HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Standing Committee on Agriculture and Agri-Food

AGRI • NUMBER 084 • 1st SESSION • 42nd PARLIAMENT

EVIDENCE

Thursday, December 7, 2017

Chair

Mr. Pat Finnigan

Standing Committee on Agriculture and Agri-Food

Thursday, December 7, 2017

● (1530)

[*Translation*]

The Chair (Mr. Pat Finnigan (Miramichi—Grand Lake, Lib.)): Good afternoon.

[*English*]

I call the meeting to order.

Welcome, everyone, to our meeting on a very popular subject: climate change and water and soil conservation issues.

I wish to welcome Pierre Desrochers, associate professor of geography at the University of Toronto, and Mr. Naresh Thevathasan.

Welcome to both of you. Thank you for your presentations to our committee today. You have up to seven minutes for opening statements.

Go ahead, Mr. Thevathasan.

Professor Naresh Thevathasan (Associate Professor, School of Environmental Sciences, University of Guelph, As an Individual): Honourable members of the Standing Committee on Agriculture and Agri-Food, my name is Naresh Thevathasan. I'm an associate professor and leader of the agroforestry research and development and woody biomass research initiative at the University of Guelph.

I would like the thank the standing committee honourable members for the invitation extended to me to make this presentation today. I would also like to take this opportunity to thank the Minister of Agriculture and Agri-Food, the Honourable Lawrence MacAulay, for his vision and leadership in the agricultural sector, especially with respect to the implementation of the agricultural greenhouse gases program.

Agroforestry is a globally recommended land use system where trees are deliberately integrated into agricultural ecosystems in order to derive environmental, economic, ecological, and social benefits. However, its impact on climate change mitigation and adaptation in Canadian agriculture systems has not yet been fully realized. This is irrespective of the Canadian government's commitment to research in temperate agroforestry through the agricultural greenhouse gases program.

If you exclude classes 1 and 2 agriculture lands, and if you integrate trees into classes 3 to 6 agriculture lands, we are blessed with about 46 million hectares in Canada. Integrating trees in those lands could significantly increase the terrestrial carbon sequestration potential for Canada.

In this context of introducing trees into the agriculture landscape, I would like to recommend three temperate agroforestry land use systems to this committee. I will quickly present some visual representations of these land use systems in order to enhance understanding of what types of land use systems I'm talking about. I will not describe the photographs, but when I mention the names of the land use systems, I will quickly flip through the photos that I brought.

The first land use system is a tree-based intercropping system. The second one is a riparian buffer system. This shot was taken in P.E.I. The third land use system is the windbreak system, commonly seen in the Prairies. The fourth land use system is the silvopastoral system, and I can assure the committee that these cows are not tied to the trees. They are resting. In peak summer months, they get heat stress, and therefore they look for shade. The fifth system is a biomass production system, or bio-energy. The sixth land use system is the forest farming system, where you integrate economic crops into the woodlots.

Here are some of the overall research findings. Irrespective of the type of agroforestry land use system, all can contribute toward climate change mitigation and adaptation while providing ecosystem services. Agroforestry land use systems are not a choice between environment and economics, as they enhance both. Agroforestry systems are not a choice between food versus fibre. If properly integrated into agricultural systems, they provide both. Therefore, I have listed some of the major outcomes, both economic and environmental, that can be derived by adopting these land use systems in Canadian agricultural landscapes.

First, the photographs that I showed, irrespective of the type, all enhance system-level carbon sequestration. If you compare with a conventional agricultural system, they can sequester between 200% and 300% more carbon.

Second, they provide better utilization of the soil nutrients via nutrient cycling mechanisms that result in less residual inorganic soil nitrogen, which is a precursor for nitrous oxide emissions from the agricultural landscape.

Third, they help with nutrient leaching reduction, which contributes towards maintaining water quality.

Fourth, they all enhance biodiversity.

Fifth, they can create climate-smart and resilient land use systems, thereby increasing economic returns to farming communities across Canada.

Globally, the Intergovernmental Panel on Climate Change and the recent COP22 conference, held in Morocco in November 2016, highly recommended agroforestry land use systems to be adopted in developing countries in order to promote climate-smart agricultural systems, while contributing to climate mitigation efforts by sequestering carbon both in trees and in soils. The same sentiment has also been echoed by the Food and Agriculture Organization in its policy paper released in 2013.

● (1535)

With regard to the challenges and opportunities for Canada, it has no specific and targeted policy in place for agroforestry land use systems. As such, agroforestry adoption rates in Canada, irrespective of the government's commitment to research in temperate agroforestry, are low. In the United States, there is a targeted policy put in place by the United States Department of Agriculture. The policy is an agroforestry strategic framework, and is called "Enriching our Lives With Trees That Work".

As I speak, field shelterbelts or windbreaks are being removed in the Prairies. Field windbreaks have become a farm operational issue, and, in some cases, trees in the windbreaks are also dying. This trend needs to be addressed with urgency. There is a lack of riparian plantings along the agricultural streams across Canada, especially in eastern Canada, where heavy non-point sources of pollutants and soils are entering the water bodies.

Tree-based farming systems are historically familiar to many first nations communities. Therefore, a concerted effort should be taken to initiate dialogue with them in order to reintroduce agroforestry land use systems on first nations lands to bring about food and income security for them.

Introduction of silvopastoral systems in the developing agricultural lands of the clay belt regions of Ontario and Quebec should be given urgency to enhance terrestrial carbon sequestration.

I would like to leave some recommendations with the standing committee.

Number one is that a Canadian agroforestry strategic framework policy is required. This should be led by the federal government in consultation with researchers across Canada, federal and provincial government officials, first nations communities, conservation authorities, and landowners. This document is required to provide the strategic guidance for science, adoption, and integration of agroforestry practice into agricultural landscapes.

Federal leadership in agroforestry is required, such as that provided by the former Agriculture and Agri-Food Canada's agroforestry development centre at Indian Head, Saskatchewan.

Programs that promote the integration of trees into agricultural landscapes are needed if Canadians wish to economically and environmentally benefit.

Finally, appropriate agroforestry education, research, training, and knowledge transfer protocols should be developed to promote sustainable agroforestry systems in Canada.

Thank you once again for the invitation and for the opportunity to make this presentation.

The Chair: Thank you, Mr. Thevathasan.

Now we'll go to Monsieur Desrochers.

Dr. Pierre Desrochers (Associate Professor, Geography Department, University of Toronto, As an Individual): Thank you very much for the invitation. Again, my name is Pierre Desrochers. I'm an associate professor of geography at the University of Toronto, Mississauga. The remarks I prepared for you were co-produced with my colleague Joanna Szurmak, who is an electrical engineer and information specialist by training. I did send you images but I cannot unfortunately display them on the screens today, so I hope you have the images with you. With apologies to the translators, I will describe my talk around the images rather than follow the script that I sent you.

Obviously there are three points that I want to address. The first is climate change, considered in broad, historic terms, and then soil and water conservation.

If you look at the third image, you see that the point I want to make should be an obvious one. It is that climate has always changed. Whenever we go back in the geological record, we see that climate has changed in the recent past. Obviously, if we had tried to schedule this meeting here 20,000 years ago, which is really a blip in terms of geological time, we would have had a minor problem as we would have had to deal with a glacier that was nearly two kilometres thick. Again, that's only 20,000 years ago; that's nothing.

Because climate changes all the time, the next image shows you that climate change is a consideration for every generation. I have some quotes from *The New York Times*. In 1895, people thought that another glacial period was about to begin. In 1952, it was a "Next Great Deluge" because the ice cap was going to melt. Then in 1959, we have "Rising World Heat". In 1974, the "Ocean Will Soon Be an Open Sea". Again, climate changes all the time and every generation rediscovers the problem.

If you go back to the past, you used to throw virgins into volcanoes or else you would burn more witches as the climate was changing. People have always blamed themselves for climate change, but a few things to keep in mind in the context of this committee is that if you look at the majority of models that have been made in the recent past, they all tend to predict favourable outcomes for Canada. That's because obviously more heat and more CO2 will benefit most growing regions in the country. In terms of formulating policy, I believe this is a general consideration that we should keep in mind.

The next image is about the increase of corn yields historically. The point I want to make is that it doesn't matter what the climactic change trend is. As long as you have economic development, agriculture tends to prosper. You can see that you got very few bushels per acre when Europeans showed up in North America, but then, whether you had cooling or warming trends, yield tended to increase. You can see the big spike, the sort of hockey stick. The blade begins really with the development of hybrid corn in the 1920s, and it goes up whether the climate is warming or cooling.

One thing that people tend to forget today is that there was actually a cooling trend between 1945 and 1975, roughly, which is why people used to worry about global cooling in the 1970s. If we were to stretch that line today, we're at roughly, these last few years, about 160 bushels per acre in terms of corn, so again warming or cooling, agriculture tends to become more productive.

What we observe also for agricultural production is that we produce more and more food on less and less land. These are American data, but you could see similar results, perhaps not as spectacular but the same trend, in most countries. You can see that corn production has been going through the roof these last few years, but the amount of land used to produce it has decreased overall. Again, warming or cooling, we produce a lot more food on a lot less land.

Just so that you don't believe that I'm making up data, I have again this cute little graph from the Food and Agriculture Organization of the United Nations that shows that in agriculture, as in every business, it always makes sense to do more with less. Whatever line of agricultural work you look at, you produce more outputs using less inputs. You don't need any government policy to do that. You just need old-fashioned competition where people have an incentive, again, to use their inputs as efficiently as possible.

The key point I want to make in the committee is that many people have declared a war on carbon fuel and petroleum products today and we view only their negative effect. But none of these advances would have been possible without a heavy diet of carbon fuels to power the engines that make this progress possible or else petroleum products, everything from plastics to seed coating to irrigation systems. Petroleum products were absolutely essential in achieving those results.

● (1540)

The longer document deals with this issue in more detail than the little summary that you might have, but historically, climate change has not really been a problem for farmers. The problem is singular weather events. Again, you have pictures of drought, frost, and floods. This is historically what really has been problematic for agricultural production, and this is why, throughout human history, you've had famine and malnutrition everywhere, either in the tropics or in temperate regions. It was only long-distance transportation, meaning at first steamships and railroads, that put an end to famine, at least for the advanced parts of our planet, as the surplus of regions that had good years could be shipped economically and in large enough quantities to regions that had bad years.

