Scott McKenzie
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The Wild Alberta Food Project's Conclusion:

How can regenerative agriculture improve Alberta's food system?

Fundamentally, regenerative agriculture is a farmer-led social movement that improves soil health through regenerative agricultural practices (RAPs). Increasing the adoption of such practices will improve Alberta's food system because they improve both soil quality and farmer wellbeing: the two essential components from which the numerous benefits and positive feedback loops of regenerative agriculture (RA) are derived.

Regarding soil quality, the process of improving Alberta's food system via RA begins with improving Alberta's soil through recarbonization: a natural consequence of RAPs that simultaneously mitigates climate change through carbon sequestration, stores vast amounts of water underground, and increases soil nutrient levels and biodiversity. Consequently, the biofueled food produced using RAPs is nutrient-dense, and healthier than the chemical-dependent food produced using industrial agricultural practices. Regeneratively produced food is also much more resilient to the negative impacts of climate change, such as increased drought and catastrophic weather events. By working with nature instead of against it, regenerative agriculture produces healthier soil; healthier soil produces healthier plants; and healthier plants produce healthier animals; all of which combine to produce healthier food and ultimately, healthier humans. The improved collective health of Alberta's population would alleviate the unsustainable financial burden of nutrition-related chronic disease on the healthcare system. Here, the progression from positive ecological outcome, to positive social outcome, to positive economic outcome is illustrative of how regenerative agriculture can improve Alberta's food system.

Regarding farmer wellbeing, because RA is a farmer-led and farmer-maintained social movement, prioritizing the wellbeing of Alberta farmers is an essential element of improving Alberta's food system. Fortunately, improved farmer wellbeing is a natural consequence of RAPs, which enable farmers to care for their land instead harming it through persistent extraction. As farmers witness the positive ecological impacts of regenerative practices on their land, they develop an increased sense of self-efficacy and a greater capacity to adapt to change. This shift in farmer mindsets promotes further RA adoption and leads to fully integrated regenerative farming operations. This process illustrates regenerative agriculture's natural tendency to establish self-reinforcing positive feedback loops.

The Alberta government can facilitate the RA movement's success through public policy initiatives, beginning with the commissioning of an Alberta-specific White Paper of Regenerative Agriculture to determine where Alberta currently sits on the continuum of regenerative outcomes, and identify what research is needed to facilitate RA becoming Alberta's dominant agricultural system. The White Paper should include an account of how new technology can be assimilated to fully leverage Alberta's existent carbon market apparatus, which, although a relatively unknown variable, could be an x-factor in regenerative agriculture

adoption reaching the tipping-point necessary to supplant the current industrial agricultural regime.

Further policy initiatives should be aimed at reforming all levels of education to facilitate necessary mindset shifts. Educators should teach students about the role of RA in climate change mitigation and food production sustainability, and also the transdisciplinary research methods required to address the complexities inherent to such issues. Through enacting sound public policy informed by comprehensive Alberta-specific research, and by utilizing Alberta-developed technology to measure, track, and share environmental feedbacks, the Alberta government can validate and incentivize both RA adoption, and RA investment.

With these policies in place, given the financial support provided companies looking to capitalize on increased consumer demand for sustainable products; the ascent of social financing; increased acceptance among venture capitalists; and the potential for Alberta's carbon market to augment farmer income, the outlook for RA in Alberta is positive. More so, in light of the environmental, social, and economic unsustainability inherent to the current industrial regime which has become increasingly vulnerable to food-borne infectious diseases, supply chain disruptions, and the negative effects of climate change.

Beyond mere viability, Alberta farmers who adopt regenerative agricultural practices should see their profits increase due to a significant reduction of input costs, including the fueling and maintenance of heavy machinery which can be sold to offset the revenue loss that may accompany early transition. Once fully operational, increased biodiversity would eliminate the need for costly pesticides and fertilizers while enabling farmers to diversify and multiply income streams: an act that further increases farmer self-efficacy and overall wellbeing. Here, an ecologically driven economic outcome has reinforced the positive social outcome of increased farmer wellbeing. Thus, it is reasonable to infer that the widespread adoption of RAPs in Alberta would result in a biologically and financially resilient agricultural sector, operated by happy, purpose-driven managers of food system transformation.

There is a widely-held belief among regenerative agriculture advocates that once regenerative practices become regionally recursive, the ecological and socioeconomic benefits will only increase over time, creating a regenerative food system that essentially functions within a single integrated positive feedback loop. For this reason, scaling regenerative agriculture to reach the recursive tipping-point should remain a primary focus of interdisciplinary and transdisciplinary research and innovation.

