



*"The ultimate goal of farming is not the growing of crops,
it is the cultivation and perfection of human beings."*

- Masanobu Fukuoka, The One Straw Revolution

It is 2050. A bird's-eye view of Treaty Four territory, the heart of the northern plains, reveals the endlessly varied, fluid contours of a resilient prairie agri biome. Prominent now are expanses of native and restored grasslands and aspen parkland, linked by green corridors. Dotted by a million sloughs, the landscape is laced together by serpentine swales and creeks. Half the territory is now natural and restored ecosystems. Hedge-surrounded farmland traces the natural contours of watersheds. The features of intensive, well-treed foodsheds stand out around cities, towns, and villages. The iconic grain elevators may be gone but the bison are back.

Still faintly visible is the checkerboard of fields and grid roads superimposed on the land 175 years ago. The Dominion Land Survey, launched in 1871, was a mechanism by which colonial forces cleared the plains of its Indigenous peoples and ecosystems. An influx of European settlers and invasive species replaced a sustainable economy with an extractive agrifood system that reflected the mechanistic mindset of Europe's Industrial Revolution. Treaties, meant to foster peaceful coexistence, had been betrayed.

Productivist agriculture was facilitated by the construction of 250,000 km of grid roads, which crossed the landscape at one-mile intervals. Ironically, the roads that once segmented the landscape have become a means of reconnection. In the post-productivist era, some one hundred thousand kilometres of little used roads, road allowances, and abandoned rail lines have been repurposed as green connectors populated with native species.

Over the past 30 years, the social-ecological landscape of the prairies has been re-formed. It has been a remarkable and clearly visible transformation from dull monoculture to vibrant diversity;

from disparity to common cause; from separateness to unity. We had come to understand that the ultimate goal of the agrifood system was not producing food; it was “the cultivation and perfection of human beings.”

With this ultimate goal in mind, we came to the understanding that the key to changing the system was changing ourselves. The real work was to replace the colonial mentality, the overt and subtle racism, the desire to dominate people and nature, with the recognition—long understood by the Indigenous population—that everyone and everything is related—*wahkohtowin*. At every level of society—in communities, neighbourhoods, schools, businesses, organizations, and governments—the people of Treaty 4 were working hard to make things right—*kwayeskastasowin*. To restore the land, the rights of the Indigenous people had to be restored. Today, the spirit of Treaty 4 is honoured.

Today, we are safe and we are secure. The forces that have torn our world apart—over the past two centuries and the past three decades—have schooled us, and we have drawn together as one people. United in our diversity, our unity is reflected in our beautiful prairie land: what was frayed is being mended. The love that is our politics, our economics, our science, our religion is transformative. We see it reflected all around us.

What Just Happened?

Our vision formed in the context of a new global reality. The transformation of the prairies, including Treaty 4, was energized by two opposing global forces, one disintegrative, the other integrative. The fury of the disintegrative forces left us with little choice but to choose a new way forward. A cascade of social, economic, geopolitical, technological, and environmental events had broken the world’s brittle social-ecological order. Humanity had been severely tested: the old world order was being rolled up and a new one spread out in its stead.

Although this storm had been forming for decades, a major shock was the first 21st century global pandemic, in 2020. In a matter of months, our way of life was upended. A series of pandemic surges followed. Though immediately threatening, these were minor compared to the shocks triggered by climate change. Witnessing synchronous failure in multiple systems, we were forced to accept that, unless drastic changes were made, as quickly as possible, whole swaths of the planet, including entire nations, would become uninhabitable

As strange as it sounds, the string of catastrophes turned out to be our salvation. We were forced to change and as difficult as the process was, our lives were now filled with meaning and common purpose. After the first 30-years of our collective effort to build a new order, we could already see signs of a new world, resilient, sustainable, equitable, just, and incredibly vibrant! Gross National Product may be down but Gross National Happiness was at a new high!

MAKING THE VISION REAL: MAIN FEATURES IN BRIEF

In brief, the critical consequences and choices made here and around the world since 2020 are:

- A complex set of shocks disrupted the global food trade, requiring every nation and region to place its primary focus on local/regional production for local/regional markets.
- With commodity markets drastically reduced, export oriented prairie agriculture has refocused on supplying the local/regional market. Exports continue at a reduced level, congruent with the carrying capacity of the land.

- With an influx of immigrants from highly stressed areas, the population of the region has doubled. Initially challenging, the result has been a significantly larger and more diverse market and workforce. Immigrants bring new capacities, ideas, and vibrancy, contributing to a thriving agrifood economy.
- An agroecological/regenerative approach to farming has largely replacing productivist, extractive agriculture. Local/regional production provides 85% of our food.
- As it was understood that a sustainable agrifood system must occur in the context of a resilient ecosphere, we were inspired by the “Half for Nature” movement: conserves and restored grassland and aspen parkland ecosystems and wetlands now comprise 50 percent of the landscape. Biodiverse species are thriving. The controlled reintroduction of the plains bison had been a key to grassland restoration.
- Indigenous people are the largest single segment of the population. Now, as a result of a difficult process of decolonization, they are spiritually, culturally, and economically emancipated and enjoying renewed physical and mental health.
- The vast expanses of conservation lands create spaces for the resumption of aspects of the Indigenous economy and culture, providing a renewed source of country foods and medicines, and spaces for cultural renewal.
- Towns, villages, and city neighbourhoods, are increasingly vibrant places for varied activities: entrepreneurial, cultural, educational, scientific, technological. Surrounding foodsheds provide nutrient-rich food, but also business opportunities and meaningful work.
- The application of regenerative/agroecological farming systems has restored soil organic matter to pre-settlement levels. The prairie is now a major carbon sink, and carbon credits and other green fees have become significant income sources. This has been facilitated by the diversion of perverse subsidies to green payments to farmers. By reducing input costs, farmers are capturing a larger share of gross income, making farming more lucrative. Ensuring that farms are “internally optimized” rather than “externally dependent” is the goal of sustainable agriculture.
- Younger people are again attracted to farming. The rural community is thriving with new jobs in farming, conservation, energy production, tourism, and food/biomaterials processing. Distributed, renewable energy is now a major source of jobs and farm income.
- Major public costs for medical care have been substantially reduced and mental health has improved through the adoption of healthier diets and lifestyles, and a closer connection to the land. The wealth diverted from repairing illness now supports enhanced public services.