Again, we take our agricultural system for granted. Today, we don't worry about famine and malnutrition, but again, this would not have been achieved without carbon fuels, and trying to go cold turkey without modern technologies would obviously be a problem.

Another thing that we should keep in mind is that farmers have to adapt all the time, climate change or not, and I would argue that, in the grander scheme of things, climate change is a minor consideration compared with economic considerations. For example, there has been a lot of adaptation in the tobacco belt in Ontario, because people smoke less tobacco than in the past, but you might have diseases or you might have competitors emerging in other regions.

I know that some of you are from out west, so pulse production in this country is a nice success story. It's an opportunity that emerged and proved better than other alternatives. Again, just for economic reasons, or perhaps because you're dealing with pests or better competitors, as a farmer, you have to adapt all the time, and climate change in that context, in terms of adaptation, I believe, is a minor consideration.

The next image is about ethanol. Before creating new policies, I would suggest that we consider repealing bad ones, and I believe that a lot of things that have been put forward in the name of fighting climate change—

● (1545)

The Chair: Mr. Desrochers, could you speed up, because we're already seven and a half minutes?

Dr. Pierre Desrochers: Are we?

The Chair: It's very interesting to me, but—

Dr. Pierre Desrochers: Okay, I apologize for that. That's not what my stopwatch is telling me. Oh, it is.

The Chair: I'll cut you a bit of time.

Dr. Pierre Desrochers: Fair enough. I'll be quick.

Soil degradation has been a concern since the beginning of farming. This was the climate change issue of the 1920s, with everybody bothered about that. What has happened in the last few decades is that forests have made a huge comeback in advanced economies, and the key issue here is that people have replaced resources produced from the surface of the land with resources that came from underneath. Because of petroleum products, we've seen the abandonment of marginal agricultural lands and the reforestation of most advanced economies. If you care about soil conservation, this is really the way to go.

In terms of water, water is like everything else. For economic reasons, farmers have used less and less of it over time, and if we want to adapt to climate change, again, we should have more trade liberalization so that regions like Canada that have a lot of water are able to ship products that use a lot of water to regions of the world that have less of it. Again, by building resiliency with more long-distance trade and more petroleum products, we should be able, overall, to better adapt to climate change.

I apologize for that. It didn't take that much time when I was rehearsing.

The Chair: That's fine. It was very interesting, but I have to respect that time.

Dr. Pierre Desrochers: My apologies.

The Chair: You'll probably have a chance to elaborate as we have questions.

We're going to start with Mr. Lloyd Longfield for seven minutes.

Mr. Lloyd Longfield (Guelph, Lib.): Thanks, Mr. Chair.

Thank you both for coming here.

Naresh, it's really good to see you again. I had a chance to visit your research centre this summer. You've attracted researchers from around the world to work in Canada, and in turn, you're taking your research around the world, which is a very good use of Canadian investment in technology.

I want to focus on our study where we're looking at carbon management within the soil system. We're looking at the economic opportunities that policy around carbon management brings. Yes, there's a cost to farmers on carbon inputs, but I'm thinking that the trees that you're showing are an economic opportunity for farmers. They also sequester carbon up to a certain point, but some trees that you showed me this summer are no good after a certain age. They stop sequestering carbon, and they need to be harvested in order to continue the sequestration cycle.

Could you speak to that, the economic opportunity as well as the sequestration that trees bring to the soil?

Prof. Naresh Thevathasan: Yes, Mr. Longfield.

Each tree species has the capacity to sequester carbon to some extent. The tree species that I showed you at the research site are hybrid poplar. They have a tendency to sequester carbon rapidly, but only after 15 years, so there should be a continuous planting of hybrid poplars. Those trees can be harvested for energy. As long as they are replanted, you can get a continuous sequestration of carbon in trees.

We should also understand that there's carbon sequestration below ground, in soils. In the study we are currently conducting, we are assessing woodlot carbon and soil carbon in the adjacent fields. That woodlot has not been disturbed for many years, so we can fairly assume that in terms of the maximum level of soil-carboning of woodlots, it is the capacity that the particular soil type can carry forward. For the agriculture systems or abandoned land adjacent to a woodlot, if the soil carbon is less than the carbon that is seen in a woodlot, then those soils have an enormous amount of capacity to sequester carbon.

In terms of economic returns, the landowners can integrate nut trees. They can integrate sugar maples, whereby they can get additional revenue from selling maple syrup. Christmas trees are another economic return for the landowners.

We also have to understand that when you put trees into the agricultural landscape, there's a certain percentage of land that is taken out of production, but if you look at the agriculture revenue that came from the land that is lost, it is insignificant. When you get a profit of 20¢ to 40¢ on a bushel of corn, even if you get 100 bushels less on the land where you have integrated trees, we are looking at $30 or $40 in revenue loss. That revenue loss can be easily obtained by the selling of nuts and by syrup production and other economic returns.

● (1550)

Mr. Lloyd Longfield: Thank you.

You also talked about the riparian buffer, which I had to look up. You received some funding this year from the federal government for riparian development, which takes the nutrients or the excess nitrogen coming from fields into the trees before it goes into rivers and streams. It protects the stream and the wildlife around the stream from contamination.

You mentioned that this wasn't part of our agriculture policy or that we need to develop some policies around trees, similar to that in the United States, which is something that we might include in our report as recommendations to the government.

Prof. Naresh Thevathasan: Yes, certainly. What is happening in the Essex County-Chatham area now is that most of the lands have been rented, and the riparian buffers are being plowed down in order to get more land under agriculture. This means that the ecosystem service you just mentioned, sir, is no longer going to be there. What is going to happen is that the nutrient loading is going to start to continue into the water bodies. They are removing riparian buffers mainly because they want more land area and more productivity.

If that area is dedicated to perennial trees and if the landowners can be compensated for the revenue loss that they could derive from that small parcel of land, I'm sure they'd be very happy to have the trees in that portion, which will not only contribute to the ecosystem services and water quality, but will also sequester carbon. If the carbon trading comes about, they could also get some revenue from carbon trading.

The main point is that there are no incentives now for any landowners to have trees.

Mr. Lloyd Longfield: Carbon trading could stimulate that.

Prof. Naresh Thevathasan: It could stimulate that. In the U.S. policy I mentioned, they provided incentives for them to plant the trees. They had to sign.... They can hold the trees for 10, 15, or 20 years. They provided incentives in order to—

Mr. Lloyd Longfield: Make up the loss...?

Prof. Naresh Thevathasan: —to make up the loss. Exactly. That loss is not great. Even if it's 100 bushels of corn, the profit margin is —

Mr. Lloyd Longfield: It's how much you can plant by a stream.

Mr. Naresh Thevathasan: Yes.

Mr. Lloyd Longfield: Finally, for the class 3 and class 4 land, we've just finished a study on food policy for Canada. Land use was a big part of what we got in terms of testimony. When we look at class 3 and class 4, I go back to my growing up in Manitoba. Between Lake Manitoba and Lake Winnipeg, it was all class 3 and class 4 rock farms.

What's the opportunity to develop more agriculture by using trees as a resource in class 3 and class 4 land, and could that help us to grow crops other than trees?

Prof. Naresh Thevathasan: Yes. I mean, the silvopastoral system that I mentioned is one land use system that can be integrated. If there are lands that can be developed for livestock, then they will contribute not only to animal welfare issues but also to carbon sequestration as well.

The other aspect is bioenergy plantations, biomass for bioenergy. It need not be only for energy. It can also be for bioproducts and biochemicals. Those industries are being developed in Canada now. Revenues can be derived from having biomass crops. When you talk about biomass crops like poplars, willows, and to some extent, conifers, they can be easily established on marginal lands. Actually, poplars and willows are weed species. They are early successional species. They don't need fertile land to be established.

● (1555)

The Chair: Thank you, Mr. Thevathasan.

Now we have Mr. Barlow for up to seven minutes.

Mr. John Barlow (Foothills, CPC): Thank you very much, Mr. Chair.

Thank you very much to our witnesses for some great input.

I wanted to ask Naresh first, if I could.... I had an opportunity to meet with the Soil Conservation Council of Canada at the GrowCanada Conference in Calgary a couple of weeks ago, and they brought up an interesting point. As we talk about where we want to go in terms of our agricultural output.... Mr. Desrochers had some interesting numbers there on growing more on much less land, but if we want to set our goalpost on where we want to go, I think it's also important to know where we start.

One of their main concerns is that there really hasn't been an in-depth soil analysis of the status of soil in Canada as a national program since maybe the late eighties, early nineties. Has any work been done on that at some of the universities, either the University of Guelph or others that you know? Are there any that are doing more of an in-depth analysis of the current status of soil in Canada?

Prof. Naresh Thevathasan: Yes, the Ontario Ministry of Agriculture, Food and Rural Affairs is carrying out in-depth soil surveys in Ontario now. I'm aware of that because they contacted me with regard to the soil carbon sequestration of agroforestry. That study I know. I think the Canada Lands Surveys and the other provinces are also taking an in-depth...but I know for sure that Ontario is taking an in-depth analysis of soil surveys and of carbon sequestration potential at different soil depths and horizons.

Mr. John Barlow: Would that be something...? It hasn't really come up—and we're early in this study—but even with regard to the food policy I don't think it really came up. Would that be something that would be worthwhile to do, or are we relying on each province to do it on it's own?

I know my municipalities talk about that all the time: “You can develop, subdivide, on class 3 and class 4 soil, but we're going to do everything we can to protect class 1 and class 2.” There are uses for class 3 and class 4 soil that can be done, whether it's ranching or whatnot. I'm worried that it's being done piecemeal. Would it be worthwhile to do something on a larger scale?

Prof. Naresh Thevathasan: Absolutely. It is worthwhile. The provincial governments are doing it because each province has now committed to the Paris accord, and they are looking at the carbon sequestration potential.

