontario side, there is a lot of concern about soil health. Unfortunately, I am not aware of initiatives similar to those of Quebec in other provinces

[*English*]

Mr. John Barlow: I think that really exemplifies our issue. Each province seems to be doing things on its own, but on a national scale, I think we're missing some important data.

Dr. Bennett, you were talking about some of the issues in the increase in efficiencies and the impact it has on soil. Can you expand on that a little? When we look at some of the innovation and new steps in technology that our agriculture producers are doing now with crop rotation, we see that in many jurisdictions they're growing pulses that would never have been grown in some of these areas before as a means to protect their soil. We're spraying much less because of some of the new tools they have, such as new seed technology and those types of things. It seems as if agricultural producers are having much less impact on the land than they had maybe 10 to 20 years ago, but I may have misunderstood.

You were saying the opposite, that some of the things they're doing to improve efficiencies and ensure they're physically driving on their land less than they ever have before are in some way detrimental. Was I misreading that a little?

● (1555)

Dr. Elena Bennett: Let me just clarify a little bit, because I don't think you're misreading. In fact, there have been improvements in efficiencies, and some of those have been quite beneficial in terms of reducing the amount of fertilizer we need.

With regard to resilience, which I understand is part of the report the committee is looking at now, even though we're increasing sustainability, we may be reducing resilience at the same time if we're creating a system that is more rigid. In other words, if you are dependent on lots and lots of technology to go exactly right in order to be able to, say, plant your crop or irrigate your crop or whatever you—

The Chair: I'm going to have to cut you off, Ms. Bennett. I'm sorry. We're a little bit over time. Monsieur Breton perhaps will give you a chance to finish.

[*Translation*]

Mr. Breton, you have six minutes.

Mr. Pierre Breton (Shefford, Lib.): Thank you, Mr. Chair.

I can let you finish your answer, Dr. Bennett, if you like.

[*English*]

Dr. Elena Bennett: Sure. It's just to say that you are creating a system that is less resilient. If it is more efficient, more tightly controlled, you will be less resilient to shocks, including climate change, including economic change, including anything else that happens suddenly. There is quite a considerable amount of evidence of that, so as we implement these new technologies, we need to be careful that we're not creating a rigid system.

[*Translation*]

Mr. Pierre Breton: Great. Thank you.

I would like to welcome you, Dr. Bennett and Dr. Michaud.

Dr. Aubert Michaud: Thank you.

Mr. Pierre Breton: Thank you very much for your testimony.

I represent a very agricultural riding. In fact, 85% of the land of the Shefford riding is considered an agricultural sector. Obviously, I speak regularly with producers, and they are concerned about climate change. It undoubtedly creates some insecurity.

However, many also talk to me about possibilities. As you said, the agricultural sector is extremely resilient, but it is always ready to come up with solutions and adapt to the different constraints it faces.

Could you talk to me about these possibilities? Dr. Michaud, since you briefly discussed this at the start of your presentation, perhaps Dr. Bennett could answer my question first.

What do you think about the possibility that our agricultural producers could increase their production? Clearly, they still want to feed the people of Canada, and there are a lot of possibilities on the world stage right now. How do you see the opportunities that the agricultural sector has for increasing its production?

I'll hear from you first, Dr. Bennett, and Dr. Michaud could respond afterwards.

[*English*]

Dr. Elena Bennett: Thank you.

One main opportunity right now for Canadian agriculture is the longer growing season, the soils that are warming earlier, and the opportunity that provides both to plant earlier and to plant different crops. That represents a great opportunity if our farming communities can adjust to it.

Then the cause for concern, of course, is that despite the best models, we still don't know exactly what's going to happen or when. People have great concern about whether they're going to be able to adapt rapidly enough. I think that's really a question of whether we're able to put measures in place that enable that kind of rapid adaptation. Over and over again we've seen farmers and farming communities doing a great job of adapting and picking up new technology, but every time that's done it requires a great input of capital, both for knowledge and for technology—for, say, tractors. We need to provide opportunities to allow farmers to do the sorts of innovations they think are necessary.

[*Translation*]

Mr. Pierre Breton: Dr. Michaud, would you like to add anything?

Dr. Aubert Michaud: Yes, I would.

In short, increased growth of a few weeks at the beginning and end of the season will certainly increase yields. And we're already seeing this in vegetable production, where the growing season has increased by about two weeks. This will certainly extend some crops. I'm thinking of vineyard production in your riding, for instance.

However, I would like to see an opportunity to increase the feasibility of agricultural conservation practice. I'm thinking of cover crops. For instance, this might involve sowing clover with small grains to rehabilitate the soil. I'm thinking of the development of application windows, especially during the summer period, to limit the compaction of soils during pre-planting in the spring or in the late autumn

I believe there are real opportunities to capitalize on this wider window to increase the feasibility of conservation farming practices, which will be really beneficial for farm businesses in the long run.

● (1600)

Mr. Pierre Breton: I'm still interested in Canada's global competitiveness in agriculture.

Dr. Michaud, how do you see climate change here in Canada in terms of competitiveness? Of course, the agricultural sector provides very high quality products. Our products are in demand everywhere on the planet. There are challenges, certainly.

Tell me briefly about the potential position of our producers and, obviously, of the possibility that they are selling their products more globally.

Dr. Aubert Michaud: There are certainly opportunities for increased performance. There was also, possibly, a reduction in some production costs. The benefits are there. In terms of management, water is relatively abundant in Quebec. This positions us very well, among other things, in terms of vegetable production. Everyone knows the problematic situation Californians are experiencing at the moment, for example.

Certainly, there are market shares to be had in some sectors.

Mr. Pierre Breton: This is interesting. Thank you very much.

The Chair: Thank you, Mr. Breton.

Thank you, Mr. Michaud.

The floor now goes to Ms. Brosseau, for six minutes.

Ms. Ruth Ellen Brosseau (Berthier—Maskinongé, NDP): Thank you, Mr. Chair.

I would like to thank our two witnesses, Mr. Michaud and Ms. Bennett.

Your testimony to the committee and your expertise are really interesting.

Let me turn to you first, Mr. Michaud.

In my opinion, to really tackle the problems of climate change, there must be collaboration and leadership at municipal, provincial, and federal levels. Everyone has to be heading in the same direction.

Can you tell us, according to your research and your expertise, what role the federal government should be playing?

Dr. Aubert Michaud: Your question is very pertinent.

The majority of the issues involve a number of players, as is also often the case for the solutions. One of the things I talked about was land development. There are a lot of concerns about this in the municipal world. It is also a concern shared by farmers. Subsoil drainage is perhaps their main asset in terms of the productivity of their crops. Clearly, the management of waterways and agricultural land is a concern for municipalities and regions, for provincial authorities, and even for federal regulations.

The techniques are often known, but it is becoming difficult to really coordinate the measures and even to make sure that the technical, financial and regulatory frameworks are consistent.

It is not for me, as a scientist, to comment on the federal government's positions. However, I can say that there are certainly major factors of infrastructure and sustainable investments with land and waterway management, for example.

In addition, federal environmental regulations are affected in these projects. It is important that the regulations put limits on problematic situations, but also that they do not prevent us from innovating and trying new approaches, for waterway management, for example.

Ms. Ruth Ellen Brosseau: We will soon have the next agricultural policy framework. The government should perhaps be investing more in education and the adoption of best practices.

In recent sessions, during our study on climate change, witnesses from the United States made presentations to the committee. One of the experts we heard from explained to us that the United States compensates producers who adopt measures along those lines, who plant trees and who move more towards agroforestry.

In your opinion, is compensating producers who make more sustainable choices a practice that the federal government could adopt?

● (1605)

Dr. Aubert Michaud: Certainly.

