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デブラ・デイビッドソン博士はアルバータ大学の環境社会学の教授です。1999年から同大学に勤務し、環境と気候変動への社会的反応、特にエネルギーと農業・食品システムに関する研究・教育に取り組んでいます。最近ではキラム年次教授賞を受賞し、気候変動に関する政府間パネルの第5次評価報告書の筆頭著者でもあります。一連の研究は、*Science*、*Nature Climate Change*、*Climatic Change*、および*Environmental Research Letters*などの国際誌に掲載されています。近著として、『*Oxford Handbook of Energy and Society*』（2018年）、『*Environment and Society: Concepts and Challenges*』（2018年）の共著を担当しました。デイビッドソン博士は1998年にウィスコンシン大学マディソン校で社会学の博士号を取得しています。


Dr. Debra Davidson is Professor of Environmental Sociology at the University of Alberta, where she has been working since 1999. Her research and teaching are focused on social responses to environmental and climate change, particularly in our energy and agri-food systems. She was the recent recipient of the Killam Annual Professorship Award, and was a Lead Author on the 5th Assessment Report of the Intergovernmental Panel for Climate Change. Her research has been featured in journals such as *Science*, *Nature Climate Change*, *Climatic Change*, and *Environmental Research Letters*. She is the co-author of two recent books, including the *Oxford Handbook of Energy and Society* (2018), and *Environment and Society: Concepts and Challenges* (2018). Dr. Davidson received her Ph.D. in Sociology from the University of Wisconsin at Madison, in 1998.

気候危機への対応における社会的な障壁と実現可能性

～アルバータ州の農家での実例をもとに～

概要

私たちのアグリフードシステムに気候変動の緩和と適応を実施する緊急の必要性があります。しかし、気候変動は単に科学的または技術的な問題ではありません。気候変動に対処する上で最も顕著な障壁のいくつかは、経済的、政治的、文化的構造を含む組織的なものです。しかし、農家は積極的なエージェントであり、彼らの多くはこれらの障壁にもかかわらず有益な実践に従事しています。しかし、私たちの農業システムを変革するためのより高いレベルの組織的支援は依然として不可欠です。このプレゼンテーションでは、高度に工業化された農業セクターがあり、気候変動の影響に非常に敏感な地域であるカナダのアルバータ州の事例について説明します。アルバータ州の農家への調査とインタビューに基づいて、アルバータ州の農家の間で観察された構造的障壁と機関(媒介)について議論します。私たちは、このセクターの気候変動を促進することができる一連の戦略で締めくくります。



Social and organizational dimensions of climate change mitigation and adaptation in agriculture: A case study of Alberta

Abstract

There is an urgent need to implement climate change mitigation and adaptation in our agri-food systems. Climate change is not simply a scientific or technological issue, however. Some of the most salient barriers to addressing climate change are organizational: including economic, political and cultural structures. However, farmers are active agents and many of them are engaging in practices that are beneficial despite these barriers. However, higher levels of organizational support for transforming our agricultural systems is still essential. In this presentation, we discuss the case of Alberta, Canada, a region with a highly industrialized agricultural sector, and one that is highly sensitive to the impacts of climate change. Based on surveys and interviews with Albertan farmers, the structural barriers, and agency observed among Albert's farmers is discussed. We conclude with a set of strategies that can enhance the climate transformation of this sector.

Social and organizational dimensions of climate change mitigation and adaptation in agriculture: A case study of Alberta

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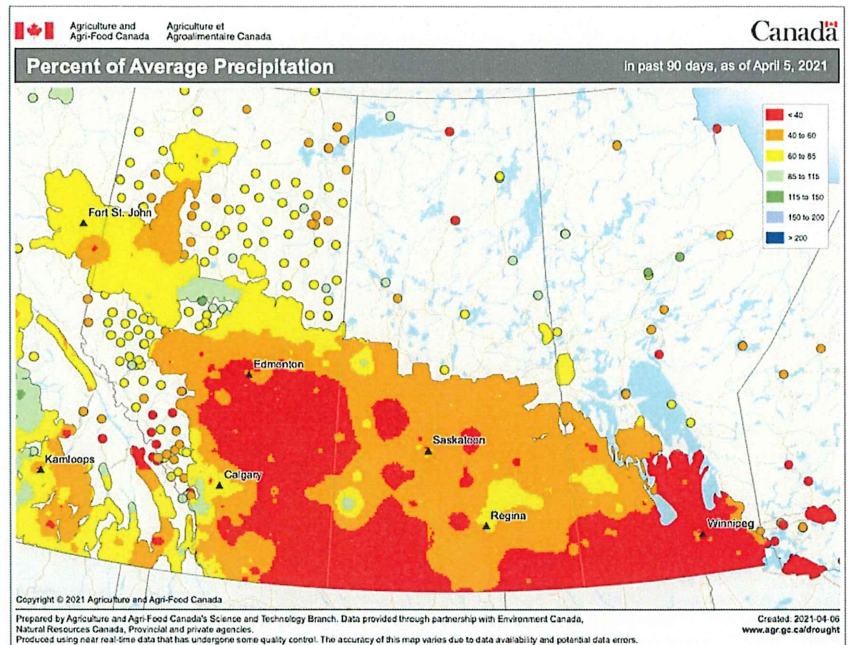
Brief Overview of Alberta Agriculture