What is interesting is the expansion of ranchers in the Clay Belt region. We have 29 million acres in Ontario and Quebec, and the farm prices are very low. They're encouraging ranchers from the south to move to the north to have established ranches in the Clay Belt area. The introduction of trees in those land areas not only will improve the soil aspect but also will improve the terrestrial carbon sequestration potential significantly. Twenty-nine million acres is a significant amount of land, and it doesn't have many trees now.

Mr. John Barlow: Mr. Desrochers, you brought up a great point in terms of the pulses that are being grown in western Canada. Five years ago, I would never have had peas or lentils growing in my constituency. Now there are literally thousands of acres. Also, producers are now concerned about the rules, regulations, carbon taxes, and all these things that are being put on them that are making them less and less competitive. Can you talk a little bit about some of the impacts that these things are having?

We're seeing studies all the time that show that not only is the carbon footprint of our farms significantly less than what I think people believe it to be, but also, possibly, there is very significant carbon sequestration on those agricultural properties. Can you talk a little bit about that?

Dr. Pierre Desrochers: I'll speak in very general terms. When we talk about climate policy in this country, and frankly pretty much anywhere, the problem is that we tend to forget about the big picture. We just look at the impact that a tax would have on reducing carbon production, or at least carbon emissions. We tend to forget that there is a real price to taxes, especially in a context with....

Whatever you might say of the head politician south of the border, if they are creating an economic environment in which people are not submitted to the same constraints we have here, we are going to put our farmers out of business and penalize consumers. I don't see the point of establishing policies that have not, frankly, delivered much in terms of concrete results in other parts of the world and penalizing our farmers in the process, especially in a very competitive environment.

Again, what I try to point out in the little memo I sent you is that our main policy should always be win-win or "no regret" things that deliver benefits to producers and consumers, but also to the environment. The more we allow our farmers to compete, the more efficient they will become over time, the more jobs they will create, the lower the food prices will be for our consumers, and the more our environment will benefit in the process.

Virtually every day, again, in terms of water retrieval, reforestation of the land.... I understand that marginal agricultural land might be a concern to some of you, but at the same time, if you take a bird's-eye view of these things, I have no problem with the rewilding of the earth.

I'm sorry if this is a rambling answer. I think our farmers have enough problems. We don't need to shoot them in the foot with policies that make them uncompetitive.

● (1600)

Mr. John Barlow: One of the main things you said was that the economic implications are perhaps more important than the climate things, and I think we've seen it with our agriculture sector. By innovation and technological advances, they are able not only to grow more on less land but also to reduce their carbon footprint.

Do you think that this should be the focus, and not taxes and regulations?

Dr. Pierre Desrochers: That should be the focus of the government. At the same time, we should do something that will be a bit more painful, and that is stop subsidizing inefficiencies or having certain frameworks, like supply management, that don't allow the best farmers to grow and the less efficient ones to go out of business.

The more competitive we are, the more efficient we will be over time. Again, both the environment and consumers will benefit in the process. I see no inherent contradiction between becoming more competitive, more efficient, and delivering environmental benefits at the same time.

Mr. John Barlow: One of your recommendations here—I'm reading through this—is not to "discourage innovative behaviour".

What would you see as an option in terms of encouraging innovation? Are there some things we can do there?

Dr. Pierre Desrochers: A lot of activists these days are very fond of the precautionary principle, saying that we should not develop technology in the absence of absolute certainty in terms of the outcome. In general terms, I would argue that a better ethical or philosophical standard would be the creation of lesser problems than those that existed before.

There are seven billion of us right now on the planet. There will soon be nine or 10 billion of us. We will always have an impact. As long as we don't import food from outer space, we will have an impact on the planet, but I think the track record of the farming sector in Canada and in other advanced economies is fairly good. Again, there will be a few hiccups along the way, but creating lesser problems than those that existed before should be our main standard.

The Chair: Thank you, Mr. Desrochers. Unfortunately, we're out of time.

[*Translation*]

Ms. Brosseau, you have the floor for seven minutes.

[*English*]

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

I'd like to welcome our witnesses. I think this is the first time you've been at a committee meeting, and you've done a great job. It's a pleasure having you here.

This is a great opportunity to talk about agriculture and climate change. There are a lot of challenges but a lot of opportunities too. Often at committee, we talk a lot about trade, because we are a trading country and it's always important to make sure there is a level playing field with our big trading partners.

Mr. Thevathasan, you spoke a lot about and you have a lot of experience in agroforestry. I understand that the United States has gone ahead, and they have a strategic plan. Did it start in 2011 to 2016?

Prof. Naresh Thevathasan: That's right.

Ms. Ruth Ellen Brosseau: They've invested a lot of money in that.

Prof. Naresh Thevathasan: Yes.

Ms. Ruth Ellen Brosseau: Can you talk about the success—where they're at with their agroforestry, and what they've been able to achieve? How would we get inspired by what our neighbours in the United States have done? Where is the Canadian government at on supporting agroforestry in Canada?

Prof. Naresh Thevathasan: They have progressed in leaps and bounds compared with Canada. There's an agroforestry centre of excellence in Nebraska. The University of Missouri has the national agroforestry research leadership. The Association for Temperate Agroforestry is situated in the States, even though Canada is a member.

The point I'm trying to make here is that the amount of land area that has been brought under agroforestry systems significantly increased from 2011 to 2016, especially forest farming systems, which have seen a humongous amount of adoption. A lot of landowners are producing mushrooms, ginseng, and speciality medicinal plants. They have also crated niche markets for them, such as supplying specialty products to restaurants. That has also enhanced income for the landowners in the United States.

What made that happen was that the agroforestry strategic network policy provided incentives and guidelines for them to initiate such changes in the agricultural sector. That took off, and adoption went significantly higher. For example, in 1998, we brought 40 landowners to the University of Guelph, and we showed the land use systems and ecosystem services, plus the economic benefits these land use systems can contribute. All of them answered a questionnaire and said, “These land use systems contribute to the public good, but who is going to bear the cost? We are happy to adopt them, but why should I put in riparian buffers for somebody downstream to benefit? Will I get a tax credit on my property? What incentive will I get in order for me to invest in public-good land use systems?”

All of them contributed that answer. They did not dispute any of the economic, environmental, or ecosystem services these land use systems could bring about. They didn't dispute them at all, but the question was “who is going to bear the cost?” As the Canadian government has committed to the Paris accord, and we are spending $2.65 billion in developing countries to bring about the climate commitment of developing countries, I think we should also contribute to coming up with a policy measure similar to the United States agroforestry strategic network.

We started that. We had an agroforestry development centre situated in Indian Head, in Saskatchewan. They were trying to formulate the policy, but then it was closed. I think we need such initiatives in Canada.

● (1605)

Ms. Ruth Ellen Brosseau: When was that closed, the initiative at Indian Head?

Prof. Naresh Thevathasan: It was closed in 2012-13.

Ms. Ruth Ellen Brosseau: Okay. Is it completely done?

Prof. Naresh Thevathasan: There is less work in agroforestry going on, but they are not contributing any national agroforestry work.

Ms. Ruth Ellen Brosseau: There's been a steady decline in investment from the federal government in agroforestry.

Prof. Naresh Thevathasan: Yes.

Ms. Ruth Ellen Brosseau: Has it gone up in the last two years?

Prof. Naresh Thevathasan: Yes. That's what I was congratulating the minister for, the agricultural greenhouse gases program. That program started with the Conservative government, but the Liberal government is continuing that program, which is welcomed. That is what is kicking up a lot of research in agroforestry, where we are showing quantitative evidence of carbon sequestration potential at the system level. It's very important to understand the system-level carbon sequestration, which includes both above ground and below ground.

Ms. Ruth Ellen Brosseau: In the United States they incentivized communities, landowners, and farmers. How did the incentives work for the people who participated in this?

Prof. Naresh Thevathasan: For each land use system, there were descriptive guidelines. In one of my recommendations I said that there should be science for adoption and for implementing agroforestry. Science fed that policy. For each land use system, they had clear guidelines for what their option should be, what the guideline should be, and what would be assessed by the USDA in order for them to qualify for the incentive. Some of them were cost-shared programs.

Ms. Ruth Ellen Brosseau: Last year, I had a private member's bill asking the government to take a leadership role on food waste. Often we have articles and reports in Canada, and in other countries they have taken some leadership on food waste. There are some estimates that 30% to 40% of the food produced is wasted and billions are lost annually. Also, when rotting food goes to landfills, it produces greenhouse gases.

Monsieur Desrochers, do you have any comments around food waste?

Dr. Pierre Desrochers: The issue is more complex than people think. I will give you an American example. If you buy oranges at your supermarket, and then you throw away the peel, this is often considered food waste. Paradoxically, the best way to fight waste in that case would be to buy orange juice, because in big processing operations they convert peels into livestock feed.

At the same time, if people were eating more frozen or processed food, there would likely be less food waste, but this is not the way our food retail system has evolved. People want to—

● (1610)

The Chair: Thank you, Monsieur Desrochers. I'm going to have to cut you off.

[*Translation*]

Thank you, Ms. Brosseau.

Mr. Drouin, you have the floor.

[*English*]

Mr. Francis Drouin (Glengarry—Prescott—Russell, Lib.): Thank you, Mr. Chair, and thank you to the witnesses for being here.

Your presentation was very informative. Forestry is an issue for me back home in Glengarry—Prescott—Russell. As you know, the Ontario government has set, I think, 30% of land mass for forestry. I'm not sure how other regions are doing, but we're at 23%. Obviously, we do need more land mass for agriculture, but what I'm seeing here is that you're promoting the combination of forestry and agriculture.

You have probably had some interaction with the conservation authorities. Back home, the conservation authority seems to be acquiring land and mass planting in one area as opposed to planting a little bit here and planting a little bit there.

In Ontario, what's been your experience in terms of educating farmers that they can combine, that their lack of revenue won't be that significant, and that they can combine both without having a major impact on the bottom line?

Prof. Naresh Thevathasan: Mass planting comes under a different definition. It will come under either reforestation or afforestation. I would slightly defer from saying that we are trying to bring forestry into agriculture, because the tree density I'm talking about is insignificant when you compare it with the tree density in a forest.

Mr. Francis Drouin: Yes.

