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Policy Brief #2: Okanagan Bioregion Food System Project

Climate Change Mitigation in the Food System

Spring 2021

This policy brief is part of a series developed for the Okanagan Bioregion Food System Project. Each policy brief is connected to an area of local food policy development identified based on a review of local government comprehensive plans in the Okanagan bioregion. These briefs are designed to give context to the policy challenge and bring forth instructive examples to support local-level decision making.

To access all the policy briefs and get more information about the project visit: www.kpu.ca/isfs/okanagan-bioregion

Authors:
Emily Hansen & Grace Augustinowicz

Corresponding author:
Emily Hansen
Research Associate, ISFS
emily.hansen@kpu.ca

Introduction

Climate change is having an impact on the lives of people and the environment in the Okanagan bioregion (CIP, 2018; Pinna Sustainability, 2020). Increasingly severe wildfire seasons, flooding of lakes and rivers, and seasonal weather pattern shifts are creating new challenges related to protecting environmental integrity and ensuring community well-being (Pinna Sustainability, 2020). The severity of climate change impacts, and improved predictive modelling has made climate change mitigation and adaptation planning a key priority for local governments.

Agriculture contributes to and is impacted by climate change. In the Okanagan, increasing summer temperatures and reduced summer precipitation are creating challenging conditions for growing food. Wildfires and floods also have an impact on food growing lands as well as farmer livelihoods and rural economies. Global food supplies are impacted by climate change, with desertification and water scarcity affecting production in some of the world's most important food growing regions (Niles et al., 2018). At the same time, emissions-intensive agricultural and food system

GHG Emissions from Agriculture in the Okanagan

In 2016, agriculture in the bioregion generated 113,000 tonnes of CO_2e.

Broken down by sector, 32% of emissions were generated from on-farm fuel use, and 6% of emissions generated by crop production. Crop production emissions are primarily those released from the application of fertilizer and manure (Sussman et al., 2016). Livestock production also contributes significantly to local agricultural emissions. In 2016, 37% of emissions were generated from ruminant livestock (enteric emissions) and 25% of emissions were generated from manure handling. This assessment identifies livestock production in the bioregion is a significant driver of regional agricultural GHG emissions.

practices contribute to increasing greenhouse gas (GHG) emissions and climate change (Moyer et al., 2020). In 2016, agriculture accounted for 24% of global anthropogenic GHG emissions (Climate Watch, 2020). When other food system activities including processing, distribution, waste management etc. are factored in, the food system accounts for over 35% global anthropogenic GHG emission (Niles et al., 2018).

While climate change planning is an increasing area of focus, agriculture and food systems have not been well integrated into climate change mitigation strategies at the local level (Moreau, Moore, & Mullinix, 2012). Novel research conducted by Carnegie Mellon University recently completed the first comprehensive food system emissions assessment for Allegheny County, which includes the City of Pittsburgh and surrounding municipalities. The study found that the County's food system generated 37 million tonnes of CO_2e (or 3.1 tonnes of CO_2e per capita). Studies of this kind could provide the information needed to develop climate change mitigation policies for the food system at the local level. This policy brief explores the ways of connecting the critical work in local food systems development and climate change planning. The examples cited in this brief represent innovative approaches from around the world and are intended to be instructive for local level policy development in the Okanagan bioregion, and across British Columbia. Recognizing the impact of provincial, state and federal policies on climate mitigation some higher level policies are also highlighted.