- Since time immemorial, various forms of agriculture were practiced by Indigenous peoples in the region now known as Alberta.
- Alberta has been occupied by European settlers who began engaging in a very different form of farming over a century ago.
- Farming has continued to play a major role in Alberta's economy since that time.
- In recent decades, several policy and technological changes have favoured large-scale, highly industrialized production of a small number of commodities, including beef, canola and wheat, primarily for export.
- Consequently, the number of farms has declined, to about 40,000, while average farm size has increased to an average of 1,230 acres, and the average age of farmers is over 50 years.



Recent Extreme Events attributed in part to climate change

- Several disasters that have been attributed to climate change have affected harvests in recent years including flooding, drought, unexpected freeze events, and most recently, supply chain disruptions.
- Other projected climate impacts include pest and weed outbreaks, decline in soil moisture, and more variable water availability for irrigation.
- The need for farmers in the Canadian Prairies to adapt to the impacts of climate change is urgent.

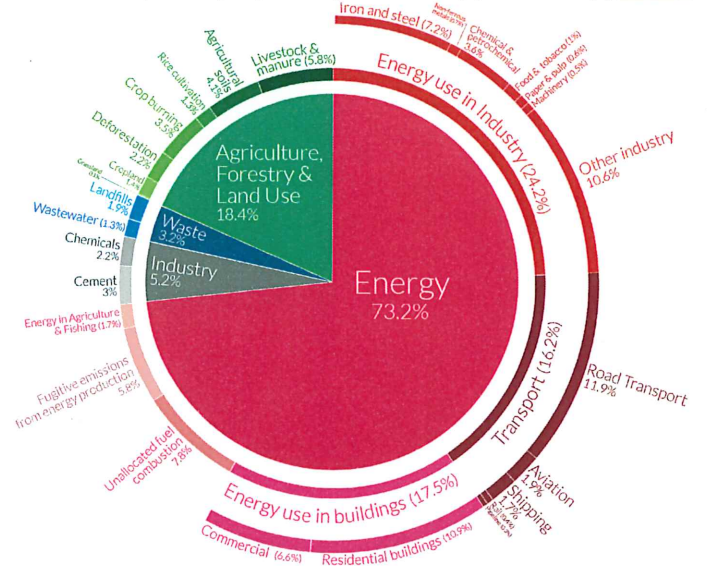


Mitigation in agriculture systems is also needed!

- Agriculture is also a major contributor to climate change, particularly in highly industrialized systems like Alberta's.
- Main sources of emissions:
 - use of fossil fuels in heavy equipment
 - application of chemicals esp. nitrogen fertilizers
 - enteric digestion and manure from livestock
- We have several strategies for reducing emissions, including precision agriculture, soil regeneration, changing livestock feed, adoption of renewable energy on the farm.

Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.



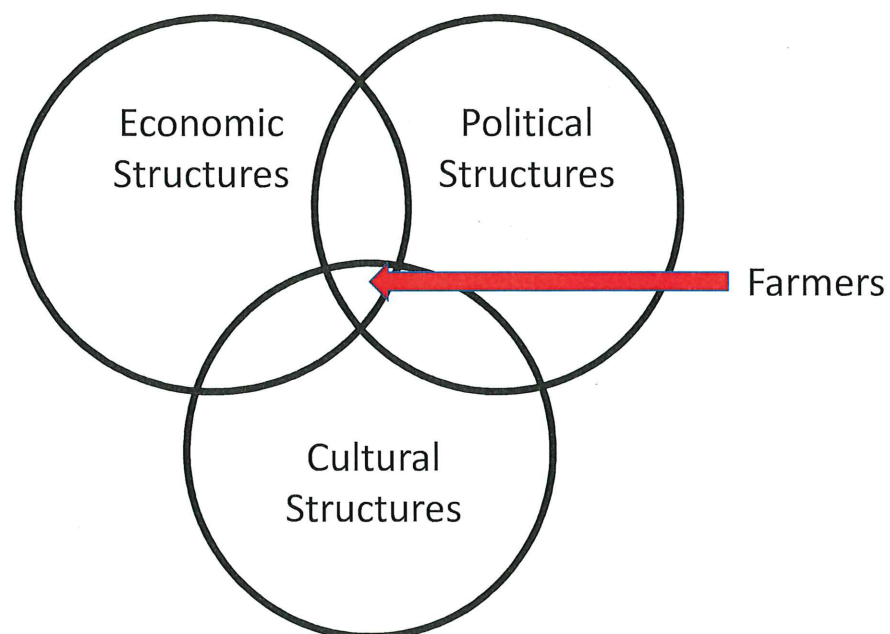
OurWorldinData.org – Research and data to make progress against the world's largest problems.
 Source: Climate Watch/the World Resources Institute (2020). Licensed under CC-BY by the author Hannah Ritchie (2020).