Prof. Naresh Thevathasan: I'm talking about 50 trees per hectare or 75 trees per hectare, so it is not per se forestry.

What we are trying to do here is to capture the nutrient-cycling aspects, the carbon sequestration aspects, the biodiversity aspects, and the ecosystem services aspects that could be derived, even at a low density of trees in the agricultural systems, in order to reduce runoff, nutrient loading, and enhance bird diversity and microfaunal and macrofaunal diversity. This is what we are trying to achieve.

When it comes to the landowners, they were paid to remove trees in order to allow big machinery. Now we are trying to ask them to put the trees back, so there's a lot of education that is needed.

I should say that these trees, when they are integrated into the agricultural landscape, need a certain degree of management, like pruning of branches. If you look at these trees, the branches have been pruned. Why? We need to allow more solar radiation in order to continue productivity. The tree row orientation is also important. You can't plant east-west in Canada, because you will get less productivity. You have to plant either north-south or northwest-southeast, because we are in the northern hemisphere.

A lot of education is needed. There's a management aspect that's needed. Landowners are willing to do that, provided there's a policy to support it. The issue, as I said, is that they're asking why they should invest for the public good and what they get as a result of that.

The science is not disputed. Actually, the science has been proven globally. I just mentioned that in the COP22 conference in Morocco, agroforestry was given a session, and it's being promoted to be integrated into the agriculture policy of the sub-Saharan African countries, because that is the only way they can increase resilience to climate change in the agricultural sector.

Trees can modify microclimate. The evapotranspiration losses can go down, and there's more moisture. We have shown through research that 3% more moisture can be retained as a result of having trees. In a dry year, when agricultural crop productivity declines, the reduction in yield in a tree-based farming system is comparatively less because of the microclimate modification. It can increase diversity of soil micro and macrofauna, which enhances the organic carbon input as well, from the leaves, and in turn, the soil's organic carbon.

The science is there and landowner acceptance is there. They are not disputing anything that you say. They can see that their animals will benefit, because the silvopastoral system not only contributes to the heat stress reduction, but it also contributes to the cold stress reduction in the winter months. If you have coniferous trees, that contributes to windbreak and cold stress reduction, which enhances productivity in the livestock because of less stress.

Some have adopted such land use systems, but the issue is that there is no policy or incentives to back the adoption of them.

● (1615)

Mr. Francis Drouin: Thank you.

Monsieur Desrochers, I was just reading some of your recommendations here, for example, the elimination of market distortions, such as subsidies and barriers to trade.

I am a little hesitant to see how that would actually improve land conditions. I would say sure, if everybody played by the rules, but in the U.S. their farm bill is full of subsidies. It's a game where nobody is going to eliminate, and everybody subsidizes their agriculture in one form or another.

Canada does not have 300 million people like the U.S. does. I'd be afraid that, in getting rid of supply management, we would actually sell off to the U.S., and they would be acquiring all of our farmers here.

Dr. Pierre Desrochers: There are two things. As you probably know, some countries have actually gotten rid of systems that were fairly similar, like New Zealand and Australia, and New Zealand has taken over the dairy products. They have better conditions to produce dairy products.

I've travelled in Wisconsin and parts of the upper Midwest where, honestly, conditions are not so different from those in Quebec. I've never understood the argument that Quebec couldn't compete with regions that had similar climates and similar soil conditions. What makes Quebec producers less effective is that they're smaller and they don't generate the kinds of economies of scale that you've seen in liberalized markets.

I'm with you in that I don't like the U.S. farm bill, but at the same time, if I'm looking at that as a taxpayer, I don't see how having dairy products that are more expensive and penalizing our food processors is actually good for us.

As you probably know, the cost of sugar in Canada has historically been lower than in the U.S., because we don't protect our corn and sugar beet producers. A lot of candy manufacturers a few years ago relocated to Canada, because with the cost of sugar being lower they could produce candy here and ship it back to the U. S. The same was true for chocolate.

Canada's dairy products ended up in Canadian chocolate that was being reshipped to the U.S. It's Canadian dairy products, and if our dairy products had been even more competitive, I believe that we would have shipped even more chocolate to the U.S.

The Chair: Thank you, Mr. Desrochers. I'm sorry to cut you off again. That was a good conversation.

Mr. Barlow, you have seven minutes.

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

I appreciate the good information from both of you—

The Chair: Mr. Barlow, in fact you have five minutes.

Mr. John Barlow: Oh. Well, that's just going to mess up the entire system.

Voices: Oh, oh!

Mr. John Barlow: I have a quick question for you, Mr. Thevathasan.

Prof. Naresh Thevathasan: You can call me Naresh.

Mr. John Barlow: Thank you. There's a really interesting program in western Canada that, ironically, was brought forward by some energy companies. They found a way to reintegrate rough fescue grassland into some of the range through what's almost like plugs. Is that part of agroforestry or is that something different? Do you know if that situation has started to catch on? I know it was about five or six years ago that they were starting to have some success on those types of plots.

Prof. Naresh Thevathasan: Perennial grass is not agroforestry per se. Agroforestry is the integration of trees or shrubs into the agricultural landscape. The perennialization of grasses will also contribute to soil carbon sequestration and soil erosion control. Several of the ecosystem services I mentioned will also contribute to that.

Mr. John Barlow: It's interesting that two major energy companies in Alberta are funding that project as a way of reclaiming oil well sites by bringing those native grasslands back. I think that also shows that there is a good diversity of companies and groups that are funding that type of research.

Mr. Desrochers, I didn't have a chance to go too much into this before, but you were talking about the impact that carbon taxes and those things could have on agriculture. It's interesting that agriculture, in terms of its GHG emissions, has pretty much stayed steady for the last 15 to 20 years at around 70 megatonnes. Despite that, their production has grown exponentially. Certainly our concern, and the concern that we have from speaking to our producers, is that they're the one group that will likely be paying the carbon tax over and over and over again. Cattle liners, fertilizer companies—they'll all be charging them, and they can't pass that on to anyone.

Can you talk a little bit about how important it is to ensure that if we want to meet the goals we have set, which I think are important, our agriculture producers need to have the tools to succeed? Some of these policies that we're seeing come through.... As you said, we've never seen the carbon tax achieve anything it says it's going to achieve in any other jurisdiction. In fact, our producers have been successful without having to worry about it. Can you talk about the importance of that?

● (1620)

Dr. Pierre Desrochers: Again, I'll speak only in general terms.

If the past is any indication of future trends, we need more innovation and more economies of scale. Let the best and more creative farmers take over, grow the scale of their operations, and become more efficient over time. We've reached a point now—it's funny that we're discussing these agroforestry issues—where a number of experts these days talk about “peak farmland”, meaning that despite the fact that the world population keeps increasing, we've probably reached the maximum amount of farmland that we will ever need if past trends and increased yields keep on improving.

Many parts of the world obviously have other disadvantages as compared with Canada in terms of infrastructure and a less corrupt political system. Competition will come from many places, and it will come hard. Historically, we've mostly had only to worry about competition within Canadian provinces, or perhaps from the U.S. I'm sure you're all knowledgeable about what has been happening in Argentina and Brazil and New Zealand and other places. These people, as far as I know, will not be burdened with those other taxes and will be able to drive our producers out of the market if we keep asking the impossible of them, which is to become ever more efficient while burdening them with regulations and taxes that their competitors don't have to face.

Again, look at past trends. Look at how much progress has been made in the past. Let's lay the foundation to make sure they can do more of that in the future. Let the most creative and the most entrepreneurial agricultural producers grow. It's nice to want to save the family farm and to want to keep supply management, but that's just not the way to go, in my opinion.

Mr. John Barlow: You also talked about the concerns with regulations and red tape. For us to embrace innovation, I think all of us have dealt with the time it takes to certify new innovation in terms of our constituents, whether it's seed breeding or neonicotinoids and glyphosates through PMRA. Is that something we also have to—

Dr. Pierre Desrochers: Oh, yes. I mean, I took it for granted that you were all familiar with those issues. Let's look at best practices elsewhere and let's try to import them here.

Again, I understand that you're all representing your constituents, but at the same time...or maybe it's more my job to do some popular education in terms of explaining why these advances are creating fewer problems than those that existed before.

Mr. John Barlow: We just want to include it in the study.

The Chair: Thank you, Mr. Barlow. Thank you, Mr. Desrochers.

Now we'll go to Mr. Peschisolido for five minutes.

Mr. Joe Peschisolido (Steveston—Richmond East, Lib.): Mr. Chair, thank you, and I'm going to be leaving a few minutes at the end for Parliamentary Secretary Poissant.

Professor Thevathasan, thank you for coming out. I want to follow up on Mr. Drouin's point. I'm intrigued by your land use system or your analytical model. I'm from B.C. Would you be able to apply your analysis to the system in B.C.?

Prof. Naresh Thevathasan: Yes, Dr. Lisa Zabek, from the provincial ministry, is leading the silvopastoral systems in B.C. Actually, I have written two book chapters, and silvopastoral systems are promoted more for western Canada than for eastern Canada, so yes, this type of land use system that we see now on the screen is what is being recommended for B.C. because of the large number of ranches and the large amount of beef cattle production and dairy production there.

Mr. Joe Peschisolido: Mr. Barlow talked about the different grades of soil. As you know, in British Columbia we have the agricultural reserve land. There are a lot of folks who are saying that because of this grade of soil, we should take this farmland out of the agricultural system and have a certain type of development there.

Do you have any thoughts on that?

Prof. Naresh Thevathasan: It's in this connection that I was talking about marginal land. In my talk I said, let us exclude classes 1 and 2. Let us not go into the highly productive agricultural lands. Let us focus these land use systems to classes 3 to 6, and we are blessed with 46 million hectares that are currently available.

Trees can reclaim those lands, depending on the type of system that you are talking about. I also work with the Canadian Wood Fibre Centre, for Natural Resources Canada, and we established a short-rotation willow plantation in 2009. By 2016, in about six years, they were sequestering at the rate of about five tonnes of carbon dioxide per hectare per year. That land was not considered for agriculture because it was considered abandoned land.

These land use systems can contribute not only to climate change mitigation and adaptation but also to ecosystem services. That is the other side of these land use systems.