SIX INTERCONNECTED AREAS OF ACTION

Establishing a new agrifood system on the prairies required a wide range of measures in six main areas: environment, economy, culture, technology, policy, and diet. As illustrated in our system map, 140 lines of action were required to make our food system secure, equitable, and sustainable.

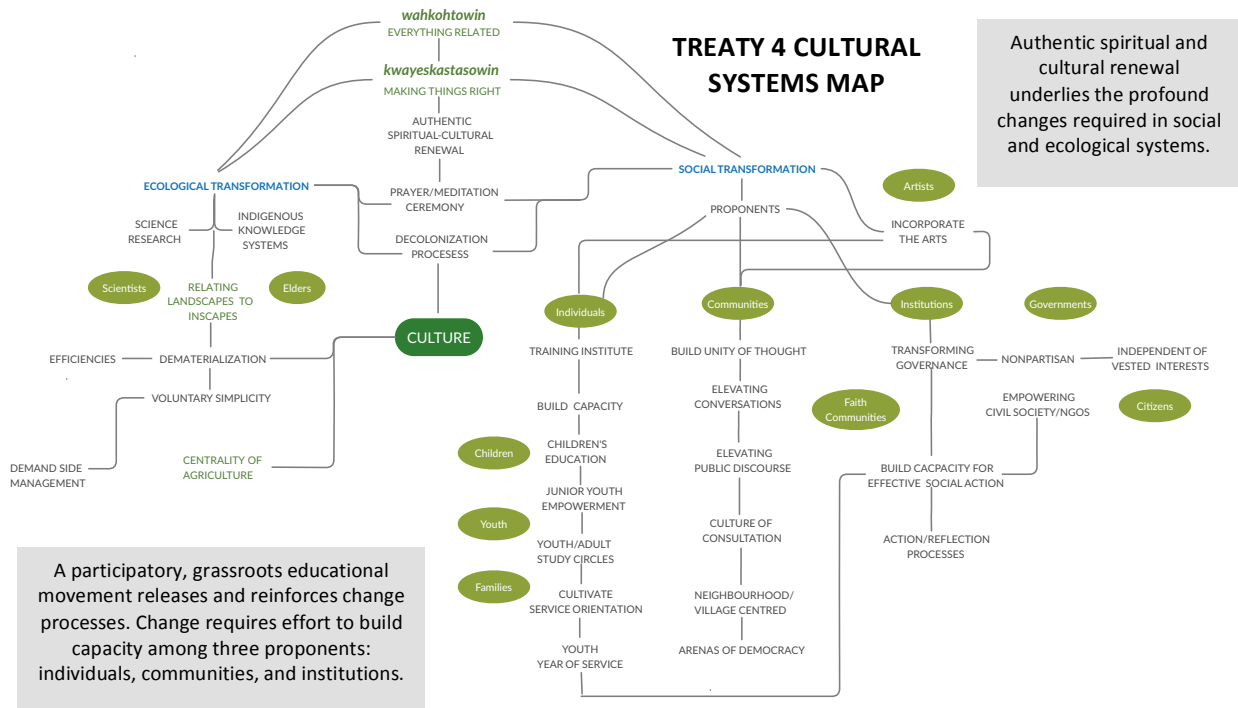
CULTURE



Hereditary chief of the Young Chipewyan First Nation, George Kingfisher, and Mennonite farmer, Ray Funk, in conversation about reconciliation, in the documentary *Reserve 107*

“The landscapes of our making match and reflect society’s cultural inscapes.”
 - Stan Rowe, Home Place

We understand that our thoughts are—quite literally—our reality. They are reflected in our social-ecological environment. The dysfunction of the agrifood system was, in large measure, a consequence of a culture based in concepts and values skewed by colonialism and focused on self-interest and the materialistic imperative of continuous economic growth. The social-ecological crisis forced us to focus on what was most important. A profound shift in public discourse occurred. Starting with elevated conversations at the individual and community levels, this discourse expanded into the media and other institutions. A new prairie agrifood system required a new cultural orientation. As indicated in the system map, some twenty lines of action were employed to support cultural changes critical to social *and* ecological transformation.