Variables of *The Wild Alberta Food Project's* Integration Calculus

Identifier	Annotation
	Ecology Theory-Based Insights
CCM	***Climate change mitigation theory*** states that RA can improve Alberta's food system by removing excess carbon (C) from the atmosphere and storing it in the soil. *CCM theory* assumes that climate change will negatively affect Alberta's food system and will accelerate without human intervention.
SR	***Soil recarbonization theory*** holds that it is possible to quickly (5-10 years) and naturally create more soil through recarbonization. Like *CCM theory*, *SR theory* assumes that although climate change is progressive, its effects can be mitigated through human intervention, which is in this case through accelerated soil development via the recarbonization inherent to regenerative agriculture.
MiG	***Management intensive grazing theory*** contends that producers can improve their soil quality by manipulating the length of time ruminants – cattle, sheep, goats etc. – graze on a single paddock before being rotated to another. An underlying assumption of *MiG theory* is that humans can effect positive ecological change, which can be amplified through public policy decisions.
IND	***Increased nutrient density theory*** references multiple independent peer-reviewed comparisons of commercially and regeneratively produced food, vis-à-vis their respective nutrient density, to argue that RA produces food with superior nutritional profiles than industrial agriculture (IA), and does so across multiple agricultural sectors. *IND theory* assumes there is a causal link between the nutrient density in food, human nutrition and health, and the overall quality of food systems.
WC	***Water conservation theory*** maintains that agricultural land sustainability can be increased through increased water conservation via the soil management practices inherent to regenerative agriculture, e.g., no tillage. A general assumption of *WC theory* is that humans can positively impact social conditions by prioritizing ecological responsibility, a sentiment witnessed in regenerated soil's increased ability to capture and store water as a means to mitigate the effects of drought.
ISB	***Increased soil biodiversity theory*** argues that biodiversity is essential to a healthy food system. The underlying assumption of *ISB theory* is that ecologically responsible decisions increase human wellbeing via positive ecological feedbacks.
	Ecology Conclusions
EC1	RA can improve Alberta's food system through soil recarbonization: a natural by-product of regenerative practices that simultaneously mitigates climate change through carbon sequestration, stores vast amounts of water underground, increases soil nutrient levels and biodiversity, all of which function to produce healthier, more resilient food. In short, by working *with* nature instead of against it, RA practices lead to healthier soil capable of growing healthier plants and producing healthier animals.
EC2	RA can improve Alberta's food system through soil recarbonization, i.e., through improving soil quality, which is a natural by-product of RA practices. The soil is the point of entry for food system improvement via RA.

EC3	RA can improve Alberta's food system through management-intensive grazing: a regenerative practice that evenly pounds carbon, manure, and other biology into the ground which is then used as fuel to produce diverse plant forages including the most desirable plants because they have not been overgrazed.

EC4	RA can improve Alberta's food system through regenerative soil-management practices (no tilling, year-round cover crops) enabling soil to store vast amounts of water underground, thereby significantly reducing the effects of drought: one of multiple climate change impacts predicted to affect the prairies.
EC5	RA can improve Alberta's food system by mitigating the increasingly devastating effects of climate change by removing excess carbon from the atmosphere and storing it in the ground.
EC6	RA can improve Alberta's food system by producing more nutrient dense, healthier food than the current industrial agricultural systems.
EC7	RA can improve Alberta's food system by increasing Alberta's soil biodiversity, which is a natural byproduct of regenerative practices.
Ecology Assumptions	
EA1	There is a causal link between the nutrient density in food, human nutrition and health, and the overall quality of food systems.
EA2	Humans can positively impact social conditions by prioritizing ecological responsibility.
EA3	Industrial agriculture is unsustainable and has negative ecological consequences.
EA4	Humans can effect positive ecological change, which can be amplified through public policy.
EA5	Although climate change is progressive, its negative effects can be mitigated through human intervention.
EA6	Food systems improve as ecological conditions improve.
Sociology Theory-Based Insights	
SM	***Social movement theory*** asserts that the recurring sociological theme of social change underlies the multiple reasons for sociologists to be interested in RA. Foremost, because RA has the potential to significantly mitigate climate change by reducing atmospheric carbon. To achieve this, *SM theory* maintains that not only must biophysical changes occur, but also shifts in social discourses and socioeconomic frameworks. Additionally, because RA is a farmer-led social movement, sociological expertise about other social movements, e.g., labour, gender, sexuality, and racial inequalities is applicable to the food production changes instigated by RA.
SI	***Social innovation theory*****:** For the purpose of this project one may understand *SI theory* as an intention to improve a specific social problem through social innovation, which entails new ideas borne of intentional and intensive collaboration.
ST	***Sustainability transitions theory*** provides a conceptual lens through which RA in Alberta is viewed as a niche production method operating within the dominant regime of global industrial agriculture. Underlying *ST theory* are two assumptions: (1) food production methods impact social wellbeing; and (2) the prevailing global industrial agri-food system is unsustainable.
FWB	***Farmer wellbeing theory*** places farmers at the center of the RA movement because it is through them as stewards of approximately 33% of Earth's ice-free land, that change will be affected regarding two of the most pressing issues facing humanity: climate change mitigation and sustainable food production.