● (1625)

Mr. Joe Peschisolido: Mr. Chair, thank you.

[*Translation*]

Mr. Jean-Claude Poissant (La Prairie, Lib.): Thank you.

First, I want to thank our guests for their testimony.

My first question is for Mr. Thevathasan.

Mr. Thevathasan, I come from a dairy and grain farm. We've had an agro-environmental plan for about 25 years.

I'd like to know how the environment might profit if we had Canada-wide environmental plans.

[*English*]

Prof. Naresh Thevathasan: Do you mean environmental plans for dairy?

[*Translation*]

Mr. Jean-Claude Poissant: No, I'm talking about the agro-environmental plans we have in Quebec.

You've never heard of them?

[*English*]

Prof. Naresh Thevathasan: No.

[*Translation*]

Mr. Jean-Claude Poissant: They are plans developed according to the type of soil, the types of crops and the inputs used to grow the plants, so as to make optimum use of them without putting too much into the soil.

You've never heard of them?

[*English*]

Prof. Naresh Thevathasan: Well, I have colleagues in Quebec whom I work with in agroforestry. I work a lot with Dr. Joann Whelan, Dr. Robert Bradley, and Dr. Alain Olivier from the University of Laval, but we generally collaborate mostly in the types of land use systems that I mentioned.

[*Translation*]

Mr. Jean-Claude Poissant: Okay.

I've been told that one hectare of adult corn captures more carbon than a hectare of forested land. Is that true?

[*English*]

Prof. Naresh Thevathasan: One hectare of....

[*Translation*]

Mr. Jean-Claude Poissant: It's a comparison between an adult corn plant and a deciduous tree of the same size. A hectare of corn, as compared to a hectare of deciduous trees, is five times more beneficial for the environment.

[*English*]

Prof. Naresh Thevathasan: Yes, it could capture more carbon, but the carbon is lost, whereas the carbon stored in the forest stays there. Also, because of the longevity of the trees, they also enhance carbon sequestration below ground, whereas corn.... I'm not a big fan of removing agriculture residue for energy production, because we need a certain degree of organic matter to go back into the agricultural lands to maintain the soil organic carbon level and the organic matter, but only part of that carbon goes into the grain, and then the grain is consumed. If the rest of the residue is removed from the field, then there's no net accumulation over a period of time.

The Chair: Thank you.

[*Translation*]

Mr. Poissant, I gave you a few seconds more, since we lost a bit of time due to the interpretation.

Mr. Jean-Claude Poissant: Yes, thank you.

[*English*]

The Chair: This will wrap up this hour of witnesses and questions.

I want to thank Mr. Thevathasan and Monsieur Desrochers. It was a really interesting conversation. Thank you so much for being with us today.

We shall break for a minute or two just to change the panel and then we will be back.

● (1625)

(Pause)

● (1630)

The Chair: We'll continue our second hour on our study of climate change and water and soil conservation issues.

We have David Sauchyn, professor, prairie adaptation research collaborative, University of Regina. Also, by video conference from the University of Lethbridge, we have Professor Stewart Rood.

Mr. Sauchyn, you have up to seven minutes, please.

Dr. David Sauchyn (Professor, Prairie Adaptation Research Collaborative, University of Regina, As an Individual): First of all, I would like to thank the committee for this opportunity to speak to you about an important issue. My remarks are based on 30 years of research on the climate and soil landscapes of the prairie provinces, including a recent five-year study of the vulnerability of agricultural communities to climate change. This project was funded by three federal government agencies: NSERC, SSHRC, and IDRC.

The Prairies are a good case study of soil and water conservation when you consider that they have more than 80% of Canada's agricultural land and that commercial agriculture has succeeded here in one of the least favourable agroclimates on earth. It has succeeded through technological innovation, but also through the sustainable management and conservation of soil, water, and rangeland.

Major changes in farming practices and agricultural policy have occurred primarily in response to periods of accelerated soil and water degradation, notably during the droughts of the 1930s and 1980s. Considerable progress has been made in conserving soil and water, especially in the past several decades. However, this progress could be undone by a changing climate.

Canada's climate is clearly getting less cold. The warming of a cold country is good news for agriculture. Unfortunately, this climate is also more hospitable for pests, pathogens, and invasive species, and there's a second major constraint on the opportunity to capitalize on warmer climate: the increasing severity of both storms and drought.

In the past few years, flooding along the St. Lawrence River and Lake Ontario and some hot, dry summers have been described as “unprecedented”, implying that they defy prediction and preparedness. A scientific interpretation of the severity of these events is that they are probably amplified by a warmer and moister climate, although events of a similar magnitude can be found in weather records that extend well beyond the limited experience of our lifespans. In our laboratory at the University of Regina, we've constructed a 900-year history of prairie climate using trees. It clearly shows that every century has had at least one drought of 10 years or more in duration. Therefore, the most challenging future scenario for prairie agriculture is the inevitable reoccurrence of a long drought, but in a warmer climate. The sponsors of our research have been preparing for this plausible worst-case scenario.

The most consistent climate change scenario is wetter and warmer winters and amplified drought and flooding. A resilient agroecosystem must have the capacity to store the excess water to withstand dry conditions that could last a growing season or longer. Healthy soils store water and carbon and support a continuous vegetation cover that is more likely to out-compete the undesirable species. Therefore, conserving soil and water is the most effective adaptation to projected climate changes.

The entire population of Canada derives benefits from healthy soil, quality fresh water, and a domestic food supply. Researchers from the University of Alberta have documented how farmers in Canada absorb much of the additional cost of conservation practices. Financial incentives from our government are almost 10 times less than the compensation given to farmers in Europe and the U.S.

At our research centre, the Prairie Adaptation Research Collaborative, we do climate change research by working with the people who manage our soil and water. This producers' perspective is invaluable. It's the social context that enables us to translate our technical data to information and knowledge; otherwise, our scientific data is just a bunch of numbers.

I keep a catalogue of quotes from producers. For example, a rancher near Shaunavon, Saskatchewan explained that raising cattle takes water, grass, and shelter. He added that he can replace only shelter. Similarly, we've been told that people construct buildings and fences, but only God makes land. An old-timer from southwestern Alberta, when accepting an award from a conservation group, offered these words of wisdom. He said that when the oil fields run dry, we'll still have the real source of our wealth: soil and water.

In addition to these anecdotes, we have a large database of producer observations that we've collected using social survey methods and focus group meetings. Of the comments and recommendations we've received from producers, the most policy-relevant are regarding the limits of their adaptive capacity.

● (1635)

Producers told us that new technologies on the farm are expensive and that a single farm business can withstand only so much extreme weather. Without help from their neighbours, the local community, and higher levels of government, they are challenged to deal with the extreme weather that we expect in a changing climate.

Participants in one of our focus group meetings recommended that government establish some type of coordinating agency or boundary organization, with technical expertise to link scientific knowledge to adaptation options and agricultural practices targeted to regional stakeholder groups and rural communities. In fact, a federal government agency with exactly that mandate existed for more than 80 years. It was phased out in 2010 to 2013. The prairie farm rehabilitation administration, or PFRA, implemented government programming related to soil and water conservation and rural development in western Canada, and for a few years late in its mandate, right across the country. With the demise of PFRA, the federal government also has abandoned most of its responsibility for irrigation infrastructure, for soil and water conservation, and for the management of native prairie on crown rangeland.

It's somewhat ironic that our federally funded research has concluded that a major impediment to climate change adaptation in rural Canada is the demise of federal programming and federal services that helped to maintain the resilience, viability, and adaptive capacity of rural agricultural communities. Coincident with this recent loss of capacity is a disconcerting but almost predictable retreat from traditional soil and water conservation practices in favour of capitalizing on above-average precipitation over the past decade.

The University of Saskatchewan surveyed 61 producers recently, and 40% had removed shelterbelts from their operations. Mostly it was to accommodate large equipment. On prairie farms, air seeders are typically 85 feet to 100 feet wide. Some are up to 160 feet wide, which is about the width of a football field in Canada, and this is a single seeder.

Shelterbelts were first planted more than a century ago to prevent the loss of snow and soil. By capturing snowmelt water and storing carbon, today shelterbelts represent both adaptation to, and mitigation of, climate change. Agriculture Canada's shelterbelt centre, which predated the provinces of Saskatchewan and Alberta, distributed more then 600 million tree seedlings.

● (1640)

The Chair: Mr. Sauchyn, could you speed up, because we're a little past—

Dr. David Sauchyn: I have one paragraph left, sir.

This program was shut down in 2013. I have no expectation that PFRA and these programs will be restored, but I expect they will. The next time the agricultural sector suffers from a prolonged drought or the impacts of heavy rain, you can expect that a program like this will be recreated.

In conclusion, I laud this committee for undertaking this study and I recommend that you carefully consider two serious constraints that producers have in adapting to and mitigating climate change. The first is the demise of institutional capacity whereby the government was able to support producers' efforts to maintain the integrity of agro-ecosystems. The second constraint is the expectation in our country, but not elsewhere, that agricultural producers will bear the cost of protecting the ecological goods and services that make our lives possible. They should not be financially disadvantaged for providing this service that benefits all of us.

The Chair: Thank you, Professor Sauchyn.

Now we'll go to Professor Stewart Rood for up to seven minutes.

Professor Stewart Rood (Professor, University of Lethbridge): Thank you very much.

I do have a slide deck, and I wonder if it's up.

The Chair: We have it on paper, so we can follow it.

Prof. Stewart Rood: That's even better. That's great.

Thank you very much for the invitation. It's interesting. I also listened to the first two presenters as well as David, so I'm pleased to follow them.

In the first slide, I have a picture that represents a landscape very familiar to John Barlow, whom I would particularly like to thank for the invitation. This is the iconic Foothills region near the Rocky Mountains in southern Alberta. This is the landscape that generates the primary water source for the rivers that flow across the Prairies.

In the next slide I have a summary, and this is the only data slide I will show you. This is called a hydrograph or a water graph. It represents the amount of water that's been flowing, in this case in the Waterton River, but it's pretty typical of the rivers that drain the Rocky Mountains. The darker plot, which is black if you have a coloured version, represents the conditions over the last century. The red plot represents the anticipated conditions into the next century.