- As we came to understand the relationship between cultural inscapes and landscapes, much thought was given to reshaping inscapes through authentic spiritual and cultural renewal. The reemergence of a rich Indigenous culture fostered a wider appreciation, at the spiritual level, of *wahkohtowin*, the kinship of people and all parts of the natural world. The settler populations awakened to a deeper appreciation of what it means to be part of this land. With this came the willingness to set things right—*kwayeskastasowin*—among peoples and with the land. Traditional Indigenous Knowledge (TIK), built through millennia of life on the prairies, helped shape the new vision and practice.
- While increasing secularization throughout the 20th and early 21st centuries served to clear away superstitions, false doctrines, and corrupt practices that had perverted religion, it had also undermined a sense of meaning and purpose. The rediscovery of authentic spirituality renewed a sense of dedication to the commonweal and invigorated the process of reconciliation and community building. Similarly, science had been subverted to serve private interests. Industry had effectively taken control of research, development, and extension services, ensuring that corporate rather than the public interest was served. A shift toward public control and funding ensured that agrifood science served long-term public interests.
- Appreciation of four perspectives or domains of reality helped shape an integral framework that informed the change process. This approach integrated and balanced meaning making, cultural, behavioural, and systems domains, as well as individual and collective interests and interior and exterior modalities. Integrating these domains adds valuable knowledge that helps communities meet complex challenges.
- Agriculture was identified as *the* central economic activity supporting civilization, thus requiring the most attention. It was understood that health, climate regulation, and other environmental goals could be achieved through constructive investment in building farmers' capacity to produce quality food, regenerate land, and sequester carbon. Farming became a particularly favoured profession. This led to new economic, political, and environmental policies and approaches.
- Cultural change was supported by a grassroots participatory educational movement. This community-based initiative involved activities to empower children and youth, as well as adult relearning. The intent of the program was to build capacity to understand reality and engage in effective community building processes. The world had trained us in a certain mentality; we needed to retrain ourselves in a new one. A critical component of the change process was the use of the arts: storytelling and songs, theatre and film, and the visual arts enlivened the discourse shaping society.
- Prairie culture now encouraged broad consultative processes to build an effective consensus around transformative change. This led to the renewal of governance structures, including the rejection of partisan politics.

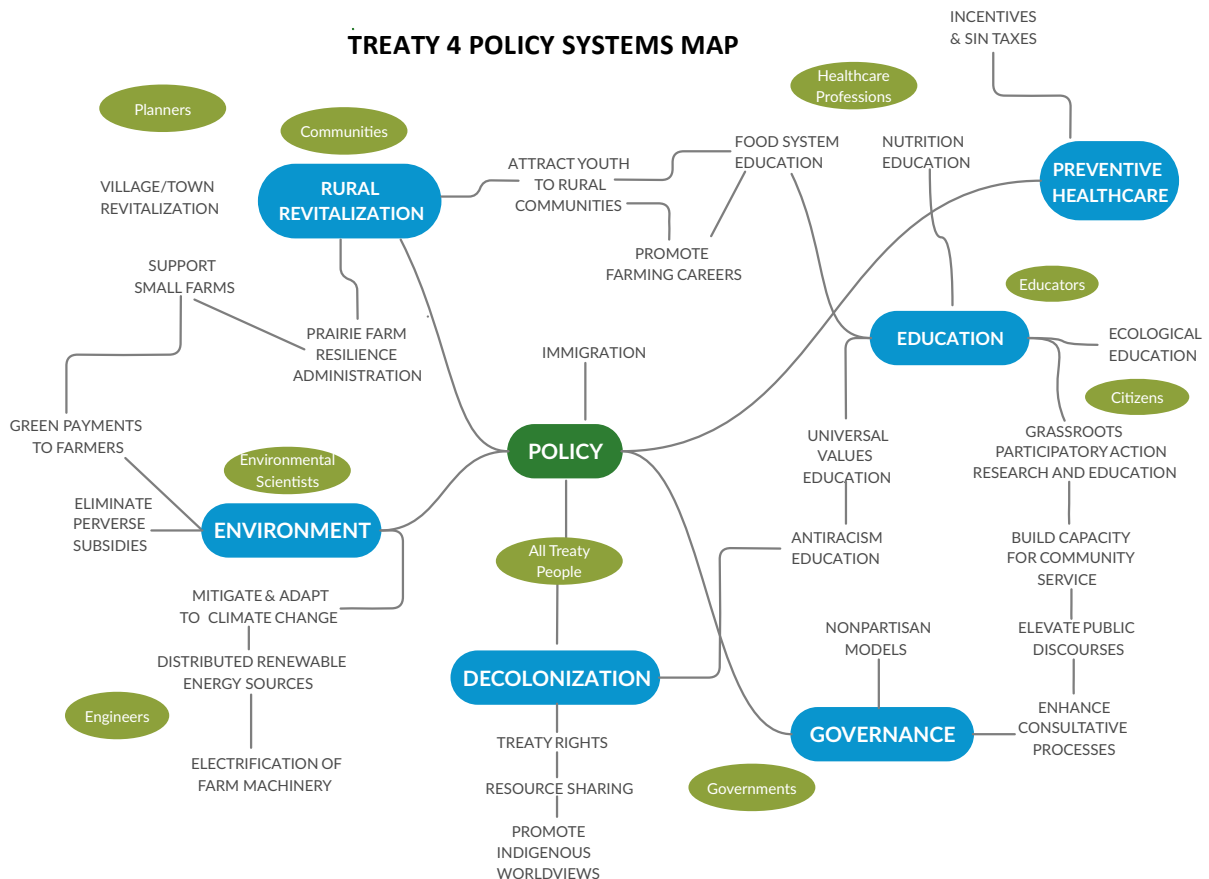


Adapted from <https://doi.org/10.1016/j.oneear.2020.04.010>



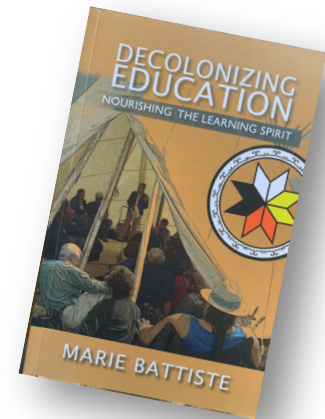
“The central place in every culture should be occupied by agriculture.”
 - Colin Duncan, *The Centrality of Agriculture*