RAE	***Regenerative agriculture education theory*** holds that education must be reformed to include the role of RA in climate change mitigation. Additionally, to maximize the benefit of including RA in school curriculums, transdisciplinary research methods should be taught to students so they may become versed in addressing the complexity inherent to issues like climate change and food production sustainability.

IFS	***Increased food security*** **theory** argues that a food system based on RA practices will be regenerative throughout the food value chain and "spiral up" beneficial social, economic, and environmental outcomes such as food security, mitigation of the financial cost of chronic diseases, and regenerate the land for future generations. The assumption of *IFS* theory is that through RA, socio-economic dimensions will arise that contribute to food security.
Sociology Conclusions	
SC1	RA is a farmer-led social movement that can mitigate climate change, produce healthier food, and increase food security. Integral to the movement's success is the improvement of farmer wellbeing achieved through regenerative practices. As farmers witness the positive environmental effects of RA on their land, they develop an increased sense of self-efficacy and a greater capacity for change, resulting a self-reinforcing positive feedback loop. The movement's success can be facilitated through public policy including education reform to include in school curricula the role of RA in climate change mitigation and food production sustainability, as well as the transdisciplinary research methods required to address the complexities inherent to such issues. With proper education and policy initiatives, the prognosis for RA is favourable in light of the ecological contradictions inherent to the dominant industrial regime.
SC2	RA can mitigate climate change. Widespread adoption of RA will require changes in knowledge, social discourses and attitudes, and economic frameworks.
SC3	Education curricula at all levels must be reformed to include both the role of RA in climate change mitigation and food production sustainability, and the transdisciplinary research methods required for students to adequately address the complexities inherent to such issues. Furthermore, education must incorporate teaching the policy required facilitate food system transformation. The education reforms required to turn the farmer-led social movement of RA into the status quo will require help from public policy initiatives.
SC4	RA is a farmer-led social movement that can significantly mitigate climate change by reducing atmospheric carbon. Hence, because RA is a social movement, a sociological perspective should be at the center of its study.
SC5	As the individuals responsible for creating and maintaining the RA movement, farmer social and economic wellbeing is integral to ecological success. As farmers engage in RA practices, they develop an increased sense of self-efficacy and a greater capacity for change, which creates a self-reinforcing positive feedback loop
SC6	The prognosis for RA is favourable in light of the ecological contradictions inherent to the dominant industrial regime.
SC7	RA can increase food-security by improving soil health, optimizing resource management (limiting waste), improving nutrient cycling, and improving water quality and availability.
Sociology Assumptions	
SA1	Social problems can be solved socially through collaboration and innovation.

SA2	Industrial agriculture is unsustainable and has negative social consequences.
SA3	RA has ecological, social, and economic benefits.
SA4	Food production methods impact social wellbeing.
SA5	Education impacts social movements and policy outcomes.
SA6	The social and psychological aspects of RA are of equal importance as the environmental-based outcomes.

SA7	Food systems improve as social conditions improve.
Economics Theory-Based Insights	
RAM	***Regenerative agriculture momentum theory*** assumes that social movements and trends are good for business, and therefore argues that financial stakeholders should look capitalize on the trend of RA now that it has become a social movement.
POY	***Profit over yield theory*** addresses farmer concern regarding the economic uncertainties involved in transitioning to RA practices by illustrating that greater profit per acre is not only possible, but likely.
PR	***Pest Reduction theory*** contends that regenerative farming systems provide greater ecosystem services and profitability for farmers than input-intensive methods of production due in-part to significantly lower pest levels.
SF	***Social financing theory*** argues that transforming unsustainable industrial food systems into regenerative food systems is possible through social financing, which has increasingly become a viable financial catalyst for RA adoption.
CCM	***Carbon credit market theory*** contends that by adopting RA practices that generate carbon offsets, farmers can simultaneously supplement their income while realizing long-term ecological benefits. *CCM theory* assumes that market forces can instigate positive ecological outcomes.
Economics Conclusions	
ENC1	At a minimum, the RA movement is economically viable due to steadily increasing corporate support as brands look to capitalize on increasing consumer demand for sustainable products. Farmers who adopt RA often see their profits increase because their input costs greatly decrease. Increased biodiversity eliminates the need for costly pesticides and fertilizers, while also enabling farmers to diversify and stack their income streams, resulting in a biologically and financially resilient farm. Although the rise of social financing, and increased acceptance from venture capitalists offers financial stability for RA farmers, Alberta's government can expedite positive economic outcomes by funding the research and development necessary to fully leverage the existent carbon credit market apparatus.
ENC2	At a minimum, the RA movement is economically viable due to steadily increasing corporate support as brands look to capitalize on consumer demand for sustainable products. To guard against greenwashing, public policy initiatives can validate corporate practices and reward those who make good on their commitments, which in turn incentivizes further corporate support in a positive feedback loop.
ENC3	Regenerative farmers can be more profitable than industrial farmers by promoting increased biodiversity below and above ground, thereby better managing their pest populations, using fewer costly pesticides and fertilizers, and diversifying their income streams. The result is a biologically and financially resilient farm.