You will see there is likely to be a gradual decline. Even though we're getting more rain, we're getting more drying from evaporation, but most critically, we have reduced flows late in the summer, in July but especially in August and September. Also on this plot I have the green dash line, which represents crop water use, in this case for potatoes. We have a temporal problem in that we have abundant water in the spring, but demand for water for irrigation and other uses happens later in the summer.

The obvious strategy to deal with this situation is to impose dams to create reservoirs to store and subsequently release the water. This has been done, and it involves pretty much all the streams in the South Saskatchewan River basin, with the water from southern Alberta as well as northern Montana that flows to Saskatchewan and Manitoba.

The problem with this approach is shown in the next slide. This is a photograph of the river valley in Lethbridge in July, when typically there would be high flows. You can literally walk across and not get your gumboots wet. As indicated in the plot in the lower left corner, we have a damming and diversion of the vast majority of the flow.

A challenge we face relative to climate change is that we've already pretty well fully allocated our river systems in the western prairies, but unfortunately things are becoming drier because things are becoming warmer.

The first problem relative to this in terms of irrigation is that agriculture relates to water quantity, and in particular to sufficient water quantity to allow for the existing commitments, and this will limit further expansion.

The other problem follows, because as we lose the water in the river, any contaminants, whether from agricultural, industrial, or municipal sources, become more concentrated. We have this interaction between declining water quantity and degrading water quality. Both are likely to increase with climate change.

Over the past month or so I have asked people who know more than I do about policies and practices what they think might be done to prepare Canada for this future. I will briefly describe five points relative to what the federal government might do.

The first point was raised by an individual from Alberta Innovates. His suggestion relates to a number of federal government programs referred to as clean technology programs. These are primarily aimed at oil and gas and energy, but many of the principles would also apply to agriculture. Thus, there should be a widening of the eligibility for this group of programs.

This next opportunity is perhaps the one that was most commonly suggested. It suggests that for agricultural research, as we try to cope with the compound problems of increasing population globally and climate change, we match the research program that is common in biomedicine.

In the medical field, we have a cluster of research programs that support basic research, cell biology, and genetics, but there's a long way from that to the hospital. In the biomedical field there is this intermediate category of research called translational research, and the view is that this should be increased relative to agriculture.

● (1645)

I'm sure people in the room and others will have better examples than mine, but mine dealt with the prospect of effective timing and scheduling relative to irrigation.

The next suggestion invites a paradigm shift, a change in the way we're thinking about things. In the past century, the view was that we should maximize crop production, and the way this was done with the green revolution was to maximize inputs: more water and fertilizer equals more yield. The problem is that this might not be the optimal use relative to efficiency. Let's imagine that we could cut back on the inputs, but not as strongly cut back on the yield. If we provide lower levels of water and fertilizer and still retain reasonable productivity, this might be a more optimal way to manage our resource. It would also reduce the environmental consequences.

Following from that, I chatted with a number of scientists in Agriculture and Agri-Food Canada, and some of them have expressed concern about the increasing requirement that they have formal funded links with industry for their research programs. I think this is great in moderation, but these same very sharp scientists should also have some independent programs, programs that are not hindered by the constraints that industrial partners might bring. In fact, some of those constraints might provide a bias that could in fact challenge some of the environmental objectives and might also limit what we could refer to as "visionary" research, research that doesn't have any near-future benefit but might help in the long run. This could be especially relevant for climate change as we think about broadening the germplasm for drought response of our crops.

Finally, as my own area of focus, in southern Alberta and elsewhere in the Prairies we've invested a lot of money on infrastructure related to agriculture, but we've generally done it primarily for agriculture. In terms of thinking about the impacts on the landscapes in western Canada, the next slide shows an aerial photograph taken while flying into Lethbridge. The circles are irrigation pivot crop circles. You'd have a similar view in Regina, Calgary, or Winnipeg. As you fly over this landscape, you can see that it has been cultivated. This is a much bigger impact than oil sands, pipelines, and many other things that are in the public media.

I would argue that we should think more broadly about agriculture, not only as providing a challenge for our environment but also as providing opportunities. There's one example in the slide. While we convey water for irrigation, let's use stream channels instead of canals, thus allowing for the secondary benefits. In fact, this relates to the prospect of riparian buffers and agroforestry that was talked about earlier.

● (1650)

The Chair: Thank you, Mr. Rood. I'm going to have to stop you there because we're a little extended on time.

Prof. Stewart Rood: It's perfect timing, because that was the end of my presentation.

The Chair: Thank you very much.

Now we'll go to our questions. I would ask everyone to specify who you would like to have answer your question, because we have a person on video.

[*Translation*]

We will begin with Mr. Berthold.

You have seven minutes, or rather six, forgive me.

Mr. Luc Berthold (Mégantic—L'Érable, CPC): Six or seven minutes, either is fine, Mr. Chair; you can stop me when I'm done.

The Chair: Fine.

Mr. Luc Berthold: Thank you.

I want to sincerely thank both witnesses for being here with us today.

The more witnesses we hear tell us about climate change, about the quality of soil and water, the more we realize that there are as many problems as there are solutions. You both work on some very specific elements.

I'll begin with you, Mr. Sauchyn. You said that according to your analyses, people expect farmers and producers to absorb the majority of costs due to climate change.

Do you have any specific examples that show that things have been different over the past few years, as compared to normal adaptation? In other words, what are the additional costs? Farmers have always had to adapt to all sorts of things. How has this been accelerated, in your opinion, Mr. Sauchyn?

[*English*]

Dr. David Sauchyn: I was referring to the practice of not maximizing the productive capacity of the fields. In fact, Professor Rood also referred to that in his third point, regarding optimization versus maximization. It's entirely possible that this is occurring. There's an industrial scale of agriculture whereby the soil is used to its maximum capacity in the short term but becomes exhausted over time. That's as opposed to conservation farming and some practices that are fairly well documented and established, whereby farming is practised in such a way as to leave behind carbon that could have been extracted and exported, as well as some soil, and to leave behind some water, even though it could have led to a marginal increase in productivity.

[*Translation*]

Mr. Luc Berthold: According to what I understand, you deplore the fact that the government has withdrawn from programs designed to help farmers adapt to climate change. Is that correct?

[*English*]

Dr. David Sauchyn: Yes. As I said, we had a fairly major five-year study completed recently. We were fortunate to have been given millions of dollars by the federal government. We concluded that the major problem was them. I presented the results at a conference in Ottawa last spring. There were representatives of Agriculture Canada in the audience, and they were willing to speak to me. They weren't willing to respond during the event, but they were willing to speak to me in private. They said that given the financial constraints over a period of time, they chose to retract the activities of Agriculture Canada and preserve the core research activities, including the traditional activities, such as the experimental farms and the research program on crop genetics and crop trials. Anything that was considered soft science, such as adaptation, soil conservation, and water conservation, was trimmed from Agriculture Canada.

● (1655)

[*Translation*]

Mr. Luc Berthold: So this is what I understand: because Agriculture and Agri-Food Canada is less present and there are fewer programs to help farmers, farmers themselves have to pay for the costs of adapting and preserving their soil. In addition, there is now a carbon tax. So farmers have to pay twice to try to preserve their soil for the long term. That is my perception, in short.

Thank you very much, Mr. Sauchyn.

I will now address Mr. Rood.

I think that Mr. Barlow was very happy to see the images you showed at the beginning of your presentation.

I'd like to go back to a point you made in your presentation. You said that "cultivation, not pipelines or oil sands, has the biggest impact on the environment [...]". However, you also said that the situation presents opportunities. I did not understand, unfortunately, what those opportunities are for agriculture. Could you expand on that? I think this could be interesting.

I know that the environment and the preservation of soils has always been at the heart of farmers' concerns. I'd like to know what the opportunities are for them, specifically.

Mr. Stewart Rood: Fine.

Thank you for the question.

[*English*]

An example of this might relate to shelterbelts. Again, this was a topic with Naresh's presentation earlier.

From the point of view of the farmer, as David indicated, it's most convenient to get rid of them because of the large machinery, but in so doing, we're losing not only something that captures carbon but also something that provides habitat. If we can provide a mechanism to allow the farmer to effectively cultivate and manage that property and at the same time allow for.... For example, there might be margin shelterbelts and things like that. These are the sorts of things that collectively I think could help. We don't want there to be an expense for agriculture, but instead, while we're managing our landscapes, we can think about whether there are certain environmental opportunities.

[*Translation*]

The Chair: Thank you, Mr. Berthold.

Mr. Peschisolido, you have the floor for six minutes.

[*English*]

Mr. Joe Peschisolido: Mr. Chair, thank you.

Dr. Sauchyn, you implied in your testimony that climate change is real, that government needs a comprehensive approach to it, and that part of that comprehensive approach was conserving soil and water. That was the key. Can you elaborate a bit on that?

Dr. David Sauchyn: I hope I more than implied that, because I've studied climate change for 30 years and I like to think it's real. Otherwise, I may have just wasted 30 years of my life.

I'm sorry. Was the second part of your question about how it relates to soil and water conservation?

Mr. Joe Peschisolido: You had mentioned that one of the key elements of any governmental approach to climate change would be dealing with conserving soil and water. Can you elaborate a bit on that?

Dr. David Sauchyn: I certainly can. In fact, there is a strong correlation between what are called sustainable agricultural practices and adaptation to climate change. If you read any literature, even the general literature on sustainable agriculture and adaptation to climate change, you see that they have the same underlying principles, so you could argue that if an agriculture producer farms in a sustainable way, they are relatively well prepared for a changing climate. In particular, with regard to the types of climate changes we anticipate, all of the climate models forecast more water in winter, but winter is not when we grow crops. Therefore, if you have practices and technology that enable you to store the water on the farm, and in the soil in particular, then you're much better prepared for a changing climate.

● (1700)

Mr. Joe Peschisolido: You also mentioned the “demise” of the institutional integrity of our system. You talked briefly about the previous government closing down an agency, the PFRA. Can you talk about the importance of that agency and in part about how a government can strengthen that institutional integrity?