Ms. Bennett talked about the benefits of environmental goods and services. I have in mind a particular pilot project on the benefits of governmental goods and services in the RCM of Brome-Missisquoi. The initiative brings together 40 or so farming companies, along 80km of river frontage, with more than 700 structures to control runoff. The initiative has remarkable scope.

I can testify to the fact that it has been a pleasure for us to support agricultural communities in their management projects. The producers are volunteers and respond well to financial incentives. So it is important to note that financial incentives are effective, as is technical support.

The policy framework called Growing Forward 2 provides a lot of support with applied research and farm-based demonstration networks. An agri-environmental consulting service network has been set up. In Quebec, agri-environmental advisory clubs are a major vehicle for the transference of knowledge and technical support. I feel that financial levers and technical support are both important.

Ms. Ruth Ellen Brosseau: Thank you, Mr. Michaud.

[*English*]

Madam Bennett, I was wondering if you could elaborate a little bit more on incentivizing farmers and producers to adopt better practices. A lot of farmers are doing that right now, but it might be a way to get more people on board.

I also have a second question. Hopefully I'll have time, Mr. Chair.

The Chair: You have 45 seconds, actually.

Ms. Ruth Ellen Brosseau: I'll ask it anyway and see if she can respond.

The government, in the Barton report, said that they want to increase exports from $55 billion in 2015 to $75 billion in 2025. Can we do that if we continue on the same path, while still trying to reduce the effects of climate change? Is that attainable, or does that need a complete overhaul and different leadership?

The Chair: Could we have a quick response, please?

Dr. Elena Bennett: It strikes me that this would be a very large increase to be able to make without a lot of other changes.

You were asking earlier about how we can organize across levels of government to achieve the sorts of things we want to achieve in farming, including these sorts of increases, but also, I think, including other things. I guess what occurs to me is that there are many ways you could get from $55 billion to $75 billion, and a lot of them would involve dramatically reducing the natural capital. The question was asked earlier about the quality of soils and the quality of water, and whether we even know what the quality of our soils and water is—

The Chair: Thank you, Madam Bennett.

[*Translation*]

Mr. Drouin, you have six minutes.

Mr. Francis Drouin (Glengarry—Prescott—Russell, Lib.): Thank you, Mr. Chair.

I have enjoyed our colleagues' remarks.

Mr. Michaud, as I read your presentation, I wondered how we could improve the situation, first in terms of reducing the impact of climate change. During our study, I have noticed that zero tillage is more commonly practiced in the west of Canada than in the east. Could you tell me about the situation in Quebec? I am not from Quebec, but my part of Ontario is very close.

Is the practice also used less in Quebec than in western Canada?

Dr. Aubert Michaud: That is indeed the case. Your question is very pertinent.

I would quickly like to recall the report on soil conservation published by the Standing Senate Committee on Agriculture, Fisheries and Forestry in 1984. It is called “Soil at Risk: Canada's Eroding Future”, or the Sparrow Report. Perhaps you have seen the document, which certainly had an effect on the development of zero tillage in the 1980s.

We are aware that, in the west, the practice is now almost the norm. Even in Quebec, it involves a little more than 50% of the land. Specifically, the dominant rotation is corn-soybeans. In general, soybeans lend themselves to no-till better, but, unfortunately, they leave very little crop residue on the surface of the soil. Moreover, if farm fertilizers are not added, we see an increased loss of phosphorous in the surface run-off.

Direct seeding really is an interesting approach but you have to consider diversifying or improving the rotation. Earlier, I talked about introducing small grains, for example. Unfortunately, they have been in a significant decline, particularly wheat and barley. Certainly, a very interesting market can be developed, with benefits for soil conservation. That is so for winter grain in Quebec, for example, where the climate will be better. As a result, other cover crops can be introduced, because the practice is much less effective with soybeans and corn.

● (1610)

Mr. Francis Drouin: I think that it is the same for us, that soybean and corn crops are the dominant ones in our fields.

I just want to ask you one more question.

At our last committee meeting, one of the witnesses talked about forest cover. He was not talking about forests on agricultural land. However, he was talking about sacrificing some fields to grow trees and even to combine a corn crop with certain trees.

According to your research, would that improve the organic matter on agricultural land, or not really? It would probably be the case near where the trees are planted.

Dr. Aubert Michaud: Actually, there are two questions there.

Trees certainly have their place in the system and specifically in terms of river management when they are next to waterways. We know that developing a riparian strip with trees or shrubs breaks the hydrologic connection between the fields and the waterway, which would have a beneficial effect on the drainage of the land and the retention of nutrients. That has also been demonstrated in some concerted actions taken in watersheds.

In terms of the intercropping and the major crops with trees, I don't think the practice is feasible for everyone. However, it is certain that some areas of agricultural land are particularly vulnerable and perhaps unproductive when they are low-lying or poorly drained. They could certainly be well suited for sylviculture.

We have to have an overall vision for the integrated management of problematic watersheds. The quality of the soil and the water, the performance of the crops and the impact of agricultural activity on water quality downstream are all interrelated.

Mr. Francis Drouin: Thank you very much.

[*English*]

Dr. Bennett, I haven't forgot about you. I have a quick question on the role that precision farming can play, and if you've seen in your studies whether or not it can be opposite to resiliency for farming. I'm wondering if you've done any studies on that, and whether or not you see a big role that Canada can play.

Dr. Elena Bennett: I haven't done studies on precision agriculture, but I am familiar with that literature. It does reduce the amount of fertilizer we use, but with great inputs of capital and great dependence on technology. There is a trade-off there between resilience and our ability to be flexible and adapt quickly, but it is decreasing our immediate near-term fertilizer use.

Mr. Francis Drouin: I think it's a question of adaptation with the farming community.

I keep telling this story, but both my colleague and I were at a farm show, and one of the sales guys said that if we were going to do precision farming, the first thing we would have to do was a soil test. It took three years for that particular person to get a soil test done.

The guy would put fertilizer across the whole land because his old man did it and it was the way he'd been taught. It produced good yields. In that third year, he found that, oops, maybe he didn't have to spend all that money to put fertilizer everywhere, and he finally adopted precision farming.

That tells me that a lot of education still needs to be done. Any recommendations on what we can do as a committee to ensure this information is out there would be helpful— and I'm cut off.

● (1615)

The Chair: Unfortunately, Mr. Drouin, we'll have to live with the good *conseils de départ*.

[*Translation*]

It is now Mrs. Nassif's turn, and she has six minutes.

Mrs. Eva Nassif (Vimy, Lib.): Thank you very much, Mr. Chair.

My thanks to our witnesses.

Mr. Michaud, I represent Vimy, which is an urban constituency and not really agricultural. I am new to the committee, but I have been trying to learn more about your project by visiting the website of the Institut de recherche et de développement en agroenvironnement.

I would like to have more information about sustainable water management in the context of climate change. Can you share your comments on that with us, especially on the current water management situation in Canada, both on agricultural land and elsewhere?

Dr. Aubert Michaud: Thank you for your question.

There are actually two types of issues. First, there are issues in quantitative water management. Earlier, I expressed some concern about excess water, the winter flooding that results from precipitation onto frozen ground and from melting snow. Clearly, that issue concerns rural areas, but it can also concern urban communities that are next to the outflows of rural watersheds. So it is a major issue for everyone.

Water deficits are also an issue. We talked about that earlier. The issue arises a lot more in western Canada than in Quebec, perhaps. Concerns are being raised, for example, about the quality of the water used for irrigation. In some areas, it is a problem because they no longer have access to surface water for irrigation, which creates additional pressure on the water under the ground. In addition, there are other users, of course. So the issue really is in reconciling water use.