Local Government Initiatives

- Connect climate change mitigation and food systems planning
- Support farmers to increase soil carbon storage and improve soil health
- Promote regenerative agriculture practices
- Protect and enhance on-farm biodiversity
- Invest in waste-to-energy infrastructure

Provincial, State and Federal Initiatives

- Climate impact food labelling
- Carbon pricing/fee and dividend programs
- Adopting national climate friendly farming policy frameworks
- Promote sustainable diets

Policy and Planning Initiatives

Local Government Initiatives

Connect climate change mitigation and food systems planning

Successfully linking climate change planning and local food system development requires coordination across policy domains and the development of high level policy directives. The City of Toronto (Ontario), recently issued a policy update that identifies the need for the food systems to be integrated with local climate change planning. Toronto's policy update identifies key mitigation strategies related to procurement, consumption and waste. High level policy also recognizes the roles of a number of municipal department stating that *"implementation of the actions will be led by TPH (Toronto Public Health), in collaboration with several other City divisions, including Environment and Energy (EED), Solid Waste Management Service (SWMS), and Social Development, Finance and Administration (SDFA)"* (p. 4).

The County of Santa Clara (California) developed an agriculture plan that links climate change mitigation, through the preservation of agricultural land and provisioning of ecological services, with the development of a resilient regional food economy. By setting high level policy and planning goals for climate change mitigation in the food system, the local government demonstrates awareness of the critical links between climate resilience, and the development of local and regional food systems.

Municipal Leadership to Reduce Food System GHG Emissions

Signatories of the C40 Good Food Cities Declaration commit to working with citizens to achieve more sustaianble diets by 2030. As of 2019, 14 cities had signed on as Good Food Cities. As a C40 signatory, the City of Toronto has committed to supporting citizens in making shifts to more sustainable diets. In developing strategies, they importantly recognize the socio-economic, and socio-cultural factors impacting what people eat. The City has pledged to promote sustainable diets working closely with marginalized communities to develop meaningful and culturally relevant policies to support diet shifts as a climate change mitigation strategy.

Climate Change and Indigenous Food Sovereignty

A recent report released by Human Rights Watch draws attention to the disproportionate impact of climate change on the food security and well-being of Indigenous communities in Canada. Temperature shifts and the degradation of ecosystems caused by climate change are making it increasingly challenging for Indigenous Peoples to practice traditional foodways and culture. The high cost of importing food to rural and remote First Nations is also exacerbating health and food security challenges. This report includes a call to action for federal agencies to better address climate change impacts on health and food security and help communities adapt. At the same time, all levels of government have a responsibility to drastically cut emissions in alignment with the target outlines in the Paris Agreement, and to help limit the severity of impacts experienced by marginalized and vulnerable populations across Canada.

The Government of Yukon has integrated important considerations of the food security and Indigenous food sovereignty into their territorial Climate Change and Green Economy Strategy. The plan includes the goal to *supply more of what we eat through sustainable local food production* (p. 57) which recognizes the impacts of climate change on traditional food supplies and food imports. The plan also identifies Indigensou governments as key partners in this work.

Photo credit: Okanagan Nation Alliance

Support for farmers to increase soil carbon storage and improve soil health

Meaningful efforts to mitigate global climate change require dramatic reductions in GHG emissions that include efforts to "draw down" current concentrations of atmospheric CO_2 (IPCC, 2019). Soil carbon sequestration works with biodiversity above and below ground to capture carbon dioxide with photosynthesis, drawing it underground as soil carbon, and capturing it in soil organic matter through microorganism and mineral associations (Moyer et al., 2020). The integrity of soil carbon stores importantly rely on ongoing effective land and soil management.

Soil carbon sequestration in agricultural landscapes, including rangeland and natural pasture, has been identified as an important strategy to support climate change mitigation (Paustain et al., 2016). Research from the 4 per 1000 Initiative suggests that an increase in soil organic matter (a determinant of carbon sequestration potential) of 0.4% per year in agricultural soils globally could offset 20-35% of anthropogenic GHG emissions (Baveye et al., 2018). Additionally, carbon-rich soils can also contribute to climate change adaptation by increasing resilience of agricultural ecosystems to climate and weather related impacts that could negatively affect agricultural productivity (Smuckler, 2019).