While the Treaty 4 change movement began at the grassroots level in civil society, policy formation soon involved governing institutions, including municipal, provincial, Indigenous, and federal governments. Policy change was enacted primarily in the economic, social, environmental, educational, and healthcare areas. As indicated in the policy systems map, 25 lines of action were pursued.



Policy measures focused on three areas:

- **Rural Revitalization** – Global conditions resulted in ever-larger mass migrations as people in marginal areas sought safer, more stable places. Despite our own issues with instability, on humanitarian grounds, Canada was compelled to admit millions of social and environmental refugees. Immigration doubled the population of the prairies. While this resulted in considerable disruption in the initial stages, ultimately the increased population meant a larger market and more human resources and innovation. At first, in-migration centred in a few urban centres, but gradually populations fanned out to the rural areas, helping to revitalize smaller communities and creating a pool of entrepreneurs and labour for a diversified agrifood industry. As a consequence, rural communities became increasingly viable and vibrant and a new rural culture emerged. Creating rural communities that are attractive to youth and young adults became a priority and was made more feasible by the proliferation of remote educational and working opportunities.
- **Education** – Now that agriculture was seen as central to the economy, a new focus was placed on educating children and youth about the agrifood system. Health and nutritional education was emphasized, contributing to consumer demand for quality food. Farming became a valued career choice and began to attract youth. Some features of the reformed educational approach included study of Indigenous resource management and the expansion of experiential learning, which kept youth more engaged in education. At the college level, it was found that agricultural research and extension, which had largely been captured by industry, should again return to the public domain and refocus on sustainable systems.
- **New Systems of Governance** – Governing institutions are ultimately responsible for public policy, but policy development in the public interest had been undermined by a partisan political approach to governance that catered to vested interests. Progress required the transition of political systems to a non-partisan approach. By 2030, extreme social-ecological conditions called for the formation of unity governments in which party affiliation became increasingly meaningless. Ultimately, it was determined that political parties were outmoded, and a new electoral system was created in which local representatives collaborated to form regional or national governments. Simultaneously, a shift occurred toward increased authority at the local, municipal, and Indigenous levels. As the Indigenous population increased and Treaty rights were respected, Indigenous governments became more important and effective. Meanwhile, Indigenous representative became a larger portion of all governing institutions, enriching the consultative process. Freed from vested interests, perverse subsidies could be eliminated and wealth taxes increased. Resources were now focused on supporting pro-social and pro-sustainable activities, including regenerative agriculture, health promotion, and education.

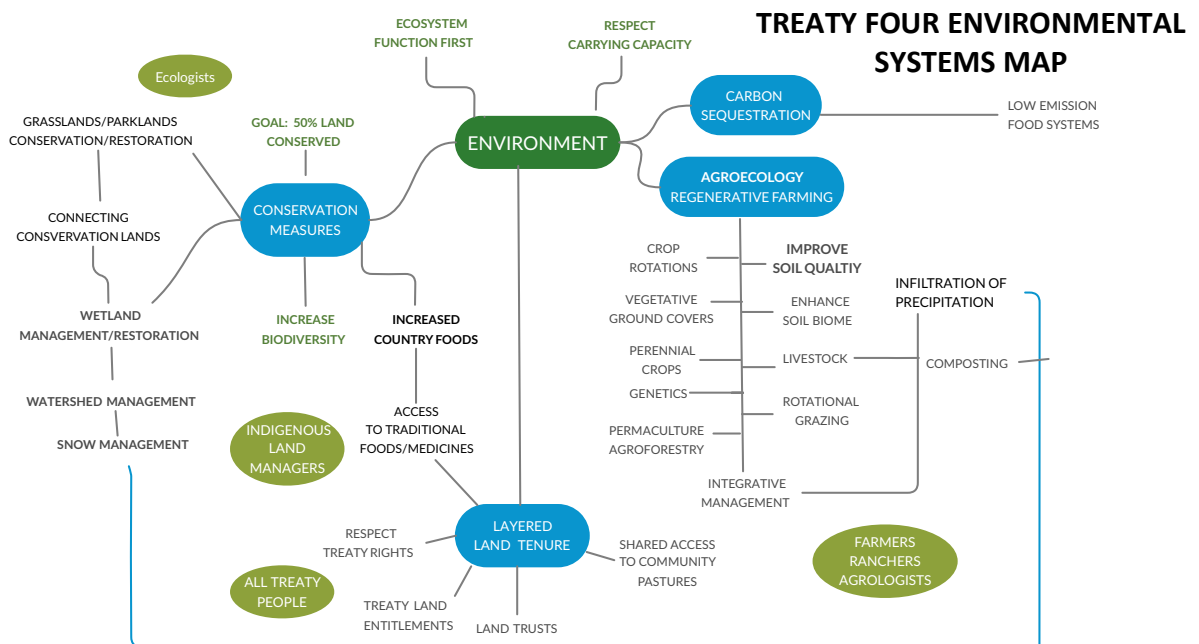


“The Proper Use of Land poses, not a technical nor an economic, but primarily a metaphysical problem.” – E. F. Schumacher