The other issue, clearly, is water quality. Hotter seasons may well increase the number of cyanobacteria and the processes of eutrophication in bodies of water. A number of bodies of water are already affected in eastern Canada and in Quebec.

I feel that we have to be even more vigilant in terms of controlling the increase of phosphorus in our soil. We have to work on structures for livestock that contain phosphorus in its solid form, manure. Above all, we have to work on cultivation systems to develop manure spreading windows that are less problematic in terms of compacting the soil, and we have to recycle nutrients better. Nothing is lost, nothing is created, but everything can be turned into win-win propositions for farmers and for the downstream communities.

Mrs. Eva Nassif: Thank you.

Ms. Bennett, if you have anything to add, feel free to share your comments. I am all ears.

[*English*]

Dr. Elena Bennett: I think Mr. Michaud has mainly covered this aspect. I'll just say that understanding where we're at with respect to the natural capital that's driving these agricultural systems is quite important for soil, water, and all of the other mechanisms that are driving agriculture.

[*Translation*]

Mrs. Eva Nassif: Ms. Bennett, my next question goes to you.

Do the government or the private sector have practices or policies that are harmful to sustainable water management?

[*English*]

Dr. Elena Bennett: Are there policies that are having a detrimental effect on water management? There are certainly policies in place that I think are probably keeping farmers from doing what they know or believe is best for water quality—even, for example, some of our regulations about how we manage buffer strips. There are quite rigid ideas of what that should look like and what that should be like, even when it's maybe not the best for a farm. You can see here there's a trade-off between making things strict and conformed enough to give people a sense of what to do versus making them loose enough that people can adapt within those bounds.

● (1620)

[*Translation*]

Mrs. Eva Nassif: You are conducting an investigation into the trade-off between agricultural production and water quality. I would like to have an answer from you about that investigation. Can you tell me about the investigation, please?

Dr. Aubert Michaud: Is that question for Ms. Bennett?

Mrs. Eva Nassif: Yes, it is for Ms. Bennett.

[*English*]

Dr. Elena Bennett: In the trade-off between agriculture and water quality, there are great trade-offs there, because a lot of the way we increase agricultural productivity is to increase fertilizer, and that has obvious implications for water quality. That's something we face every day, and certainly we've been applying.... There was the case that was mentioned before of the farmer who was applying more fertilizer than was needed simply because he didn't have a soil test.

The vast majority of our farms, because fertilizer is relatively cheap, are applying far more than they are taking up in crop production, and it's just sticking around. That's like a bucket of fertilizer uphill from all of our waterways, just waiting to get into our water quality. Over the last 50 years, we have set ourselves up for quite an issue with all of this phosphorus stored in our watersheds, just waiting for the big winter rains and the big spring storms to send a lot of eroded soil with a lot of phosphorus in it into our waterways.

The Chair: Thank you, Ms. Bennett.

[*Translation*]

Thank you, Mrs. Nassif.

[*English*]

Now we have Mr. Falk for six minutes.

Mr. Ted Falk: Thank you, Mr. Chair. It's a pleasure for me to be here as a substitute on this committee today. Thank you to our witnesses.

Ms. Bennett, I'll start with you. Summer fallowing used to be a very common practice among a lot of farmers, and then we moved to minimal till, and now zero till. Farmers used to incorporate a lot more mature forage crops back into the soil. That obviously doesn't happen when we're doing zero till. Can you give me a few of your thoughts and comments on the positives and negatives of doing or not doing that?

Dr. Elena Bennett: Yes, whether to use zero till or to incorporate crop parts back in depends on what you're trying to manage for. Zero till is great for managing for phosphorus and some aspects of water quality, but it turns out to be less useful or sometimes even detrimental in managing nitrogen. Again, this is a case of getting the right balance between flexibility and rigidity to allow farmers to do the right thing in their particular location, whether the issue in their location is phosphorus or nitrogen.

Mr. Ted Falk: What are your thoughts on summer fallow? Is there a place for that? Is that a practice and philosophy that's no longer relevant in the day and age we live in?

Dr. Elena Bennett: That's actually not a part of agriculture that I know that much about, so I don't want to categorically say there's a place or not a place in Canadian agriculture.

Mr. Ted Falk: Okay. You also talked about this phosphate that's waiting in a bucket up there for a flood or torrential rain. Are you familiar at all with tiling?

Dr. Elena Bennett: Yes.

Mr. Ted Falk: What are your thoughts on tiling?

Dr. Elena Bennett: Tiling, basically, is a system for delivering phosphorus straight to our waterways.

Mr. Ted Falk: That's in the absence of retention ponds on the particular property that's being tiled.

Dr. Elena Bennett: That's right, it's in the absence of retention ponds. Most of the soils work that I've done is in Quebec, and what I've seen there is that most of it's going pretty straight into drainage ditches. We need to do it in many areas when we have compacted soil and we have relatively wet, low-draining soils of the kind we have around here, but it is certainly delivering more nutrients to waterways.

Mr. Ted Falk: Okay. In comparing natural fertilizer, such as livestock waste, to artificial fertilizer, what are your thoughts there?

Dr. Elena Bennett: Well, there are a lot of differences in livestock fertilizer, depending on how we're applying that, when we're applying it, and what sorts of quantities we are talking about. Is it from grass-fed pasture beef, or are we talking about a feedlot system?

In the area around here, a lot of animal production is happening in feedlots, and the issue there is that there's more manure than we know what to do with. It's a great fertilizer, but we have more of it than we have land available to spread it on. It does reduce the amount of purchased fertilizer, but it can be problematic, especially if we're spreading in early spring or late winter, which can be quite damaging.

● (1625)

Mr. Ted Falk: I went to a reception probably three weeks ago, here in Parliament, and there was a soil scientist there. I asked him what he thought the biggest threat to our soils here in Canada was. What answer do you think he gave me?

Dr. Elena Bennett: I've no idea.

Mr. Ted Falk: What would be your answer?

Dr. Elena Bennett: What's the biggest threat to our soil? I might say it's loss of organic matter, but that's driven largely by my personal experience. What did he say?

Mr. Ted Falk: He said that wind erosion is our biggest threat to soil conservation, so I'm wondering if you've had any experience with shelterbelts and whether you have any advice for the committee on shelterbelting our farmland.

Dr. Elena Bennett: Sure. I've had less experience with shelterbelting, but one thing that has turned out to be quite beneficial, not only for wind erosion and rain erosion but also in just providing more services in general, has been to plant strips with native habitat—for example, native prairie. That can serve as a shelterbelt. It can serve as habitat for pollinators. It can reduce wind erosion, runoff, and water erosion. They're having quite a lot of success with that in the United States Midwest.

Mr. Ted Falk: Okay.

Dr. Elena Bennett: I imagine it would be similar here with shelterbelts.

Mr. Ted Falk: Okay. Thank you, Ms. Bennett.

Mr. Michaud, you've heard my questions. Do you have any comments on any of those questions?

Dr. Aubert Michaud: There was the question about mineral in manure. There may be two points out there.

First of all, there's the ratio. When we're dealing with organic manure, there's a lot of phosphorus out there. When we apply manure, we try to respond to nitrogen needs. The nitrogen-phosphorus ratio of the manure is lower than the crop needs, so we have a certain imbalance there. That's why I was commenting on those areas where we're getting very excessively phosphorus-rich soils. The interesting aspect would be to reduce that nitrogen-phosphorus ratio of manure through solid and liquid separation, especially for pig liquid manure. That's one aspect.

The other aspect, in fact, is that mineral fertilizer—phosphorus, for example—is applied at seeding, while most of the organic manure loadings are applied pre-seeding or in the fall, when it is subject to soil compaction and more prone to runoff. That's a big issue, I believe.

The Chair: Thank you, Mr. Michaud.