The Marin Carbon Project (MCP) is a collaboration between agricultural organizations, universities, government agencies and farmers that focuses on increasing carbon sequestration in agricultural landscapes in Marin County (California). These partners work together to conduct research, and support farmers to increase carbon stocks by adopting management practices proven to increase soil organic matter, and carbon sequestration potential. The program also supports farmers in accessing funding and resources necessary to support their efforts. Marin County was one of the first counties in California to include targets and mitigation strategies for agriculture in its Climate Action Plan.

Financial incentives, in the form of direct payments of tax credits, can encourage farmers to adopt soil management practices for climate change mitigation. For example, the California Healthy Soils Initiative is a multi-agency initiative that allocates funding to support agricultural management practices that contribute to increased soil carbon sequestration.

Promote regenerative agriculture practices

Regenerative agriculture describes a farming systems that aims to restore resilient ecological systems. Key principles of regenerative agriculture include reduced tillage, the use of cover crops (especially nitrogen fixing ones such as legumes), diverse crop rotation, integration of livestock, and reduced use of synthetic fertilizers and pesticides.

Park City (Utah) has identified regeneration as one of four priority areas in local climate and sustainability planning, with a focus on increasing carbon sequestration in agricultural soils and protected open space. In 2018, the City began to explore the use of regenerative agriculture on city owned land. They have introduced cattle and rotational grazing to control noxious weeds, and restore soil and ecosystem health.

Boulder County (Colorado) also considers regenerative agriculture in their sustainability planning efforts. The County maintains approximately 100,000 acres of protected open space, 25% of which is dedicated for agricultural uses (Climate Reality, 2019). In collaboration with farm operators, who rent land from the County, and researchers at Colorado State University, Boulder County is exploring the impact of regenerative agriculture on these lands. Regenerative agriculture practices being explored include reduced tillage, cover crops and compost application. It is estimated that if 1,000 of the 25,000 acres of municipally owned agricultural land were restored using regenerative practices, it could sequester 20,000 tonnes of CO_2 — four times what the city has achieved through other emissions reduction strategies. Boulder also participates in Restore Colorado, a public-private partnership which builds connections between agricultural and restaurant communities to raise funds that support the adoption of regenerative farming and land management practices.

How can Regenerative Agriculture Support Climate Mitigation?

Research and technical application of regenerative agriuclture suggests that adopting these practices can contribute to both climate change adaptation and mitigation by improving soil health and biodiversity, reducing dependence on fossil fuel based fertilizers, and reducing the impacts of floods and drought events (Moyer et al., 2020).

Project Drawdown ranks the wide adoption of regenerative agriuclture as #11 on the list of 80 low-tech soloutions to mitigate GHG emissions (FFCF, 2019; Hawken, 2017)

Soil Carbon Measurement and Mapping Initiatives

Mapping and measurement of soil carbon is important in order to establish a baseline that will guide the development and implementation of mitigation policy and programming. While some farmers may track, and measure soil quality at the farm scale, measurement and data collection at the landscape level, with a specific focus on carbon sequestration is less common.

In Australia, the Soil Carbon Research Program was an extensive soil sampling and data collection program to improve the understanding of the impact of climate, land use and management practices on soil carbon levels across the country. At the community level, the Soil Health Coalition (Erin, Ontario) works with voluntary participants to measure and track soil health, and carbon sequestration over time. With this initiative there is a strong emphasis on community collaboration, public education and knowledge sharing engaging farmers, landowners, citizen scientists and the broader public. This grassroots initiative is based on the work of the Soil Carbon Coalition.