Dr. David Sauchyn: Certainly. The PFRA is a famous institution, at least in western Canada. That includes parts of British Columbia, such as the Peace country and the Okanagan, which the PFRA was responsible for. The PFRA was probably the most respected government agency that you could imagine, including in the rural Prairies.

It was created in response to the drought of the 1930s, so scholars often refer to the PFRA as perhaps the best example in the entire world of an institutional adaptation to climate change. It existed to rehabilitate prairie farms and it succeeded, and, like a good government agency, it found another mandate. Once they had rehabilitated prairie farming, they expanded into water, infrastructure, irrigation, and rural development in general. As I said, it was an iconic institution on the Prairies and was shut down about five years ago.

Mr. Joe Peschisolido: Thank you, Professor.

Professor Rood, you briefly discussed possible strategies to deal with water management. Can you elaborate on your approach?

Prof. Stewart Rood: This is an opportunity and also a challenge. Partly it's a challenge because we've gone so far down one particular pathway, and that pathway is to commit as much water as possible for as much land as possible.

Relative to changing that, instead of thinking about.... There are some mechanisms. For example, one in particular that we might think about changing is a policy known as “first in time is first in right”. What it means is that the water user who commenced the irrigation back in 1900 gets the highest priority during a drought interval. In fact, it's likely that the user may have been in the Foothills area and not in that area in the Prairies, in the Taber area or something. What it means, then, is that instead of growing potatoes, we're going to end up in a drought cycle growing hay. This is the type of unfortunate historic legacy that we have to rethink.

Mr. Joe Peschisolido: Also, Professor, can you talk a little more about your paradigm shift? You were discussing water and fertilizer and saying that perhaps we should be going the other way. Can you elaborate on that?

Prof. Stewart Rood: Yes.

The Green Revolution was regarded as a huge success, and I think there were elements of it that indeed were; there was a Nobel Prize for Borlaug. What that did is develop types of wheat and rice that were able to cope with high levels of water and fertilizer without toppling over, without lodging.

That was great if your objective was yield, but if you start to think about the use of that water as opposed to alternate uses, and also if you start to think about the costs, including the energy cost, the carbon cost, of producing that nitrogen fertilizer, you may rethink that business.

As David mentioned briefly, I think, the function of yield versus input is not linear, so you get a big return for your first application of water and your first application of fertilizer, but the response tapers off. I suggested as a hypothetical example that you might end up with 75% with only 50% input.

There's a problem with this. There are a number of complexities, but one is that the farmer invests in the infrastructure of the pumps, the sprinklers, etc., so they're going to want to use them to the utmost.

Anyway, that's the nature of that perspective paradigm shift. I think people worldwide are moving in this direction.

Mr. Joe Peschisolido: You also mentioned a different approach to infrastructure—

The Chair: I'm sorry, Mr. Peschisolido, but that ends your time.

[*Translation*]

Ms. Brosseau, you have the floor for six minutes.

[*English*]

Ms. Ruth Ellen Brosseau: Thank you, Chair.

I'd like to thank both witnesses for their participation at committee. Their experience and knowledge is really impressive.

I represent a riding that straddles the St. Lawrence River in Quebec. In the springtime, we had a lot of flooding. Usually the people who live close to the water get it for a few weeks. They're used to it. They get out their boots, and they just deal with the flooding. However, a lot of people were stuck in flooding for months. A lot of farmers weren't able to get out and work the fields. Usually they start a few weeks later, but it was months. A lot of people in Saint-Barthélemy and Maskinongé have lost significant amounts of money. One dairy farmer wasn't able to produce enough grain for his cows, and he had to buy it. It was $100,000 to $150,000 to feed his cows this year. One year it's drought; the next year it's flooding.

I know that in the federal government we negotiate business risk management programs with the provinces. They're supposed to be there. These are tools we have to help farmers when there are issues like this.

Mr. Sauchyn, could you comment on the importance of the government's taking a leadership role in elaborating a strategy, an agroforestry shelter belt?

● (1705)

[*Translation*]

Prevention is better than cure, as we say.

[*English*]

This is an opportunity for the government to show a lot of leadership, work with education, and, if need be, incentivize producers to adopt different practices.

Dr. David Sauchyn: You mentioned leadership, and an important element of leadership is to take a broader view of things—over a large country, but especially over time.

Working with our colleagues in the west, we've clearly documented these wet and dry cycles that reoccur. I mentioned that we have 900 years of climate history. We're in the midst of a wet cycle; not only in the St. Lawrence lowlands but also in parts of Manitoba, this farmland has been under water now for close to a decade, but we know almost certainly that there's going to be a shift and there's going to be a long dry period. This water will not only disappear, but there will also be a shortage of water.

Whereas understandably producers are focused on the next growing season, government needs to have a longer viewpoint and recognize that there are these cycles and that there has to be leadership and programming to enable farmers to withstand periods in which there is too much water and periods in which there is not enough, and to capitalize on those times when the growing conditions are favourable.

Ms. Ruth Ellen Brosseau: It's really important, as you said, to have a long-term vision, because we often see strategies or programs that last a few years, five years, but there needs to be an overall vision for the long term.

Could you comment a little bit more on where we are at with PFRA? In the House we have asked questions of the minister during question period—it is during question period most of the time—and we don't really get answers, but at least we're on record on certain things. Could you comment on where we are at currently with the divestment of that land and the importance of conservation? There are a lot of endangered animals.

Would you speak to that, and maybe to some possible solutions? In your presentation you said that you don't expect the government will restore PFRA, but is there anything they could do right now?

I would like to have your comments on that, please.

Dr. David Sauchyn: I can speak at least to the situation in Saskatchewan. It is the province that had the vast majority of the PFRA community pasture. Also, the infrastructure that was owned by the Government of Canada was primarily, as far as I know, in Saskatchewan.

The government has divested itself of that irrigation infrastructure and the PFRA community pastures. The expectation is that local people will take them over, but the local people tell me they just don't have the capacity to do that.

There was also the expectation that the Province of Saskatchewan would assume management of the community pastures. They don't really have much of an interest either, so the concern is that this community pasture will fall into private ownership, which isn't necessarily bad as long as the private owners are committed to preserving the native prairie. After all, most of the native prairie is gone, and much of what remains is in these PFRA community pastures. That process is ongoing in terms of the fate of these former community pastures.

● (1710)

Ms. Ruth Ellen Brosseau: In the notes that you presented to members at committee, you talked about the expectation in our country, but not elsewhere, that agricultural producers should bear the cost of protecting the ecological goods and services that make our lives possible, and the fact that farmers should not be financially disadvantaged for providing this service that benefits all of us. We talk often at committee about trade and what's going on with our major trading partners, what other countries are doing. In the United States they have agroforestry and they incentivize farmers and communities to adopt certain practices.

Do you think it would be beneficial for the government to adopt a similar measure?

[*Translation*]

The Chair: Thank you, Ms. Brosseau. Unfortunately we won't have time to hear the answer.

I now yield the floor to Ms. Nassif for six minutes.

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

I want to thank the witnesses for their presentations.

I think it is fair to think that there is always room in research to develop better policies, technologies and practices to fight climate change and pursue sustainable development. That said, I am curious to know what we have done and what we are doing now.

My question is addressed to you, Mr. Sauchyn. You have 30 years of experience with climate change. You are aware of methods we have put in place to preserve our soil. In your opinion, are our methods currently adequate to meet immediate needs? Do we have what we need to implement them everywhere in Canada, or is there an urgent need to acquire innovative new methods, for example?

[*English*]

Dr. David Sauchyn: As you can expect, I would say no, we're not sufficiently prepared. We still have some work to do, especially in the context of the loss of institutional capacity within the Government of Canada for assisting at least farmers in the west.

In my experience, much of the focus in the climate change file has been on mitigation—limiting greenhouse gas emissions, storing carbon. Mitigation still remains the focus of policy and practice in Canada, but there is an adaptation imperative. There is increasing awareness that we have changed the climate, and it will continue to change; therefore, we have to prepare Canadians for a changing climate. It's encouraging to see that there were new federal programs announced in the last budget that make resources available for research on adaptation as well as for implementation of that research.

[*Translation*]

Mrs. Eva Nassif: Mr. Rood, did you want to add something?

[*English*]

Prof. Stewart Rood: There is one thing. I acknowledge that the federal government did make a very major investment in aspects related to water and climate change with the global water security program. I'm not sure—David might remember—but I think it's $70 million. It will, I think, be a better-integrated and larger commitment to better understanding the impacts of climate change on water resources, not just in western Canada but across Canada and worldwide. I think that's a really positive thing.

I would guess that David would agree with me that it would have been nice to have had that investment one or two decades ago.

[*Translation*]

Mrs. Eva Nassif: Thank you.

We all know that climate change is having adverse repercussions on everything. However, according to Agriculture and Agri-Food Canada, global warming may have positive aspects for the Canadian agricultural sector, because it may extend growing seasons and reduce the cost of animal feed. However, climate change could lead to serious droughts and more frequent violent storms, as well as contribute to increasing insect infestations and pathogens.

Are Canadian farmers in a position to increase their productivity, given the possible effects of global warming? I'm referring to agriculture in Canada, naturally.

● (1715)

[*English*]

Dr. David Sauchyn: Right. The perception of Canada from places like the U.K. and Washington is that Canada is going to boom under a warming climate because we're a cold country. If you look in more detail....

In fact, we've collaborated with agricultural researchers at the University of Saskatchewan and the University of Guelph. They have these models that simulate the production of various crops. We give them data from climate models. We give them a climate scenario, and they apply it to their crop model. The results are much higher yields in the future—in some cases, yields that are two to three times higher—just based on an increase in temperature and a longer growing season.

However, what they don't factor in is, as you said, the impacts of the pests, the pathogens, the disease vectors, and they don't necessarily factor in the impact of extremes. When they factor in the variability of the future climate, they discover that yes, on average, yields are higher, but they can be very high or very low from year to year. The message we give to agricultural producers is that in the future you could have very high yields, but you could also have no yield at all. If you want to capitalize on a warmer climate, be prepared to have wildly fluctuating yields from year to year.

[*Translation*]

Mrs. Eva Nassif: Mr. Rood, what is your opinion on the matter?