Thank you, Mr. Falk.

Mr. Ted Falk: Oh, that's it, eh?

The Chair: Yes, we're a bit over.

It was a very interesting conversation.

This wraps up our first hour. I want to thank Monsieur Michaud and Madame Bennett for taking the time to be with us today.

We will break to change the panel. We shall return in two minutes.

● (1625)

(Pause)

● (1635)

The Chair: Welcome again to our second hour as we study climate change and water and soil conservation.

We have, in person, from East Prince Agri-Environment Association, Jason Webster, vice-chair—welcome, Mr. Webster—and also Gordon McKenna, board member. Wayne Easter talks very highly of what you're doing on the island.

Also, by video conference, we have Sean Smukler, assistant professor, junior chair of agriculture and environment at the University of B.C.

We'll start with an opening statement, and I'll give either of you up to seven minutes. I don't know if you want to split it.

Mr. Gordon McKenna (Board Member, East Prince Agri-Environment Association): Thank you, honourable members.

As you said, my name is Gordon McKenna. I come from P.E.I. I'm a potato producer. Along with me is my colleague Jason Webster, who is also a potato producer.

The Chair: If I could interrupt you for a second, Mr. McKenna, you had a slide presentation. Unfortunately, it's in one language. If they want to look at the pictures, it's fine. It's okay.

Mr. Gordon McKenna: We were invited up here to tell you folks all about our East Prince Agri-Environment Association, which we formed about three years ago to build a more environmentally sustainable agriculture industry through evidence-based management practices that affect our environment.

We are 12 producers from the Prince County area of Prince Edward Island, and we're primarily potato producers. We're all located on the same rivershed. It's called the Dunk River watershed. We are there to share common interests in building a more environmentally and economically sustainable potato industry in that area.

How would we achieve this? We work with each other, researchers, government, industry, and the public to better understand how our agricultural practices are impacting the environment so we can make more informed management decisions.

Here's a picture of one of our many projects, working directly with the federal researchers. It is a willow tree project to mitigate greenhouse gases. It's very interesting.

Take it away, Jason.

Mr. Jason Webster (Vice-Chair, East Prince Agri-Environment Association): Currently we're working on eight different projects with researchers from AAFC on Prince Edward Island and in Fredericton, and also a couple of different Prince Edward Island agriculture department officers and a professor from NSAC.

With regard to climate change and its impact on P.E.I.'s agriculture industry, some of the things we're seeing are more heat units available to the crops. We're seeing somewhat of a lengthened growing season, a change in our precipitation patterns, and a bit of an increase in our frost-free period.

What does this mean for our industry?

We see a possible opportunity to grow different crops that we may not have otherwise been able to grow in P.E.I. If we can keep research funding going to AAFC and other affiliates, we could use it to research these other crops that might be available to us.

Climate change could potentially result in a higher yield for some of our crops, based on longer growing days, especially for potatoes.

As agriculture producers, we would benefit greatly from increased research into the new varieties of existing crops and new crops that could prosper on P.E.I.

Also on climate change, we're seeing extended dry periods. These extended dry periods are certainly putting our potato crops at risk of low yields and low quality.

We're also seeing less frost during the winter months, which is not totally a bad thing in some respects. On the other hand, frost helps with our pest management system. Without the deep frosts, we're seeing an increase in insect pest populations, we're seeing an increase in some soil diseases, and we're also seeing increases now in weed populations.

We're looking to continue working with AAFC and others on partnerships on new water management strategies that are required and on some new things we can use to help the crops against new or greater pest populations. We also want to deal with the new pests and we want to work on improving storage management strategies.

We need information and data to improve our decision-making on when to irrigate, how much water to apply, and where to apply it, etc. Gordon and I are two of the 80% of growers in our group who do irrigate currently. There's definitely a need for research in proper irrigation on Prince Edward Island. There are different soil types. There are different areas of P.E.I. where irrigation has worked better than in others. There are different types of irrigation that can be used. We see this as a real opportunity on P.E.I. to work with AAFC to move forward on the irrigation file.

One thing we had in our presentation, although I don't have it to put in front of you, is that in the past several years in P.E.I. we have seen basically a flatline in potato yield increases, while other regions of the U.S. and parts of Canada are seeing a steady increase in their yields. That's one of the reasons we have formed this group, and we're trying to work closely with the AAFC researchers and get their boots on the ground with us in the fields so that we can build a good relationship with them, build the trust, and hopefully, when we get to the end of projects together, find the positives and negatives and pass them on to our fellow growers. Hopefully, with that trust built, those research initiatives will be used for the industry.

Go ahead, Gordie.

● (1640)

Mr. Gordon McKenna: Jason's mentioned that with climate change on the rise, it brings more challenges in managing our pest program.

The Chair: Mr. McKenna, could you just go farther from the mike?

Mr. Gordon McKenna: Yes, there we go. Perfect.

Can you hear me better now?

The Chair: Really well, even at that distance.

Mr. Gordon McKenna: Excellent.

With climate change, in our pest management strategies it is becoming very much of a challenge to combat what I'm going to call an epidemic right now in Prince Edward Island to our potato industry. It is known as the wireworm.

One thing we all have to understand here is Bud the Spud is the breadwinner at home. The spud represents more than $1 billion worth of GDP to the Prince Edward Island economy annually, and wireworm is costing millions of dollars. We only have two tools in the tool box right now to manage wireworm; PMRA is looking at one of those right now, and it's not looking that promising. That will put the P.E.I. producers in a very vulnerable spot as far as managing this pest that came with climate change is concerned.

My ask to you is, through PMRA, to stay on top of the regulations and approval of the necessary management products and techniques required to deal with pests in an environmentally and economically viable way for producers.

The Chair: I'm going to have to end it here, Mr. McKenna. We're out of time, but you'll have a chance with the questions later on.

Mr. Gordon McKenna: Yes, I understand. Perfect.

The Chair: Now we'll go to the video conference and Professor Sean Smukler for seven minutes.

Dr. Sean Smukler (Assistant Professor, Junior Chair of Agriculture and Environment of the University of British Columbia, As an Individual): Thank you for the opportunity to speak with you all.

As mentioned, I'm an assistant professor. I'm the junior chair of agriculture and environment at UBC's faculty of land and food systems. I'm an agricultural ecologist. My role here is to help farmers reduce their impact on the environment but also to help reduce the environment's impact on agriculture. Specifically, my role is to help farmers with climate change adaptation.

I'm also the chair of the B.C. agricultural climate adaptation research network, ACARN. This is a network that comprises five universities in the province, industry, NGOs, and government organizations. The objective of this research network is to enhance B.C. agriculture's capacity to adapt to climate change.

My knowledge and experience are focused mainly on B.C., but I think some of what I'll say applies broadly to farmers across the country.

Here in B.C. we expect to see temperatures and precipitation increase. Increased temperatures could present a great opportunity for our growers here, as we would see increased numbers of growing degree days. The challenge, however, with increased precipitation is that we're expecting to see this on the important shoulder seasons: in the spring, when farmers are trying to get their fields ready for planting, and in the fall, when the farmers are trying to harvest. In case you don't know, when you put heavy equipment on saturated soils, you can potentially cause irreparable damage to that soil, impacting the productivity of the system and the long-term sustainability of the farm.

In terms of the projections for B.C., the models suggest that we could see increases of up to 12% to 15%, even by 2030, in terms of precipitation. If we were to capitalize on the increased growing degree days, we'd for sure need to do something about drainage.

The other important thing to note is that increased precipitation in the shoulder seasons is not necessarily good for our water dynamics in terms of the production season. With increased precipitation, we're actually expecting a reduced snowpack. The snowpack is where we store our water for use in irrigation in the summertime. As that resource is reduced, we may be turning to groundwater resources more frequently for irrigation. The problem is that we don't have a good handle on the status of our groundwater here in B.C., or on the changes to it. We also haven't planned well in terms of forward thinking in terms of other water resources.