Promote and enhance on-farm biodiversity

The Okanagan bioregion is home to a high percentage of the province's sensitive ecosystems, and many rare and endangered species (SOSCP, 2013). Many of these critical ecosystems and rare species are located in valley bottoms along where human settlements and activities, including agriculture, are also located. Healthy and diverse ecosystems help support agricultural productivity and mitigate climate change through water retention and carbon sequestration in agricultural landscapes (FFCF, 2021; Moyer, et al., 2020). However, modern food production systems and practices have eroded biodiversity, and impacted the provisioning of ecosystem services. This erosion and loss

of natural landscapes and their biodiversity also disproportionately impacts the health and food sovereignty of Indigenous populations (Capitals Coalition, 2018). Enhancing on-farm biodiversity can mean both diversifying cropping systems and protecting and enhancing natural areas on-farm to support greater biodiversity and contribute to climate change mitigation.

Credit Valley Conservation (CVC) (Ontario) employs agricultural outreach workers with specific skills to support and engage with the agricultural community to enhance ecosystem integrity across the Credit Valley Watershed. CVC's Rural Water Quality Program provides access to grant funding to landowners who engage in activities to protect aquatic ecosystems and water quality. Grants can support 100% of the cost for natural area enhancement and creation, tree planting and livestock fencing as an ecosystem protection measure. CVC also supports grassland restoration and biodiversity enhancement through other grant programs and direct farmer outreach.

The Ecological Services Initiative in the Township of Langley was a pilot project that provided a combination of farmer support, peer to peer learning and funding for riparian habitat enhancements on farms. The pilot project developed in partnership with the Township of Langley, the Langley Sustainable Agriculture Foundation and Farmland Advantage also engaged in monitoring to measure the collective impact of on-farm habitat enhancement and conservation efforts across the landscape. The New Acre Project developed by ALUS (Alternative Land Use Services) works with local government and community partners to support farmers enhancing habitat areas on their farms. The New Acre Project is active in Alberta, Saskatchewan, Manitoba, Ontario, Quebec and PEI.

Investment in waste-to-energy infrastructure

In Canada, 4% of total GHG emissions are attributed to organic waste in landfills, much of which is food waste (NZWC, 2018). While this represents a small portion of total GHG emissions, they are almost entirely avoidable. Municipal waste-to-energy facilities can support local level climate mitigation goals, and help to advance circular economy strategies. In addition to reducing emissions produced from organic waste decomposition in landfills, these facilities produce renewable energy as well as nutrient-rich compost for agricultural use.

The Surrey Biofuel Facility processes Surrey's organic waste, as part of the City's Rethink Waste Program. The facility turns food and organic waste into 100% renewable natural gas (RNG) for waste collection vehicles and district energy, while also producing high quality compost. The facility can process about 115,000 tonnes of organic waste per year. Both residential and commercial food wastes are processed at the facility.

The City of Toronto has an extensive residential and commercial organic waste collection program that began in 2002. The City's organic waste is processed in one of two anaerobic digesters producing biogas, and compost that is distributed for use in landscaping and non-food gardens. The Anaerobic Digestion Facility located at the Edmonton Waste Management Centre, can process up to 48,000 tonnes of organic waste per year and divert it from landfill.

Provincial, State and Federal Initiatives

Climate impact food labelling

Labelling food with associated carbon footprint could be an effective strategy for increasing consumer awareness about the environmental implications of food choices and can contribute to behaviour change. The Danish Agriculture and Food Council has pushed for this type of mandatory eco-labelling. Implementing mandatory climate impact labelling policies can be challenging because they involve consultation with, and agreement of, consumers, trade partners, and the private sector.

"Keeping Nature in Our Future" - Biodiversity Conservation in the South Okanagan

Keeping Nature in Our Future developed by the South Okanagan Similkameen Conservation Program is a comprehensive plan for protecting and enhancing biodiversity in the South Okanagan, and across the bioregion. The plan emphasizes local government actions including land use planning, funding and incentivising biodiversity conservation, advancing science and information sharing, and supporting partnerships and collaboration. The report also identifies the existing tension between biodiversity conservation and farming. Understanding and communicating the direct benefits to agriculture of biodiversity conservation, including climate change mitigation, will be key in advancing a biodiversity strategy that meaningfully engages agricultural stakeholders in biodiversity conservation.

