Agriculture 3.0:
A New Paradigm for Agriculture

Feed the Soil to Feed the World
Get Social and Get Growing

A Nuffield Scholar Review of the Future Possibilities and Choices in Agriculture

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SCHOLAR PROFILE - Gayl Creutzberg

I live in Midwestern Ontario, which has some of the most productive crop land in the province. It is also the highest in the production of beef and lamb. When I moved to Huron County from Grey-Bruce, it was a major wake up call. Grey-Bruce livestock are seen outside grazing, but in Huron, the land is often too valuable for this practice.

In Grey-Bruce, I was a livestock farmer on an organically certified land base, which included sheep and cow-calf pasturing. In my heart, I'm still a sheep producer! My attention turned to farm-direct marketing and working with food, which developed into an expertise for understanding food at many stages in the value chain, from the farmer who produces it to the chef who serves it and consumers who struggle to afford it.

For 15 years, I collaborated on food and farming initiatives, including farm business training and regional local food branding in Midwestern Ontario. I researched models for accessing and distributing local food, and owned and operated a local food deli. With over 150 producers, chefs, and owners of 100 Mile stores, I had formal conversations and interviews about the challenges of distributing food and artisanal (value-added) products direct from the farm. I launched an online farmers' market at www.gumbootgourmet.com, where farmers could market themselves on-line to an expanding consumer base looking for nutrient dense food direct from the farmer. This enterprise however, proved not to be viable.

As a result of my Nuffield travels, I was empowered to take the next step towards a vision for farm-direct marketing that I had for many years. I saw many local food and community farming enterprises during my travels; raw milk vending machines in Transylvania, service stations selling and serving local products in Italy, a mountain region organic brand marketing itself across Austria, the beautiful Mediterranean simplicity of terroir food on Gozo Island, Malta and the Comptoir Paysanne in France. It was there that the vision for the 5 Star Food Hub was born. After a year working with a collaborative between five counties to build a social enterprise, it was all to apparent that Ontario was not ready for that size of local food initiative. The project is dormant at this time, making it an excellent case study for this Nuffield study.

My experiences have developed into a deep understanding for the importance of healthy rural communities. I now look to social enterprise as a model for rural economic development and to agriculture 3.0 as a narrative for the future of agriculture. I hope that this report draws attention to the choices available to us in agriculture, that I can achieve some impact with my ideas, and help Canada to promote itself authentically as:

Quality is in our nature

DISCLAIMER

This report has been prepared in good faith but is not intended to be a scientific study or an academic paper. It is a collection of my current thoughts and findings on discussions, research and visits undertaken during my Nuffield Farming Scholarship.

It illustrates my thought process and my quest for improvements to my knowledge base. It is not a manual with step-by-step instructions to implement procedures.

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NOTE TO READERS

The presentation of ideas and information in this report are mine and do not reflect the views of Nuffield Canada and Nuffield International. This report is a review of the future possibilities and choices for agriculture. The mention of different methods of farming does not imply that these practices are being endorsed or recommended in preference to other practices.

The author does not take credit for the term 'Agriculture 3.0'. Steffen Schneider of Hawthorne Valley Farm, introduced the term at a biodynamic conference in November, 2012. He was sharing his Ag3.0 explorations which he started in the spring of 2011, searching for a way to heal our disconnect between soul, soil, farming and food in what he describes as the "Soil to Soul" connection. The term has also been used (incorrectly) in a few other articles.

This report is by no means definitive on the subject of agriculture and food. It is a compilation of the views of various authors, in addition to my own views and experiences. More on this study, including a definition of various terms used in agriculture will eventually be available at www.theinnovativefarmer.com.

FOREWORD

Welcome to my Nuffield journey! I have explored new pathways and disciplines, met incredible people, read the works of great leaders and reflected on so many new ideas. My study evolved over time as I looked at my topic from so many different perspectives and I admit that I went in (too) many directions. And then, I ended up right back where I started!

My intentions for reporting about my Nuffield study were:

1. To produce a 'knowledge guide' (attached in Appendix G) that is practical, and applies this study to the field to assist in the shift to a new paradigm in agriculture. This guide is meant to inspire possibility and inventory many of the choices available to us as farmers, in addition to providing benchmarks, in the form of a score card, for measuring progress. This part of the project is incomplete.
2. To produce a 'best practices' report that is a reference for the knowledge guide to further the discussion on the production of food with a mission of '*nourishing communities*' rather than *'feeding the world,'* from a more academic or researcher's perspective. This report includes 'real life' stories in case studies, design principles and indicators for a new agricultural paradigm, a farm viability discussion as well as some indication of policy required to facilitate change.

This report before you is a review of all this work prepared for Nuffield Canada, with a focus on three case studies in Appendix B summarizing my travels.