Prospects for Climate Mitigation and Adaptation in Alberta Agriculture

As with so many other sectors of our socioeconomic systems, recognizing the problem, and even having strategies to address the problem, do not mean that the problem will automatically be addressed.

I will draw from a recent case study involving 301 surveys and 31 interviews with Alberta farmers to highlight the social and organizational dimensions of transitioning our agricultural systems.

Three key social structures constrain opportunities for changes in farmer behavior



Economic 'lock-in' effects in Alberta Agriculture

Operating in a global staples marketplace means no producer control over price, and those prices are highly volatile.

Industrialization means capitalization, so farmers must acquire expensive heavy equipment, accumulating debt in the process.

Shrinking profit margins incentivize further production growth for economic survival.

Younger generation of farmers can't afford to enter the sector, so the average age of farmers goes up.

Political 'lock-in' effects in Alberta Agriculture

Agriculture policies in recent decades have been written to support large farms, and industrialization, favouring a small number of crops, for export. Making operational changes will require policy change.

Neoliberalism has been a strong feature of Alberta politics, which favours minimal regulation, and free markets. This limits the types of policies likely to be introduced.

No policies have been established to support a coordinated effort at climate mitigation or adaptation in agriculture. Some policies, like disaster relief, may actually discourage adaptation.

Cultural 'lock-in' effects in Alberta Agriculture

- Many farmers abide by cultural norms that dictate farm cleanliness (weed free, e.g.), conformity, economic success, which conflict with many strategies favouring mitigation and adaptation.
- Farmers tend to live in rural communities, with a strong conservative political orientation that influences their reaction to certain policies, such as carbon taxes.
- Farmers form close-knit groups, group borders reinforce information silos, and within these groups distrust of outsiders and misinformation can circulate.
- As one outcome of this, we have deeply instilled support for the goal of production maximization as opposed to a balanced management system that puts environmental and climate protection on the same level.

Another notable outcome: We observe very high levels of climate denial in this group

Survey Responses to the Following Belief Statements	Percent of Responses who agree
Climate change is occurring, and it is caused mostly by human activities	10
Climate change is occurring, and it is caused more or less equally by natural changes in the environment and human activities	36
Climate change is occurring, and it is caused mostly by natural changes in the environment	28
There is not sufficient evidence to know with certainty whether climate change is occurring or not.	19
Climate change is not occurring	2
Prefer not to answer	4

Breaking the Impasse to Support Climate Mitigation

What I have just described is a system in which multiple processes pose barriers to mitigation. But, all systems are dynamic, and we can't forget that farmers are autonomous and reflexive human beings who are capable of changing course.

Many farmers are already adopting several climate mitigative practices

Practice	Adopted	Would Consider	Not Adopted	N
Leave/spread crop residue in fields after harvest	97	2	1	260
Zero-tillage	82	12	6	252
Use GPS, precision agriculture, or variable rate technology for fertilizer application	81	16	3	250
Installed LED lights	80	19	1	299
Manure composting	79	19	2	148
Include perennial, forage, and/or legume crops in rotations	71	23	6	231
Improved the energy efficiency of buildings	68	30	2	289
Introduce legumes or other nitrogen fixers into grazing lands	67	29	3	147
Maintain wetlands	62	23	14	222
Fence off riparian areas and sensitive ecosystems to protect from livestock	60	27	12	139
Planted permanent/perennial vegetation on marginal lands	51	33	16	250
Plant cover crops	36	46	18	192
Restored wetlands	33	42	25	209
Installed solar panels	19	67	14	276
Production of bioenergy	10	61	29	165
Built a covered manure storage facility	5	41	54	99

Those farmers most likely to adopt these practices:

- Have a strong conservationist identity
- Have a strong learning orientation

Most frequent stated reasons for adoption include:

- Wildlife protection
- Soil and water quality
- Economic benefits

Note: Beliefs and concern about climate change does NOT predict best management practice adoption in this group!

Change is happening in other ways too



We observe an upsurge in young ecologically-minded farmers seeking to enter the sector.

New organizations such as *The Young Agrarians*, *Organic Alberta*, and *Farmers for Climate Solutions* are providing support for new farmers.

These new farmers are seeking to change the dialogue in the agricultural community to generate awareness about climate change, and introduce different farming techniques.

Strategies to Enhance Climate Change Mitigation and Adaptation in Alberta Agriculture

Farmers, consumers and stakeholders need to put pressure on government to enact:

- Policies to support farmers, not agri-businesses: supporting new technology adoption, and value-added, diversified, multi-functional farming operations
- Government support for transition, in the form of financial and informational needs.
- Engagement with farmers themselves to craft those support systems, so their knowledge and values are incorporated.

Strategies to Enhance Climate Change Mitigation and Adaptation in Alberta Agriculture

Policy change is slow, but farmers, consumers and stakeholders can also take action now:

- Supporting farmer-led organizations that are working for change.
- Building relations between farmers and urban consumers.
- Get food systems on the agenda: Bring the urgent threat of climate change to our agri-food systems into our conversations.



Thank you!