[*English*]

The Chair: Mr. Rood, I think—

[*Translation*]

Mrs. Eva Nassif: I'd like to hear your point of view, please.

[*English*]

Prof. Stewart Rood: It's interesting. This point was also raised by Dr. Desrochers earlier on. I thought his early point that all agriculture in Canada is going to benefit was a little bit flowery. I think David's suggestion is more realistic. There will be some winners and there will be some losers. I would certainly say I'd rather be involved in agriculture in Canada than in Mexico, relative to climate change, but again the issue of variability is interesting.

One other element is that I think Canada will have a greater responsibility globally to help out with food production, partly because of our context and our wealth of physical landscapes.

The Chair: Thank you, Mr. Rood.

[*Translation*]

Thank you, Ms. Nassif.

[*English*]

Now, we have Mr. Longfield for six minutes.

Mr. Lloyd Longfield: Thank you.

Mr. Sauchyn, I grew up in Winnipeg. I hate to admit it was the sixties when I was hearing about PFRA when I was in school in grade 3 or 4. I remember talking to my parents while we were driving down the highway about those rectangular ponds that we saw, and that those were PFRA.

The relationship between PFRA and the federal government and the provincial governments.... If we were to reconstruct PFRA, what kind of a challenge would we face?

Dr. David Sauchyn: I think the major challenge is that you've lost a lot of technical capacity because a lot of people were laid off. They were surplused or retired. It would be difficult to assemble such a large, competent team of soil scientists, engineers, and hydrologists and get them out of retirement.

It would be quite difficult to reconstruct PFRA the way it was, but nonetheless I expect there's going to be some type of agency like that arising from the Government of Canada's current climate change adaptation initiative. There's all this research that's being supported on adaptation, and it has to be translated, as Professor Rood said. The translational research needs to be done. That's something that PFRA was especially good at—taking research to the farmers.

Mr. Lloyd Longfield: In the case of Ducks Unlimited, there's a potential relationship there. As part of our study, is that a group we should be getting some input from?

Dr. David Sauchyn: I would suggest you should, because there's an issue in the Prairies of the draining of wetlands, especially the eastern part of the Prairies. A large amount of land that stored water has been drained.

Mr. Lloyd Longfield: I'm very cognizant of time.

You mentioned a presentation. Is that something you could submit to us? You didn't get a chance to really talk in public with Agriculture Canada, but could it form some information for our study?

Dr. David Sauchyn: This was a major national conference on adaptation to climate change, and I was asked to speak and present the results of our study. There were people from the director level from Ag Canada in the room. I invited them to respond, but they felt that they couldn't in public. Afterwards, in private, they agreed that unfortunately that function had to go.

● (1720)

Mr. Lloyd Longfield: Would the information in that presentation help us? If so, could we get a copy of it?

Dr. David Sauchyn: I could certainly share it with you.

Mr. Lloyd Longfield: Okay. If you could send that to the clerk, it would be wonderful.

Dr. David Sauchyn: It was paid for by the taxpayers of Canada.

Mr. Lloyd Longfield: Well, we might as well use it. Thank you.

Professor Rood, as you were speaking, the pictures of Lethbridge brought back prairie memories. It's great to see that Mr. Barlow pulled you into the study here.

I was thinking of the melting of the snowcaps. The Bow River has some potential challenges with climate change. There are probably some challenges from Waterton. Is losing the snow in the mountains and the spring runoffs that come along with it something that needs to be considered?

Prof. Stewart Rood: Absolutely. Perhaps the biggest influence of climate change on water resources is indeed the change in the snow pattern. What we have is winter warming, so the ratio of rain to snow changes. Especially in the shoulder seasons and at lower elevations, we have shallower snowpacks. The problem there is that you really need that deep snowpack to provide the melt in mid to late summer. Unfortunately, the declining snowpacks are moving in exactly the wrong direction relative to our need for more water for our crops in the future.

Mr. Lloyd Longfield: Not having the snow cover on the Prairies will drive frost deeper, which will drive moisture deeper, so it might not recover in time for the summer season.

Prof. Stewart Rood: That's right. All of these have feedbacks, and unfortunately, a lot of the feedbacks are not what we really want.

The benefit relative to agriculture, unlike forestry or maybe agroforestry, is that since the crops are generally annuals—or if they are biennials or perennials, it's only a few years—there are opportunities to change cropping patterns and to develop some cultivars and things.

There are things that need to be done and there are things that are being done, but it is going to take effort.

Mr. Lloyd Longfield: There's research money that needs to be considered as well, then.

Prof. Stewart Rood: Sure.

Mr. Lloyd Longfield: I have another minute. I wasn't expecting that. I thought I was on a short cycle here, so I'll go back to the health of Prairie soil. We have grasslands that we need to maintain for cattle, but we also need to consider grasslands in terms of soil health and soil management.

Professor Rood, could you start us off with the issues around federally owned grasslands or areas where the federal government could help to preserve grasslands?

Prof. Stewart Rood: I think the situation in Saskatchewan may involve more federally owned lands than in Alberta. In relation to PFRA, and it may be the chronology of it, it's interesting that there were a number of transfers of ownership of infrastructure and properties to Alberta Agriculture. They went from PFRA, but they are still on government management. There are some special areas and some protected areas, so I don't think the situation is as much of a challenge in Alberta as it might be in Saskatchewan.

The Chair: Thank you, Professor Rood.

Now we have Mr. Barlow for six minutes.

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

Professor Rood, thank you very much for being here with us today. Professor Sauchyn, that was great information. I really appreciate the input that you've had.

I'm really glad, Professor Rood, that you brought up the first in, first out issue, which has been for us in Alberta a huge headache in terms of unused water licences or for those who could really access water. Is that an opportunity for us to have a much more extensive discussion on water licences and first in, first out in terms of ensuring the water resources that are available are being used as efficiently and as well as possible? I'm certain there are some opportunities for us to use our resources better.

Prof. Stewart Rood: Absolutely. That principle of prior allocation—first in time, first in right—is really tragic, and it's so inefficient. It does not make sense to allocate something based on conditions of a century ago, so yes, that principle needs to be revisited.

There are one or two fortunate things. One is that during the drought of 2001 in southern Alberta, when it was clear there was going to be a shortage of water, there was a meeting of the major irrigation districts in southern Alberta, along with the provincial water master, who said, “Okay, we're going to have a shortage. What shall we do?” The irrigation director said, “It's easy; with first in time, first in right, we get ours first.” He then had a list of the agencies that would be cut off first . Right at the top of that list was the food processing plant of Lamb Weston, a multi-million-dollar facility that utilized the product from the irrigation crops. The irrigation district said, “We obviously can't have that cut off.” This is the type of leverage that I am hopeful will allow us to revisit this obsolete historic precedent.

● (1725)

Mr. John Barlow: Thanks.

I wanted to touch on PFRA a little. My colleague Mr. Longfield brought it up.

If I recall, 90% of the PFRA land that was federally owned was in Saskatchewan and Manitoba. There was very little in Alberta, and what was in Alberta was given over to the provinces. It was up to them to decide what to do. I know that a few farmers and ranchers in our constituency got together and bought land as a grazing co-op, so there were opportunities there for them to save it.

In terms of research, we've also heard in our study that there is a void in research in commercialization, in getting it on the farm. Perhaps we can get some recommendations from this study that will help us address some of these shortfalls.

Last, before I run out of time, Mr. Rood, in the WISE program, the University of Lethbridge has become quite renowned for some of the water, agriculture, and soil studies you've done there. We've talked a little in this committee about some of the opportunities for new crops that are being grown around Lethbridge, the pulses, lentils, and sugar beets that would never have been grown there even a decade ago. Can you talk about the importance of the ongoing study in crop rotations that are allowing us to conserve our soil, as well as educating our producers and taking advantage of some of those new opportunities?

Prof. Stewart Rood: It's pretty exciting. It involves partnerships with the federal government. In Lethbridge we have a large Agriculture Canada research station. We have a large Alberta agriculture research group. Then we have the university and college. We're all working together.

There are explorations of new crops, as you've indicated. Lentils is a huge one now, and it's quite new. Potato is likely to take over in crop value. I don't know if it's number two or number three. There are some interesting new ones. I showed a picture of sorghum, and I think some other crops will be considered.

I think we need to think a little differently. If the government can provide mechanisms to help farmers experiment, I think it would be quite worthwhile.

Mr. John Barlow: Do I have a little more time?

The Chair: You have a minute and three quarters.

Mr. John Barlow: This is a little outside the box. I'm not sure if you'd be familiar with it, Professor Rood, but in connection with some of those new opportunities and experiments, there has been a lot of work in the Lethbridge area on the poppy farm with API Labs. Is that an opportunity? Do we have to start looking a little outside the box at those types of opportunities as well?

Prof. Stewart Rood: I think poppy is an ideal example. It's interesting that poppies were grown in the Lethbridge area during the Second World War when there were embargoes on export and movements of some of these alkaloids, so yes, that plant is well adapted to our climate. Instead of having the hazard of moving these materials across borders, if we could control this production and maintain it within Canada, I think it would be a really nice opportunity. Yes, poppies make good sense.

Mr. John Barlow: Last, in addressing our water issues, Professor Rood, what would be some of your recommendations? We talked about water licences, but can you put forward some other recommendations in water conservation that we should be taking a look at?

Prof. Stewart Rood: I'm expecting that over time, irrigation will progressively move to the warmer, drier regions for the higher-value crops. We do have a water market in Alberta to allow for the farmer to sell their licence. It's fairly new. I think this should be encouraged. I think it makes sense to grow some of these new specialty crops, some of the vegetables, etc., rather than irrigating hay in all cases. For sure livestock is huge, but at the same time we can grow livestock in the western Prairies quite well in non-irrigated regions.

Again, I think there's going to be a spatial shift, a move eastward in Alberta. I also think that southwestern Saskatchewan has some interesting opportunities relative to further irrigation development.

● (1730)

Mr. John Barlow: Thank you.

The Chair: Thank you, Professor Rood and Professor Sauchyn. We had a great two hours here today.

This concludes our portion of today's climate change study.

Thank all of you so much.

We'll see you next week. The meeting is adjourned.