Regenerative and conventional farm fields seen side by side

In the 21st century, sustainable, resilient, and equitable agricultural systems were needed to feed a growing human population. Initially, the productivist model of agricultural intensification was thought to be the answer. While it produced high yields of low cost commodities, with its reliance on increasingly energy-intensive and costly off-farm inputs, it had resulted in a loss of ecological function and critical ecosystem services—without providing economic security for farmers. A key consequence of productivist agricultural intensification was landscape simplification. The prairie biome had become among the most altered in the world. A new approach tailored to the realities of Treaty 4 territory incorporated 24 lines of action.

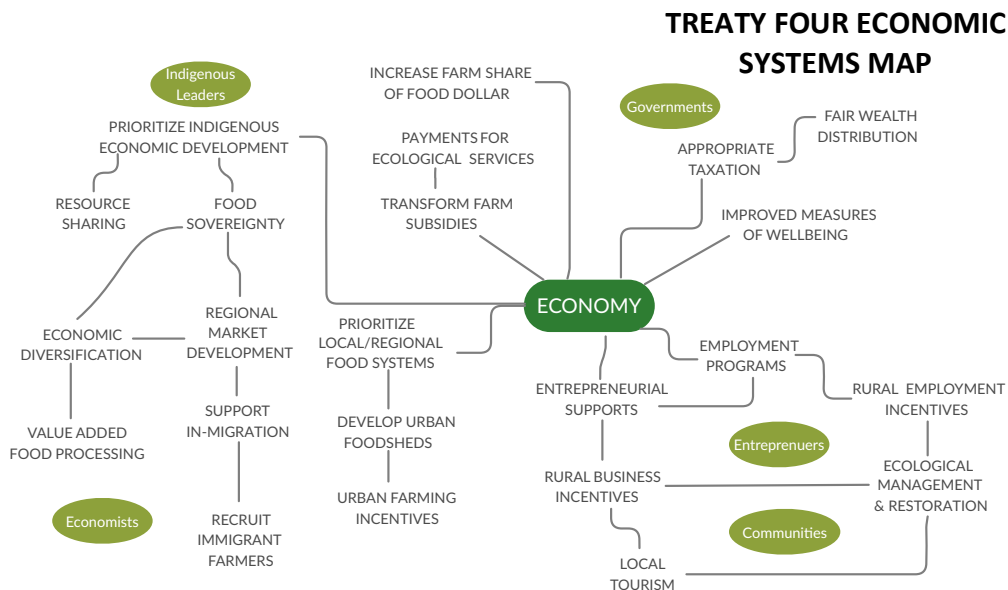


- Regenerative farming/agroecology emerged as a viable alternative to productivist models. But for agroecology to remain resilient in perpetuity, it must exist within the wider context of healthy and resilient ecosystems that provide a range of ecological and climate services, support biodiversity, and provide restorative spaces for our own species. Ecologists began to engage with farmers and other stakeholders, other disciplines, and policymakers in education and advocacy to foster landscape design for sustainable and resilient biodiversity services. The “Half for Earth” proposal, now popular throughout the world, was adopted as a goal for the prairies. By 2050, conservation lands occupied 50% of Treaty 4, resulting in the restoration of the landscape described at the outset of this paper.
- Valuing ecosystem function above a singular focus on production and consumption ultimately strengthened the economy, bolstering sustainable productivity and improving health. Practices that protect the natural environment also protect human and animal health, thus reducing health care costs.
- To accommodate multiple users and uses, a creative approach—layered land tenure—was adopted. While farmers retained the “right to farm” they also accommodated other users, such as Indigenous people involved in hunting and gathering, and uses such as ecological services. In return, farmers received Payment for Ecosystem Services (PES). Rather than becoming exclusive “preserves”, conservation lands support production of “country foods” that were particularly important in supplementing the diets of Indigenous people.
- To support efforts to improve the environmental impacts of farming, a Prairie Farm Resilience Administration (PFRA) was created by governments, along the lines of the Prairie Farm Rehabilitation Administration of the 1930s. The main areas of focus for ecological restoration included:
 - Conservation and restoration of grasslands, aspen parklands, and wetlands.
 - Conserving natural tree cover and strategic afforestation with native species.
 - Wetland conservation and watershed management.
 - Regenerative farming methods, including designing farms to manage and conserve water; the use of cover crops and effective rotations; a primary focus on increasing soil organic carbon; reduced and zero tillage; and rotational livestock grazing.
 - Devising methods to safely use urban wastes, including human waste, to build soil.
- Another key concern was greenhouse gas emissions from the conventional agrifood system. Research indicated that the emissions coming out of our farm and food systems were the direct downstream byproducts of petro-industrial inputs. As one 2020 report put it, “Farming does not create GHG emissions; petro-industrial farm inputs create GHG emissions. As we have doubled and redoubled input use, we have doubled and redoubled the GHG emissions from agriculture. From this novel observation comes an inescapable conclusion: *‘Any low-emission food system will be a low-input food system.’*” The low-input, regenerative farming practices adopted on a large scale by 2050, along with the other changes to the agrifood system described in this paper, substantially cut GHG emissions from agriculture.