ENC4	Although the rise of social financing offers another stream of financial support to farmers looking to adopt RA, public policy and government funding should remain stabilizing factors throughout food system transformation.
Economics Assumptions	
ENA1	Social movements create profit.
ENA2	Farm-level practices can positively impact farm profitability.
ENA3	Industrial agriculture is unsustainable and will increasingly have negative economic consequences.
ENA4	Increased financial investment improves food systems.
ENA5	Food systems improve as economic conditions improve.
Public Policy Theory-Based Insights	
GI	***Government incentivization theory*** claims that agricultural transformation requires the creation of government policies that encourage the adoption of RA practices. *GI theory* assume that the best way to motivate people is through monetary gain.
ISSR	***Increased social science research theory*** asserts that further research into both bio-physical, and socioeconomic processes is needed for farmers and businesses within and beyond the rural sector to secure opportunities surrounding regenerative agriculture. Underlying *ISSR theory* is an assumption that without RA as part of an ecological reorientation, farming will eventually become a noneconomic enterprise, i.e., not profitable.
GR	***Geocentric research theory*** builds onto *ISSR theory*, utilizes *social innovation (SI) theory*, and is the most important public policy theory-based insight to *The Wild Alberta Food Project*. An assumption of *GR theory* is that increased knowledge will yield better policy.
Public Policy Conclusions	
PC1	The Alberta government can help facilitate RA in Alberta through public policy initiatives, beginning with the commissioning of an Alberta-specific *White Paper* to determine where Alberta currently sits on the continuum of regenerative outcomes, and identify the research required for RA to become Alberta's dominant agricultural system. Already identified research needs include an account of how new technology can be assimilated to fully leverage Alberta's existent carbon market apparatus. Through sound public policy derived from comprehensive Alberta-specific research, utilizing Alberta developed technology to transparently measure, track, and share environmental feedbacks, the Alberta government can validate, and incentivize both RA adoption, and RA investment.
PC2	The government of Alberta can help improve Alberta's food system via RA by funding research initiatives, and incentivizing RA adoption.
PC3	*ISSR theory* is concerned with maximizing the economic value of RA by increasing research and ensuring prospective investors have access to all of the relevant information needed to make an informed decision. Further research into both bio-physical, and socioeconomic processes is needed for farmers and businesses within and beyond the rural sector to secure opportunities surrounding regenerative agriculture. RA needs validation, new insights, adjustment of missteps, market appreciation, new information and scientific research. The expansion of research-based information will support accurate decision making and encourage further investment from both on and off-farm stakeholders.

Public Policy Assumptions	
PA1	Alberta's current industrial agricultural system is ecologically, socially, and economically unsustainable.
PA2	Research positively impacts policy, and good policy produces good ecological, social, and economic outcomes.
PA3	Without RA as part of an ecological reorientation, farming will eventually become a non-profitable enterprise.
PA4	People are primarily motivated by monetary gain.
PA5	Food systems improve as public policy improves.
Conflicts	
Conflict 1	Conflict between the disciplines of sociology and ecology regarding which disciplinary perspective should take precedence in assessing how RA can improve Alberta's food system.
Conflict 2	Inconsistent assumptions regarding which disciplinary-based conditions corresponding to food system improvement.
Conflict 3	Conflict between the economic and ecological perspectives regarding the production of positive social conditions.
Conflict 4	Is RA a social movement, or is it a series of practices that improve soil health?
Resolutions	
Res. 1	The causal relationship between conflicting perspectives was established and used to create common ground: According to *FWB theory*, improved farmer wellbeing is predicated on improved soil quality.
Res. 2	One of the inconsistent assumptions was invalid and through *extension* and *organization*, the other three worked together toward a common goal.
Res. 3	Through *organization*, common ground was created by defining the causal relationship between conflicting views regarding how RA may best facilitate positive social outcomes
Res. 4	Through *extension*, the most fundamental ecological and sociological conclusions were integrated to provide a starting point for understanding *what* RA is.