I think you're also interested in hearing about soil, and that's what a lot of my research is focused on. It's clear that if we change our management of soil, we could help address some of these problems. We could also help to mitigate the impacts of climate change broadly. By increasing soil organic matter through a number of different management practices, we can potentially increase the water-holding capacity in the soil, improve soil structure, improve infiltration rates, and overall improve the resilience of our crops and our farming systems.

There are a number of well-known management practices that can increase soil organic matter. The challenge is in getting farmers to adopt these practices in the face of labour or other economic constraints. Some of these practices need to be incentivized in some way. Broadly across Canada, it's possible that we could substantially increase our soil organic matter on the 20% of our agricultural lands that are currently considered moderately to severely degraded and are not currently sequestering carbon.

● (1645)

Climate change is a huge challenge for agriculture, as it is for other sectors, but farmers are going to be some of the first and hardest hit. As we heard earlier, farmers are already recognizing that problem. They are recognizing the problem here in B.C. The major challenge is that this is a big, slow-moving beast, and it's hard to differentiate the challenges of fluctuations in weather patterns we have seen in the past with the ongoing and quite dramatic changes we're expecting to see.

We just held a workshop last week with a number of industry groups, and it's clear that they have a whole set of research priorities that are related to pest management, nutrient management, disease control, and managing for irrigation, but many of their research priorities are not consistent with what some of the long-term research priorities should be.

For us as researchers who are thinking about the long game, the challenge then becomes some of the more dramatic impacts that are going to happen with climate change. How do we get funding when we need industry to match it? Industry is clearly looking at the near term, and that's important, it's critical, but we also need to be playing the long game. How is it that we're going to do that research for projecting industry needs 10 or 30 years down the road if we need that industry match and they are focused on today?

What I ask of you all is to help think outside of the box. How do we get the funding into research so that we are ready for the big changes that are coming?

We also need to be thinking in ways that are going to address the complexity of this situation. Climate change is incredibly complex. We need to be thinking about the economics, the environmental problems, as well as the social issues that are involved, and we need to be thinking about some of the opportunities for our local farmers but at the same time consider the agricultural situation across the nation.

● (1650)

The Chair: Professor Smukler, I'm going to have to ask you to conclude, if you can, as we're running out of time. Please give a short conclusion. We'll have time to ask questions.

Dr. Sean Smukler: That was it. I just wanted to point out that the problems are both local and national, but we really need to be thinking internationally not only in terms of opportunities but also in terms of responsibilities.

The Chair: Thank you very much, Professor Smukler.

Now we'll start our question round.

Mr. Barlow, you have six minutes, please.

Mr. John Barlow: Thank you very much, Mr. Chair.

Oonce again I appreciate our witnesses' great information. It's always great to see young producers get together and come up with initiatives and projects like this one that you guys have taken on. It's really good to see that you're thinking outside the box, tackling some of the issues you face, and doing it together as a group, which is fantastic to see in the watershed that all of you share.

My riding is southwest Alberta, so I'm in the heart of cattle country, with a little bit of potatoes on the south end. Cavendish has just opened up there.

The one thing I'm glad you brought up is the issues with PMRA and imidacloprid, which I'm assuming is the one you were talking about when you were talking about wireworm. I know this has a huge impact on potatoes, but canola and pulse growers also use it in Alberta. I know the horticulture industry in Ontario relies on it a great deal.

I understand you guys as a group have about 20,000 acres. Can you talk about the impact that losing some of those tools would have on your industry? I think that's the message we need to get to PMRA. We're seeing, as I think a lot of my colleagues would agree, a discussion going on in silos. Health Canada and PMRA are not talking to the agriculture sector. They don't understand how the decisions they are going to make will impact our producers and our agriculture economy.

Can you talk about it, just so we can have it on the record? Do you have an idea of what the economic impact would be if you lost some of those tools that are in your tool box?

Mr. Gordon McKenna: That's a great question.

If we start losing more tools in our tool box to manage wireworm, it will be devastating.

Wireworm is a funny animal to manage. There are regions that aren't experiencing any problems yet, and there are other regions where production ground is almost non-existent. We're talking about an animal that doesn't just affect potatoes, as you commented, but we're the first ones to notice the blunt hit from it.

You can see ranges. I have crop insurance employment history, and I've seen dockages of up to 25% to 30% in crops. I believe you guys, Jason, suffered a 30-acre or 40-acre loss two years ago that exceeded a $120,000 value.

Mr. Jason Webster: We had a field basically go completely down to it. It was a variety that we were unaware that wireworm seemed to especially like. We've since used the protectants that are available to us now and we've been able to manage that. In our studies on our own operation, wireworm is just creeping into our area, but it's doubling every year. It's just like the old penny story.

● (1655)

Mr. John Barlow: It's like compound interest.

Mr. Jason Webster: Yes. The first year, it was a $2,000 cost to us. Now it's up to $16,000. If we don't manage that and hold it, it's just going to keep going. We're working with some of the AAFC scientists on management through other crops and whatnot, but we need both tools. The other crops that are hard on the wireworm don't do it all by themselves.

Mr. John Barlow: The other part that is sometimes overlooked is that having some of this new technology and this innovation has had a substantial impact on water and soil conservation. Were you to lose some of these fungicides and pesticides, you would likely have to go back to other chemicals that are certainly much more harmful and you would have to be spraying on the land much more than you are now. Is that not correct?

Mr. Gordon McKenna: Absolutely. There are chemicals out there that will kill the wireworm parent, the click beetle, on contact, but you are looking at insecticides being sprayed a lot more than they are now, significantly more.

The way we're managing it right now is an in-furrow process. It's safe. We are trained professionals in this field. It's regulatory that you do have to be certified and your employees have to be certified. We have legislative buffer zones. We abide by crop rotation acts. We abide by sensitive area acts and so on and so forth.

The problem I see with PMRA's decision-making process—I'm not 100% aware, but I know a bit about it—is that they'll look at it as a global spectrum. They have to start zeroing in on the actual locations where these pesticides are used and used the most, because there are reasons behind that. It may not have anything to do with what's going on in Saskatchewan, but it matters a lot in P.E.I., or vice versa.

Until there are other alternatives, I can't see how they can take that away from us.

Mr. John Barlow: You hit the nail on the head. We're decertifying them faster then we can find replacements. I think that is something we really have to focus on.

We had an opportunity to meet with the crop development centre at the University of Saskatchewan. They're on the other side; they're trying to come up with these new tools to help you, but they are taking so long to get to the CFIA process to be certified that we can't possibly replace one with the other. There's a real disconnect there in terms of helping our producers.

The Chair: Thank you, Mr. Barlow.

I just want to remind the committee that I know we've referred to wireworms being a factor of climate change, but I just want to make sure that we stay focused on the subject. I know you made the link and I appreciate that. This is just to remind us that this is about climate change and soil conservation, but I know the link was made.

Mr. John Barlow: I was just trying to say which product is harmful and which is no problem.

The Chair: Go ahead, Mr. Peschisolido, for six minutes.

Mr. Joe Peschisolido (Steveston—Richmond East, Lib.): Mr. Chair, thank you.

I'd like to thank Mr. McKenna, Mr. Webster, and Professor Smukler for joining us today as witnesses at committee .

Since I'm blessed to be the member of Parliament for Steveston—Richmond East in B.C., I'll begin my questioning with Professor Smuckler.

You talked about climate change and the need to simultaneously mitigate but also adapt to some of the changes. You also talked about the distinction between near term and long term and the need to think outside the box.

