

Climate change adaptation on the farm and ranch

A meaningful climate change adaptation policy in the agri-food sector must include the families who are impacted by extreme and unexpected weather.

[David Sauchyn](#)

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In Canada's western interior, commercial agriculture has succeeded in one of the least favourable agro-climates on earth, with its short frost-free season and permanent water deficit. Once called "the bread basket of world," today the region is the world's largest exporter of lentils and canola. The latter, Canada's most valuable crop, was developed by Saskatchewan crop scientists. To the extent that adaptation to climate variability and change is achieved through the management and conservation of soil, water and rangeland, the Prairies are good place to reflect on adaptation policy in the agricultural sector.

Adaptation to a dry cold climate has enabled and sustained agriculture across this region, which represents more than 80 percent of Canada's agricultural land. Large parts of the landscape are a geographic expression of adaptation; a mosaic of crop circles, shelterbelts, strip cropping, dugouts, canals and reservoirs (figure 1). This historical adaptation has occurred in response to extreme weather, notably drought, and to seasonal, interannual and decadal cycles in the natural climate regime.

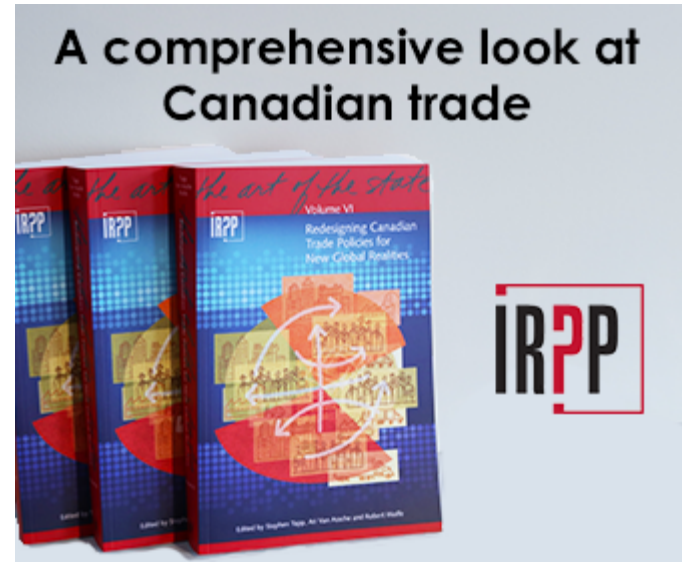


Figure 1
The prairie agro-ecosystem in Enchant, southern Alberta,
a geographic expression of adaptation to a dry, cold climate





Source: Google Earth.

It's important to recognize the distinct ways in which farmers see climate adaptation compared with the way that international experts and policy-makers approach it. The views of local producers are essential to shaping any coherent plan for dealing with the effects of global warming in Canada.

The advocates of proactive adaption to projected climate changes, for the most part, are not farmers. The rural population has a reputation for dismissing the notion of human-created global warming. Social psychology undoubtedly is a factor, but there is a more immediate explanation. If detecting a regional signal of global warming in a variable climate is problematic for scientists, consider the agricultural producer, who experiences weather, not climate, and whose livelihood is sensitive to seasonal cycles and extreme weather events. Under these circumstances, adaptation policy is more effectively framed as fostering the *sustainability* and *profitability* of agriculture, rather than addressing climate change.

Best agricultural practices and policies are essential both to climate change adaptation and sustainable agriculture, the basic principles of which are the same. Maintaining the resilience and biodiversity of agro-ecosystems — through the sustainable management of water, soil and pasture — provides agricultural communities with the natural capital to withstand climate variability and change.

Meanwhile, the national and regional data about climate change is often communicated in a coarse, “top down” way that follows the methodology of the Intergovernmental Panel on Climate Change. The global

climate models present an optimistic view of Canada, where the warming of a cold country is considered good for agriculture. Certainly, agricultural production favours warmer winters and a longer growing season, but so too do pests, pathogens and invasive species. Capitalizing on warming will be further constrained by the impacts of extreme weather and a less predictable climate.