Carbon pricing/fee and dividend programs

Pricing carbon is a popular strategy used around the world to reduce GHG emissions and encourage a shift to renewable energy sources. In Canada, the federal government has announced a plan to increase the federal carbon tax by $15 per tonne by 2030 (Government of Canada, 2020). Carbon pricing schemes are often seen as detrimental to agriculture sectors, causing increases to the cost of production and threatening net farm revenues. However, it has also been demonstrated that while operational costs could increase in the short term, revenues from the tax could be beneficial to farmers over the long term by boosting investment in alternative energy as well as mitigation programming and strategies (Citizens Climate Lobby, 2019). These innovations and investments are expected to benefit agricultural communities and farmers in the long terms by decreasing dependence on fossil fuels and increasing resilience by building soil health and ecological integrity. The federal carbon pricing plan is also accompanied by incentives to help farmers shift away from fossil fuel and GHG intensive processes. Canada has developed a 10-year $98.4 million Natural Climate Solutions for Agriculture Fund and a $360 million fund that will help preserve wetlands and grasslands and improve carbon sequestration in agricultural soils (Cross, 2020).

In New York, a state law recognizes the potential to increase GHG mitigation through soil management, introducing a "carbon farming" tax credit that would provide direct payments to farmers for improving carbon sequestration potential on their lands.

Adopting national climate friendly farming policy frameworks

Recent research by the grassroots organization Farmers for Climate Solutions identifies that both the EU and U.S. outspend Canada on a per acre basis when it comes to agri-environmental programming. The organization's 2021 budget recommendations outline a plan to invest $300 million nation side to reduce agricultural GHG emissions and lay the groundwork for widespread climate friendly farming policy development at the federal level.

Promote sustainable diets

Food and nutrition guidelines and recommendations are another strategy employed by governments to encourage a shift to more sustainable diets and food choices (Mason & Lang, 2017). For example The new Canada Food Guide makes recommendations for diets high in fruits and vegetables and lower in animal products and protein sources. The Nordic Nutrition Recommendations, developed in 2014 were among the first dietary guidelines developed that emphasized environmental sustainability and climate change impacts related to food choices.

Conclusion

Agriculture and food systems contribute significantly to global GHG emissions while also being impacted by the effects of climate change. Locally, tracking and understanding the impacts of climate change on food systems is challenging. As a result agriculture and food systems have not been well integrated into climate change mitigation strategies. Even at a federal, provincial and territorial government levels, measuring food system -related emissions including those from embodied energy in fertilizers, refrigeration, food waste emissions etc. is a challenge because these impacts are often accounted for in other economic sectors. Grassroots and community level advocacy has significantly advanced conversations and policy development in this domain. Importantly, developing effective climate mitigation strategies for the food system requires developing and sustaining partnerships between researchers, extension personnel, farmers, policy makers and consumers.

Research and Extension for Climate Change Mitigation in Agriculture

Research and extension networks help farmers improve their operations and adapt to new challenges through knowledge development and sharing. The BC Agriculture and Food Climate Action Initiative is active in climate change adaptation and mitigation research and knowledge sharing across the province.

The Farmer-Led Research Program administered by the Ecological Farmers Association of Ontario provides support for farmers engaging in on-farm research, and sharing their findings with the broader community. This program addressed a number of production issues of concern to farmers, including issues related to climate change adaptation and mitigation.

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About the Okanagan Bioregion Food System Project

These research briefs were developed as part of the Okanagan Bioregion Food System Project. Communities and governments are increasingly looking to strengthen regional food systems as a way to address many complex agriculture and food challenges. This multidisciplinary research project, initiated by ISFS and regional partners, can guide conversations among communities and decision-makers seeking to advance their regional food system.

To access all the policy briefs and the full project report visit: www.kpu.ca/isfs/okanagan-bioregion

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