Professor Smuckler, can you talk a bit about your thinking outside the box?

Dr. Sean Smukler: Yes. Thinking outside the box means thinking about the various scenarios we might be looking at.

You know that climate change is a problem already in our region, but we will be facing intersecting issues in the future, such as development. In coming up with solutions, in anticipating the problems, if we don't do so within the greater context of the complex issues we're likely to be facing, we might not come up with the right solutions.

For example, I work on drainage in Delta, and one of the biggest hurdles for making such a major investment in infrastructure there is that while we know the technology works, we don't know what level of investment is going to pay off. In the context of land prices and in the situation of many of the farmers we work not owning their land, they're unlikely to make those investments. On the other side of the coin, we have some of the highest-valued real estate in Canada, and if those farmers are not successful on that land, I think we're going to be making some wrong choices in the way we manage that land going forward.

● (1700)

Mr. Joe Peschisolido: You identified some factors that would usually be beyond the scope of non-traditional agricultural factors. You talked about land. Can you elaborate a little on that in two ways: the factors you would include, and also elaborate a little on factors like foreign investment?

Dr. Sean Smukler: We've done some projections on local food security in the region, and the factors that we need to be considering are the way climate change is going to impact places like California and the changes in the market across....

We now live in a completely globalized food system. We need to anticipate those changes in a way that's going to benefit our local producers. On one side we have a great opportunity to enhance our local agricultural production, and on the other side we have these increasing pressures of real estate and the challenge of making major investments to stay relevant and successful. We have this confluence of challenges that are both near term and long term, so in coming up with solutions, we need to be thinking about those long-term scenarios and anticipating them.

Mr. Joe Peschisolido: Professor, have you looked at the different regional approaches?

For example, you talked about Delta. Farming in Delta, Richmond, Surrey, or Pitt Meadows would be different, and it would be different from farming in the Peace River Valley. Can you elaborate a little on whether you have looked at a regional approach for the province of B.C.?

Dr. Sean Smukler: Yes. Our regional approach included the entire Lower Mainland when we did our analysis, and it's clear that we can meet many of the local needs for food. Certainly if we expand our region to places like the Peace, we can include a greater diversity of opportunities. The challenge just becomes how we make that system efficient.

The workshop we held last week was focused on the fact that places like the Peace don't have the support they need in research and development for their agriculture. All our efforts are now completely focused on the Lower Mainland.

Mr. Joe Peschisolido: Professor, thank you.

Mr. McKenna, you talked about eight different projects your group is looking at. Can you talk a little about some of the projects you think are, if not more important, projects that you would like to emphasize?

Mr. Gordon McKenna: Sure. Right now we're focusing on soil health and ways to improve organic matter, as he spoke about, and we're working with crops that offer a fumigant benefit to combat...I don't want to be in trouble with the wireworm again.

It came in because we're seeing longer growing periods with no frost. That's including your mustards and your different cropping mixtures and so on and so forth. That probably would be priority number one.

It's doing more than just improving soil health; it's about managing our nitrates properly so they're not getting into our watersheds, and it's also about controlling soil erosion.

● (1705)

The Chair: Thank you, Mr. McKenna. We'll move on.

[*Translation*]

Ms. Brosseau, you have six minutes.

[*English*]

Ms. Ruth Ellen Brosseau: Thank you, Chair, and I'd like to thank the witnesses for their expertise and their help with this study we're doing at the agriculture committee.

From what I understand, 12 farmers got together and formed this group in 2015. You recently received about $900 million...it wasn't $900 million.

Mr. Gordon McKenna: It was $900,000.

A voice: We'll take that, though. That would be good.

Voices: Oh, oh!

Ms. Ruth Ellen Brosseau: Okay. Sorry, but wouldn't that would be great? Wouldn't we love that?

How long will this project last? Can you go into details about it? I want to understand it better. I'm sorry that we couldn't have access to your slides, but all materials have to be bilingual.

Mr. Gordon McKenna: Would you like to answer that, Jason, or Andrea?

Mr. Jason Webster: I don't know if the committee will allow it, but we have our project manager with us here in the crowd. She could answer that question better than either of us, but I don't know if that's.... We can answer it too, if you want.

The Chair: Do we all consent? Yes? Okay, sure.

Mr. Jason Webster: Andrea, would you come up for a second to answer this question?

Ms. Ruth Ellen Brosseau: Thank you, Andrea.

Mrs. Andrea McKenna (Manager, East Prince Agri-Environment Association): Thank you very much.

We received just a little under a million dollars to do a greenhouse gas mitigation project. We're planting willow trees not in but near the buffer zones on our farms. That's to do two things.

One is to sequester the carbon in the soil. We're working with a professor from Dalhousie University and we'll be hiring two master's students who will look at the greenhouse gas emissions from the trees and do measurements on the sequestration of the carbons in the soil.

We're also using this as an agroforestry best management practice. It's fairly easy. The willow trees are easy to plant, and they grow fast. With that fast growth, they're cut every three years. After they're cut, they grow back even more rapidly. They create more habitat within the fields for wildlife species.

We were pushing this project because we see a lot of environmental benefits, and it's also a very easy and cheap practice that can be adopted by the farmers. With this project, we're working on 12 different sites across the province. We have 12 sites planted. The testing and the research will be going on over five years for this particular project.

What we're hoping for at the end of this project is that we will have demonstrated to farmers that this is a very easy thing for them to do within their grassland areas. These are areas that have already been taken out of production, so they're not taking anything away from their existing crop production areas. Also, willow trees are easy to plant and easy to manage.

One of our researchers who we work really closely with on two other projects has just made a proposal to extend that project to look at the biomass. You're cutting the trees every three years, and he's looking at applying that biomass back to the potato fields to combat disease and build organic matter in the soils. Right now, he has proposed that research for five to 10 years as an extension of this project.

We're hoping that at the end of the day there's an agroforestry best management practice that will be easily adopted by most of our potato producers across the island and elsewhere.

An hon. member: How long is this...?

Mrs. Andrea McKenna: It's a five-year project right now.

Ms. Ruth Ellen Brosseau: That's amazing. I'm very happy that you were able to come and help explain what the project is.

Is willow being used more in P.E.I., or is it being used in...?

Mrs. Andrea McKenna: No. Actually, there's a lot of work like we're doing in Manitoba.

Ms. Ruth Ellen Brosseau: In Manitoba?

Mrs. Andrea McKenna: Yes, and one of the specialists we worked with when we were developing this project was Bill Schroeder, who did a lot of research. He used to work with AAFC and has since retired. He was in Manitoba, right?

A voice: Yes.

Ms. Ruth Ellen Brosseau: That's perfect.

In the last meeting we had on our study on climate change and soil, we had witnesses who talked a lot about what was being done in the States for agroforestry and about having a five-year plan. I think it ended last year.

Would you be of the same...?

[*Translation*]

Would you agree?

[*English*]

I'm thinking in French. I'm really tired.

Would you agree that we would need a national strategy to incentivize farmers to invest more in agroforestry and to do what is being done in the other countries that are our major trading partners?

● (1710)

Mrs. Andrea McKenna: Yes, definitely. We had discussions yesterday at the U.S. embassy and we were talking about just that. If there are incentives provided to our competitors in the U.S., we'd like to see the same here.

As producers, these 12 farmers came together to talk among themselves about how they wanted to lessen their footprint on the environment for the sake of their own farms and future generations. They're all younger producers with young families, and they're quite concerned about the future and about public perception. Their willingness to adopt these practices is unique, so I think there would need to be some incentive to encourage the rest of the industry and the rest of Canada to do this.

I'd like to see more research projects that are focused like ours and would prove that there's an easy thing you can do. That encourages the willingness, and then the incentives on top of it I think would put it over the top.