“Sustained agriculture means maintenance first—attending to the health of soil, water, plants, and animals—ahead of attention to yield and production.”- J. Stan Rowe, Home Place

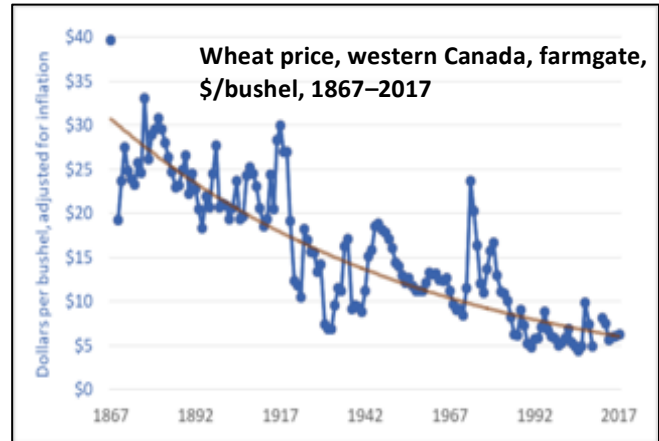
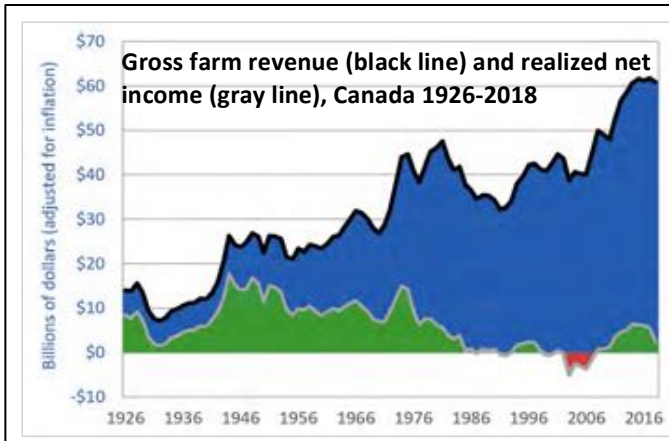
Global forces had reshaped the agrifood industry in the first half of the 21st century. This, and the understanding that productivist agriculture does not provide stable incomes for farmers, strengthen rural communities, optimize health, or support environmental resilience led to a new economic approach for prairie agriculture, involving 21 lines of action.



The Failure of High Input Farming

An analysis of the economics of Canadian farming systems showed that productivist agriculture is *economically* unsustainable. A 40+ year experiment in high-output, high-input, high-energy-use, high-emission food-production systems has reduced net farm incomes to near zero, multiplied debt levels, and reduced the number of farm families on the land by a third in a single generation.

- As indicated in the graphs below, the farmgate price of wheat (the main prairie crop), adjusted for inflation, had fallen progressively since the early days of prairie farming. To compensate, production per acre had to increase along with farm size, which involved more off-farm inputs and borrowing. However, input costs had grown progressively, until they consumed more than 95% of farm revenue and left farmers with just 5%.



GRAPHS COURTESY NATIONAL FARMERS UNION

- Transnational input-supply corporations and banks pocketed nearly \$1.5 trillion dollars of the value created by Canadian farms since 1985.
- Farmers have dealt with their inadequate cash flows by borrowing. With Canadian farm debt at more than \$106 billion by 2020, with debt increasing by \$2.7 billion per year, with interest payments of \$2.6 billion per year, and with realized net incomes from the markets averaging just \$1.5 billion per year, the Canadian farm sector was becoming insolvent.
- Governments were transferring \$3 billion a year to farmers through farm-support programs.
- Farm families were being forced off the land. By 2020, there were fewer than 193,000 farms in Canada, down from 280,000 in the 1990s. The loss was even more dramatic in Treaty 4 territory, where half of the farms have disappeared since the 1980s.
- The number of young farmers was down 68% since 1995.

Adopting Low-Input Farming

It is no wonder interest in low-input alternatives exploded. A key to adoption of new economic approaches was a change in the way of measuring economic well being. Multiple initiatives were enacted to build a new economy that delivered on these measures, including:

- Supplying the local/regional market, rather than exporting commodities, became a top priority. A large increase in population due to immigration expanded the local market. The first objective was to nourish our own population sustainably, and to export only within the carrying capacity of the land.
- Multiple means to ensure the delivery of fresh, high quality, nutrient rich foods to consumers were devised, with emphasis on direct farmer-consumer relationships.
- Diversifying the agrifood industry stimulated entrepreneurship and employment.
- More farmers and rural communities earned income from energy production, by owning or hosting wind and solar projects.