Just as global climate models provide a crude depiction of exposure, secondary aggregate socio-economic data give an incomplete picture of the sensitivity and adaptive capacity of farming operations and rural communities. Agriculture is unlike any other sector of the Canadian economy in several policy-relevant respects: 1) it consists of more than 200,000 independent businesses, most of them family based; 2) it is highly sensitive to fluctuations in weather and climate; 3) it is based on a seasonal production cycle that enables frequent adjustments to crops and practices; and 4) it is inherently adaptable.

Therefore, a meaningful study of climate change in a rural area has to start on the ground, talking to farm and ranch families about extreme and unexpected weather, its impacts, and adaptive practices.

This is the approach taken by [two consecutive](#) five-year studies of rural vulnerability and adaptation to climate change, led by researchers from the University of Regina. They were funded by the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council, and the International Development Research Centre. We achieved results and insights that could only be derived from a bottom up, interdisciplinary research design.

My social science colleagues sent graduate students to live in rural prairie communities to conduct vulnerability and governance assessments. They interviewed hundreds of agricultural producers and local government officials at their kitchen tables and at meetings in town. We shared our data and our climate

scenario models with them, and we sought their reactions and advice.

Probably the most policy relevant response concerned the limits of farm-scale adaptive capacity. We expected producers to tell us that technological innovation will sustain, even raise, crop production in the changing climate. Agriculture is arguably Canada's most adaptive industry, as it increasingly adopts advanced technology and innovative farming practices. But they told us that these technologies are expensive, and that there is only so much extreme weather that a single farm business can withstand. Individual farms have finite technological and financial resources, and they also have limited access to institutional help during times of emergency.

The adaptive capacity of rural agricultural communities depends as much on social and natural capital as it does on financial resources and technology.

Despite a well-earned reputation for self-reliance, agricultural producers recognize the essential role of community and local, informal institutions, such as watershed stewardship groups, churches and social clubs. And they also see the importance of responding collectively to climate change by cooperating with nonagricultural organizations, such as the three levels of government, the Nature Conservancy of Canada, Ducks Unlimited, regional parks and local industries. The adaptive capacity of rural agricultural communities depends as much on social and natural capital as it does on financial resources and technology.

Participants in our stakeholder workshops recommended the establishment of a coordinating agency or boundary organization, with technical expertise that can connect scientific knowledge of climate and water with adaptation options and agricultural practices, and targeted toward regional stakeholder groups and

rural communities.

A federal government agency with exactly that mandate, the Prairie Farm Rehabilitation Administration (PFRA), existed for more than 80 years before it was phased out between 2010 and 2013. The PFRA possibly was the best example anywhere of a national institutional response to the impacts of extreme weather on a vulnerable population (the “dust bowl” drought).

The PFRA implemented government programming related to soil and water conservation and rural development in western Canada, as well as nationally for a few years late in its mandate. With its demise, the federal government also has abandoned most of its responsibility for irrigation infrastructure, soil and water conservation, and management of native (uncultivated) prairie on Crown rangeland.

It is somewhat ironic that our research, which is federally funded, concludes that attrition in federal programs and services is a major impediment to climate change adaptation in rural Canada. These programs and services contributed to maintaining the resilience, viability and adaptive capacity of rural agricultural communities and the sustainability of local agro-ecosystems.

If there is no community-based research or meaningful stakeholder consultation, it is more likely that centralized policy-making around climate adaptation will lack relevance. Although climate change is global, its impacts and the adaption to it are local. Adaptation is carried out on farms and in rural communities, by the people who are most directly exposed to weather and climate. Their perspectives on climate change tend to be different from those of the policy-makers and their advisers.

This article is part of the [Canadian Agriculture at the Cutting Edge](#) special feature.

Photo: A storm-damaged barley field is shown near Cremona, Alberta, on Tuesday, August 9, 2016. THE CANADIAN PRESS/Jeff

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