The Chair: Thank you so much, Andrea, for your intervention.

[*Translation*]

Thank you, Ms. Brosseau.

[*English*]

Go ahead, Mr. Longfield, for six minutes.

Mr. Lloyd Longfield (Guelph, Lib.): Thank you, Chair, and thank you to the witnesses.

Andrea, join the table. It's great to have you here.

I was really interested in the five-year project. I read online about the environmental impact of willow—Minister MacAulay was there to make the announcement—and trying to sequester carbon faster during the growth cycle of the willow, and then getting rid of the willow and getting more carbon.

I know that every province and territory has its own climate change mitigation pricing systems. Have you looked at the economic impact of sequestering carbon? Are you able to get credits from the P.E.I. government on any of that?

A voice: No.

Mr. Jason Webster: I don't think that's quite been decided yet on P.E.I.

Mrs. Andrea McKenna: Not yet, but it's something we've proposed. We've said that we'd like to work towards that with our provincial government so that we would be able to have credits for sequestering, but of course we need to find a way of measuring it. That's one of the things our students will be working on.

Mr. Lloyd Longfield: I know that the University of Guelph has been working on the island as well, and one of our witnesses in our last committee meeting talked about poplar. Poplar and willow are two very similar species.

Mrs. Andrea McKenna: Yes.

Mr. Lloyd Longfield: I'm from Manitoba. I know they're everywhere; they're weeds.

Are you also doing anything around riparian zones, such as planting trees around streams, or is this being done just on the fields that you're working on? Would you connect with Guelph? That's more my question, I guess. Do you work with research centres across Canada?

Mrs. Andrea McKenna: We'd like to.

Mr. Jason Webster: We'd like to. Right now, we're working with AAFC in Charlottetown. We're working with the AC branch of Dalhousie University in Truro, and with a couple of the scientists at AAFC in Fredericton on various other projects.

You asked about where we put the willows. We have one of these willow projects on our own farm. We're putting them at the bottom of sloped land that's coming close to a watershed. The idea is that willows love nitrogen and just gather it up, so we're hoping they will pull that out and lower the numbers in the streams. We're going to measure that as we go.

Mr. Lloyd Longfield: Right, and you'll stop erosion at the same time.

Mr. Jason Webster: Yes, it helps with erosion, and it's a natural filter before anything hits the surface water.

Mr. Lloyd Longfield: Beautiful. Thank you.

To go over to the next coast, the west coast, I'm interested, Professor Smukler, in the same kind of question. The British Columbia government has had its carbon pricing programs in place a little bit longer. Is the economic benefit of sequestering carbon or managing the carbon cycle in the soil also part of your study?

Dr. Sean Smukler: Yes, and the economics are key, but they're not actually part of what I do. I study the biophysical components of sequestration in the soil. One of the major challenges, as was mentioned, is accurately measuring the rate of sequestration. I think that's key to the economics.

Mr. Lloyd Longfield: You mentioned 20% of land being at risk in terms of soil degradation. Is there an action plan that's being developed for that? Is that something the federal government needs to be involved with?

Dr. Sean Smukler: I would hope so. I think that's a real opportunity for Canada as a whole to address some of its mitigation targets.

● (1715)

Mr. Lloyd Longfield: I read your bio before the meeting. Coming from Berkeley, after working in the States, do you think there are best practices from the States that we can be drawing from? We heard at the last meeting about the forest management incentive programs. Are there other things that you've seen, in terms of water conservation in California, that we might be able to learn from in Canada?

Dr. Sean Smukler: At some point we might be in the same situation, or a similar situation, as California, but that's a long way off. Yes, there are practices in California that we could learn from, but I think California has a lot to learn first. They probably should look to Israel to figure out how to manage their water.

Mr. Lloyd Longfield: Yes, they have the drip processes in Israel. They've done some unique things around recovery of water in systems for irrigation. In terms of our study, should we recommend to the government to watch for best practices and maybe look to Israel?

Dr. Sean Smukler: That would be a good place to start.

Mr. Lloyd Longfield: I think they're already doing it.

Dr. Sean Smukler: They're doing it. They're the masters of that.

Mr. Lloyd Longfield: Staying on your topic, looking at the relationship between agriculture and ecosystems, we've heard a bit of testimony around the Prairie Farm Rehabilitation Act and the Prairie Farm Rehabilitation Administration on the Prairies. Having some type of governance group that would help Prince Edward Island or British Columbia....

Does AAFC have a go-to group that either one of your groups would be working with in terms of the topic we are studying, or is this something that we need to recommend to the government, to set up a cross-provincial governance group as an opportunity?

Dr. Sean Smukler: It sounds like a great idea. I don't know of one.

Mr. Lloyd Longfield: You're not aware of one.

Dr. Sean Smukler: No.

Mr. Lloyd Longfield: How about you guys from P.E.I.?

Mr. Gordon McKenna: We work with six or seven different researchers, so there are a lot of different ongoing projects, but I don't recall any specialized individual who would zero in on just one topic.

Mr. Jason Webster: We do have one individual in our province, Scott Anderson, who is tasked with starting to make the bridge and has worked closely with our group in bridging us back and forth with the researchers, but there's no official thing. That's official, I guess, but....

Mr. Lloyd Longfield: Sure.

The Chair: Thank you, Mr. Webster. Thank you, Mr. Longfield.

[*Translation*]

Mr. Drouin, you have six minutes.

Mr. Francis Drouin: Thank you, Mr. Chair

[*English*]

Thank you to the witnesses for being here. I really appreciate hearing first-hand the issues, particularly those affecting you guys up there in P.E.I.

You mentioned the willow project you're participating in. Have you guys adopted precision farming in P.E.I. as well, or is that something you're looking to? Perhaps you guys are aware of this, but are your other members aware of precision farming? Are they adopting those practices?

Mr. Gordon McKenna: Absolutely. The margins, especially in P.E.I. potato growing, are getting squeezed more and more, and the costs of production are increasing annually. I truly feel that P.E.I. potato producers probably led the pathway for agriculture in Canada in the precision ag area. We are specializing now in grid soil sampling. We're pushing that. There are likely 15,000 to 20,000 acres on Prince Edward Island that are under grid sampling today, and it's all potato, basically.

We are hoping to push that envelope even further and get the livestock guys and other commodity growers on board with precision farming.

Mr. Francis Drouin: Okay, great.

Go ahead.

Mr. Jason Webster: Maybe I'm not supposed to ask you questions, but when you talk about precision farming, are you talking about variable rate and stuff like that, or are you talking about GPS technologies and whatnot?

Mr. Francis Drouin: I think it's all of it combined. I think it's something that we've heard about. It's out there, but I haven't been convinced that it's been adopted on a grand scale. Again, part of it is a trust issue and cutting costs and the bottom line. John and I had a chat about this, but sometimes it's a battle between the son and the father or the father and the son. I have it at home as well. I used to have it with my father about VHS versus DVD at the time. It can be as simple as that—

A voice: Beta.

Mr. Francis Drouin: Yes, Betamax. That's right.

It was just the example that I use often and over and over again. It was just a matter of having that trust and paying in order to get that soil test done right away, and then they would know whether or not they should apply fertilizer across the field.

We hear a lot out there and we'll blame the fertilizer industry for not doing enough, but they are promoting the safe use of fertilizer, and precision farming jumps into that, applying fertilizer at the right time at the right place, and just on rows, as opposed to the whole field. I think that's where the value can be.

Obviously, from our committee's perspective, we can help incentivize and promote that education piece to farmers. That's something I would like to get your opinion on as well.