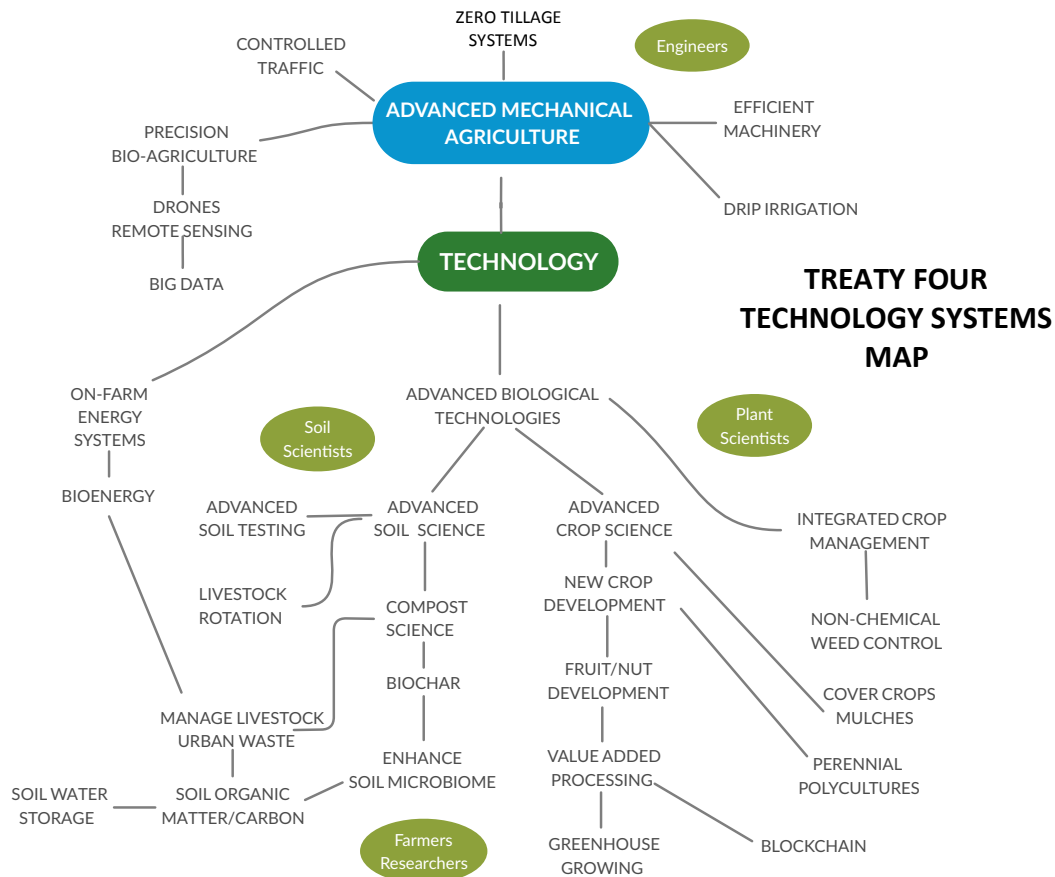
- Government subsidies were targeted to support regenerative farming. The crop insurance system was adapted to support regenerative agriculture.
- Measures were developed to ensure a larger percentage of the food dollar went to farmers.
- Expanding urban and peri-urban agriculture aimed for 20% of food grown within and around cities and towns. This created multiple opportunities for entrepreneurs and a significant new area of employment.
- Real Value Added focused on processes that improved nutrition, such as increasing pre- and probiotic activity and growing and processing nutritional supplements and plant-based medicines.
- Sustainable livestock production created new business opportunities.
- With the decline in international tourism, local eco- and cultural tourism became a thriving part of the prairie economy.
- Practices such as job splitting/sharing, reduced workweeks, and guaranteed income programs reoriented attitudes to work and income needs. People focused more time and energy on personal development and community service rather than material accumulation.
- To honour Treaty relationships, resource revenue sharing with Indigenous communities was initiated. Food sovereignty became an economic driver for Indigenous communities.



“The overall vision guiding pathways of technological development and use cannot come from technology itself; it must be informed by essential ideals, spiritual insight, and actual participatory practice that promote the common good.”

- Matt Weinberg, Technology, Values, and the Shaping of Social Reality

Technological innovation advanced at a rapid pace and the people of Treaty 4 took full advantage of its positive applications. Progressive research has made technology relevant for small-scale farmers. Consequently, some 24 lines of action focusing on enhanced production systems and materials recycling have played a crucial role in the change process.



The agrifood system adopted a sophisticated set of technologies based in the biological sciences and advanced mechanical agriculture.

- A refined approach to soil fertility aimed to increase soil organic matter/carbon and enhance the soil microbiome. Precision testing to manage soil fertility was widely adopted.
- Weather extremes, including increased drought and flooding, called for major changes in soil and watershed management. Maximizing infiltration and water holding capacity of soils became critically important.
- Zero and minimum tillage methods that did not require pesticide applications became the norm. Soil enhancements and cultural practices resulted in effective pest (weed, disease and insect) management regimes.
- Perennial grains and polycultures were developed. PMax, a technology that enhances the success rate of establishing perennial grassland polycultures, was commercialized.
- Production of native species seeds became a significant industry segment.
- Refined spectral light quality of greenhouses permitted advancements in vegetable and fruit production.
- Drip irrigation improved water conservation and regulation while reducing soil erosion.

A key to input cost reduction was energy self-reliance. Distributed energy production and storage allowed farmers to reduce costs and profit from selling energy.

- Reduced farm size, improved efficiency and conservation, and the adoption of alternative fuels such as hydrogen and bioethanol made from wastes, changed the energy demands and climate impacts of the agrifood system.
- The electrification of farm machinery, which could be powered by renewables, was made more efficient when ultra-light farm equipment was developed.

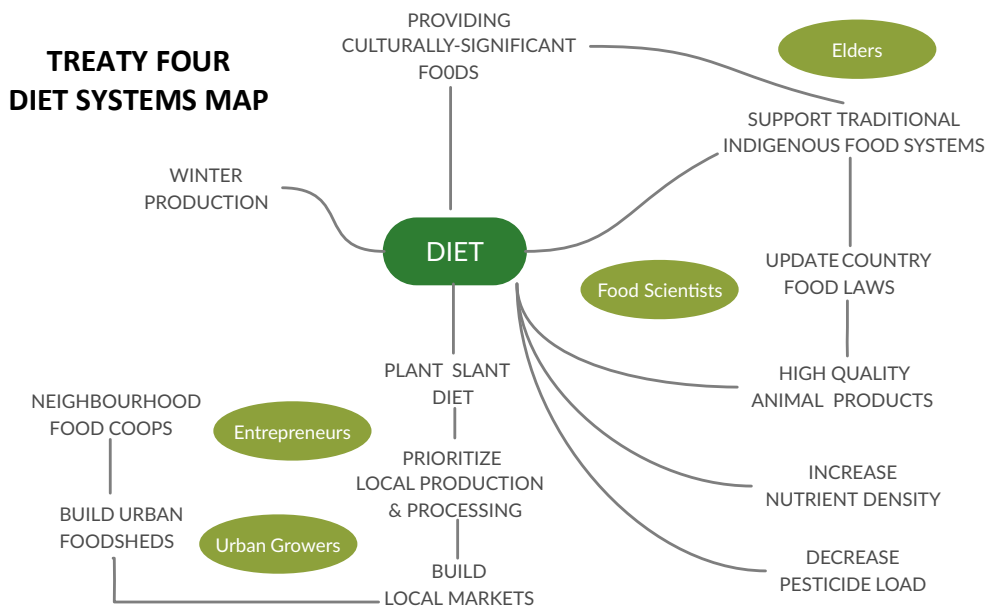
DIETS



“Eating is an agricultural act.”

- Wendell Berry, *The Pleasures of Eating*.

Understanding the importance of dietary choices for health increased throughout the early decades of the century, resulting in a slow but steady shift in demand for diversified food products. This was driven by two forces: On the one hand, deteriorating health and the corresponding rise in health care costs, which were becoming unsupportable, and, on the other, growing evidence about diet as a foundation of health. A third factor was an understanding of the impact of diet on the environment. Nine key lines of action were adopted.

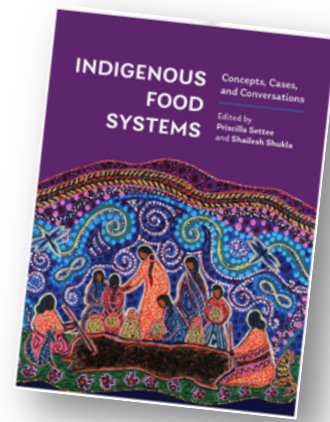


An explosion of diversified, local specialty crops of nutrient-rich berries, fruits, nuts, herbs and spices bred for the prairie climate resulted in a dynamic new stratum of micro-farms and food processing businesses. Herbs and spices were processed into both culinary and medicinal uses. Revitalized villages became known for unique specialties, contributing to local tourism.

Demand grew steadily for food with low chemical residues. A crisis of faith in industrial suppliers also increased demand for locally produced foods supplied by producers known to consumers. In addition to direct producer-consumer relationship/transactions, the use of systems like block chain, to track products and guarantee quality, became the norm. This crisis also resulted in increased support for the expansion of urban and peri-urban farming, local efforts to produce a wider variety of fresh food and to store locally grown food for the winter months instead of importing foods, and increased indoor growing of nutrient rich foods in winter. A “greens revolution” supported a widely adopted diet of natural, unprocessed foods.

As a general rule, a heavily plant-based diet was determined to promote health, sustainability, and climate stability. Interestingly, while the gradual transition to a largely plant-based diet led to a decrease in gross consumption of animal products, livestock producers refocused to meet demand for high-quality animal products. In the grasslands, livestock would continue to play an important role in sustaining agriculture. Although industrial-style livestock production waned, small-scale production, using practices like rotational grazing, proliferated. Farmer-led research facilitated development of a popular mixed cropping system, NMax, which is widely used to produce a balanced, nutrient dense porridge that is widely used as a staple food substitute for staples like rice and wheat.

Meanwhile, Indigenous people began to refocus attention on traditional, country foods. With the renewal of the prairie and parkland ecosystems, traditional plant and animal foods, as well as medicines, became more plentiful. Populations of bison, the animal that had played a key role in maintaining healthy grassland ecosystems for millennia, but had been hunted almost to extinction, recovered. Small bison herds became commonplace and are again an important dietary staple for Indigenous people. Indigenous food systems supported a viable food sovereignty movement. Elders worked with youth to transfer knowledge about gathering and preparing traditional foods. Indigenous chefs developed innovative recipes and popularized diverse country foods.



In towns and urban neighbourhoods, citizens and institutions organized to:

- Establish city food sheds, including buying land to form land trusts to create more opportunities for small producers. Efforts were made to eliminate food deserts and food swamps. Schools and parks became food sources.
- Promote gardening, including replacing lawns with orchards and vegetable production.
- Encourage young people to adopt a healthy lifestyle. Parents supported child and youth education with a focus on health and outdoor activity, including growing food. Study placements on rural and urban farms, and in conservation areas, were a common part of education.

Photos courtesy Branimir Gjetvaj, Takota Coen, University of Saskatchewan, and the Mennonite Central Committee.