● (1720)

Mr. Jason Webster: The more of that, the better, of course. As far as GPS is concerned within the potato industry, it's been taken on. We had the first auto-steer tractor, I think it was in 2004, on Prince Edward Island, in our operation. I went through everything you're talking about. I had all the neighbours telling me, “You just can't drive a planter. That's why you had to get that”, and blah, blah, blah.

Voices: Oh, oh!

Mr. Jason Webster: Anyway, today I think I know of only two or three potato farms in P.E.I. that don't have a complete auto-steer system on their planting operation. We're really pleased to see that the growers, in general, have adopted that, but I think there are more steps to be made in incentivizing the variable-rate fertilizing and liming, and the precision agriculture piece.

Gordon here has just got a soil sampler, and he can speak to it. It's a soil sampler that hauls behind the tractor that makes that system a lot more efficient. A lot of members of our group have hooked on and are using that as well. It's our first year of getting into precision agriculture in a bigger way.

Mr. Gordon McKenna: Our vision of precision farming is going to start with mastering the soil sampling side of things first.

As Jason alluded to, I invested in a very expensive machine from southern Illinois, and it covers 100 acres in less than an hour. I can pull 4,200 soil plugs. The problem with grid sampling is it's so labour-intensive and it totally relies on the human, and there could be human error. If you're talking about soil science, you're talking about depth inconsistencies and so on and so forth, so that's why I looked for this machine.

We're going to start with soil sampling and move into nutrient management.

I just got back from a trip to a fertilizer company in Great Britain three days ago, and they were emphasizing different kinds of nitrogens. Some work differently under different temperatures. There's no better fit with what we're talking about now: we have to pay attention to our soil temperatures more.

We're starting to apply fertilizers throughout the season, not just giving one bang in the row in May or June and hoping for the best. I think we have to look at that more. I think we have to learn our nutrients and the characteristics of them with climate change and temperatures and so on.

Then we're going to take this grid sampling and nutrient management and introduce drone imagery to potato production in Prince Edward Island. To take it a step further, we are investing in yield maps on our harvesters. Basically, you can imagine taking all the guesswork out of your yield and where it came from. You can zero in on the exact location in that field and why it overproduced or underproduced.

The Chair: With that, we're going to have to go to Mr. Barlow for six minutes.

Mr. John Barlow: Thank you very much, Mr. Chair. This has been a great discussion with great information.

I'm going to try to go through this as quickly as I can.

With all due respect to our wonderful chair, I want to mention that when we talked about the wireworms, you did mention that some of these pests have come forward because of climate change.

A voice: Absolutely.

Mr. John Barlow: If this is something that we're going to see more of, we have to ensure we have the tools to address some of those things. I just want to make sure you know that I'm not trying to mess around.

With that, too, Mr. Webster, and for my colleague Mr. Drouin as well, I want to make sure that you don't tell my wife that we're not working very hard when we have auto-steer combines and those things, because after harvest this fall I want to make sure she knows how hard I worked.

Voices: Oh, oh!

● (1725)

Mr. Jason Webster: You can explain to her now that you can watch the machine so closely that you're just glued to it, and that's the truth, actually, with the potato machine. I end up looking behind me most of the day, right? I can watch the machine so closely and keep an eye on what's going on. It's great, for sure, but you were asking about incentives.

For the steps that Gordon was just mentioning, please, we do need incentives in order to get the growers hooked onto that. They've hooked onto all the auto-steer stuff. The next step that can really help the industry in our area is what Gordon was just talking about with the precision agriculture.

Mr. John Barlow: The question I want to ask is a broader question. We've heard from many of our witnesses about how difficult it is to get some of these new innovations and new technologies into the hands of farmers—we joke a bit about it—and not only to get these into their hands but to get them to use them. You've talked a bit about drones. I know that we're using drones to check areas, and there are areas where I don't even have to use fertilizer anymore because they show that this area has been this good. The drones are that specific.

What did you guys do to get your group up and running initially? Was it a difficult discussion among your 12 to try to do something a little differently? For us, what's the message that maybe we can pass on about what works?

Can you can do it quickly? I have one more question for Mr. Smukler.

Mr. Jason Webster: There was a recognized need, I guess. I have to give our coordinator, Mr. John Phillips, who is sitting behind us here, a lot of credit. He got initiated by the minister of agriculture at the time to look into getting some growers together. He's a local guy and grew up on a farm himself. He went around to see all of us and started talking to like-minded growers. Every time he went to another place, he'd ask for suggestions for other names of people who would be good to have sitting around the table.

It's so key not to have the group too big and to have a group of people who you know are going to share, if you know what I mean. There's nothing worse than sitting around a table with two or three guys who you know are taking all your information but aren't going to share it. Then everybody starts to clam up. It was very important to try to work through that part and to make it very up front with everybody involved to start with. So far, we've been doing well with that.

Mr. John Barlow: Thanks. That's much appreciated.

Mr. Smukler, I have a question for you. At the end of your testimony, you were talking a bit about the importance of building those bridges between industry and research. We have certainly heard from some other witnesses about that dreaded “valley of death” in getting some of that innovation from the researchers—what you're doing—to industry and to farmers. Do you have some recommendations for us on how we can help build some of those bridges?

Dr. Sean Smukler: There's certainly a gap in terms of personnel. For those of us who are tasked with doing the research, it's very challenging for us to do the effective research we're working on without that bridge to the producer. Where I come from in California, there is an extensive extension program that bridges from researcher to producer. The extensionist spends a lot of time just building trust with the producer and then becomes a conduit for that knowledge transfer, and in both directions, so that the researcher is prioritizing what's important for industry and the knowledge transfer for the research to the producer.

Mrs. Andrea McKenna: Could I comment?

Mr. John Barlow: Sure. Go ahead, Andrea.

Mrs. Andrea McKenna: I need to say that our group has been extremely successful because our bridge is sitting right here. On a very personal basis, he has gotten to know each and every researcher at AAFC as well as he knows each of the farmers in our group and what their needs are. Many times he has physically taken the researchers directly to the field, and the researchers and the producers now have these wonderful trusting relationships, working together and sharing information, and now they're drafting the parameters for the research projects based on exactly what needs to happen in the field.

The researcher is coming back and talking about the results, and the farmers are sitting around the table talking about the results to their peers, and it is sinking in. They're saying, “Okay, a researcher was doing this on my field, and this is what worked, this is what didn't work, and this is what we've changed going forward.” They're talking directly to their peers, who are saying, “Okay, I'm going to try that.” The adoption of the best management practices is happening because it's working. We're working collaboratively. We have the trusting relationships. We have the two-way communication with the researchers and the producers.

I know we're a unique group because of that, but we want to keep expanding and working with more researchers. As I said, our bridge is sitting here, and we need more bridges to make sure that can happen with more producers.

● (1730)

Mr. John Barlow: Thank you very much. I appreciate it.

The Chair: That's the end of our second hour. I really want to thank you. It was a very useful conversation from both coasts. You did a great job, and thank you for taking the time with us today.

I'd also like to thank the committee members and wish them a merry Christmas and happy new year, happy holidays, whatever works.

Do take the time with your families. Do take the time to recharge, and we shall certainly come back all re-energized.

Thank you very much. It has been a pleasure.

Mr. Jason Webster: Mr. Chair, we got cut short at the end. We didn't get to say thank you either.

Thank you very much for the opportunity to come on up and sit in front of you. It's been great. Hopefully we can work together with the relationships we've built even with some of you guys as we go forward. Thank you very much.

The Chair: We appreciate it.

Mr. John Barlow: Mr. Chair, just really quickly, because they weren't allowed to submit their submission, if they can translate it, can it be submitted later on?

The Chair: We can do that, yes. We have a copy here, so we'll translate it and submit it.

Mr. John Barlow: Perfect.

The Chair: Thank you, and have a great flight back.

The meeting is adjourned.