It is not my intention to document the research that proves the validity of statements made about food systems, nor to verify that how we practice agriculture today is harmful. We now have a "well-documented crisis in the conventional regime of agri-food."[1] To quote Arden Andersen: "Where is the replicated university research proving that this system of chemical use works in the long run?"[2]

There are many ways to produce food, just like there are many ways to run any business. Farmers who are inclined to consider change in the way they practice agriculture will be participating in what the French Minister of Agriculture calls a shift in "state of mind." It requires a willingness and commands us to rethink how we produce food.[3]

John Ikerd, whose work I will refer to often says: "I could cite volumes of ecological and socioeconomic research and gigabytes of government data documenting the negative ecological and social impacts of an agriculture that increasingly is driven by the economic bottom-line. The industrialization of American agriculture; with its specialization, standardization, and consolidation of control of agriculture was a logical strategy for a quest for ever-greater economic efficiency. The unrelenting quest for economic efficiency through

[1] Marsden, T. 2012. *Third Natures? Reconstituting Space through Place-Making Strategies for Sustainability.* International Journal of Sociology of Agriculture and Food. Vol. 19, No. 2, p. 257.

[2] Anderson, 2000, p. 268.

[3] Le Foll, S. 2014. *L'agro-écologie : l'agriculture autrement* posted on September 19, 2014 at www.huffingtonpost.fr/stephane-le-foll/agriculture-autrement-agro-ecologie_ b_5840936.html.

consolidation inevitably led to corporate control... Industrial agriculture may have been profitable for some but it has not been good for most of the people who farm or most people who live in rural communities."[4]

There are many 'foodie' books that have come out in the past couple of years. There is also plenty of scholarly material on sustainability, sustainable agriculture, sustainable development and sustainable food systems; too much I say, because I argue that the use of the term 'sustainability' in agriculture is outdated; and therefore, from here on I will mostly avoid using that term. Perhaps it still applies to business, but it certainly no longer applies to natural systems-based enterprises such as farming.

Agriculture 3.0 proposes a shift to a new paradigm for agriculture, from being focused on production and 'sustainability' to focusing on soil life and resilience. I admit that this report is somewhat of an agro-ethnographical study (see glossary). I am motivated to inspire possibility, opportunity and choice in agriculture and to initiate a paradigm shift in the way we practice farming in North America. To achieve that, we need some understanding of people and cultures within an agro-culture (see glossary) context. In the knowledge guide, I remove all the fluff and get down to the business of farming, extracting best practices from the knowledge embedded in Nature and in resilient traditional food production systems, much of which is now being documented, to produce a tool for measuring our progress towards Agriculture 3.0.

From my office window vantage point in Huron County, May 2013

and in October 2014 (Ontario, Canada)

KEY WORDS: AKST, agricultural anthropology, agriculture 3.0, agro-culture, agroecology, agro-ethnography, Canadian agriculture, community agriculture, efficiency, nutrient density, regenerative farming, resilience, sacred agriculture, self-reliance, social enterprise, soil health, subsistence agriculture, sustainability, traditional agriculture, transitional farming, the Work that Reconnects.

[4] Ikerd, John. 2014. *Crisis and Opportunity in American Agriculture; Revisited*. Presentation at the Agricultural Hall of Fame presentations, Charlottetown, PEI, June 13, 2014. John Ikerd is Professor Emeritus, University of Missouri, Columbia, MO.

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EXECUTIVE SUMMARY

Study Topic: As a 2013 Nuffield Scholar, Gayl is seeking to define a new paradigm for agriculture by asking:

> *If Agriculture 1.0 is subsistence farming that uses traditional farming practices, and Agriculture 2.0 is industrial agriculture, which is creating serious health and environmental concerns in Canadian communities and communities world-wide, then what might Agriculture 3.0 look like, that offers farmers more choice and also addresses the many concerns of feeding 9 billion by 2050?* (Please note that the use of version 1.0, 2.0 and 3.0 is tech talk, used to indicate the version of software used by computers).

Gayl chose to travel through Europe because of the potential impact that industrial agriculture (Ag2.0) could have if it was adopted in areas that have preserved their culture, traditional foods and distinctive landscapes by continuing to practice traditional farming (Ag1.0). The lure of industrial farming and the cash it generates is hard to resist.

Can these regions leap from Agriculture 1.0 to Agriculture 3.0 if presented with a clear set of measurable indicators and best practices? This happened with the telephone, where many undeveloped countries progressed from 'telephone 1.0' (ie. the telegraph or other) directly to 'telephone 3.0' (cellular technology).

Objectives of Study Tour

1. Explore whether there are characteristics of Ag1.0 and Ag2.0 that can be used to envision the principles of Agriculture 3.0.
2. Find real life examples of Agriculture 1.0, including traditional foods, sacred rituals, local food systems, indigenous food systems, and farming practices that produce food while also preserving or restoring ecosystems and biodiversity.
3. Determine which farming practices can be health-promoting, while also producing nutrient dense food that increases the vitality of individuals and the health of communities.
4. Witness different food marketing ideas that support direct-to-market farmers, helping them operate viable farm businesses.
5. Offer a vision for Canadian agriculture that showcases many choices for practicing farming.

Findings

1. Since agriculture is a sector that works so closely with Nature, natural systems offer a model of sustainability, by demonstrating resilience. The 3 legged model for sustainability may work for human designed systems of industry and corporate structures, but it is a wobbly milking stool when applied to the sector of food and agriculture that is so dependent on living organisms.
2. For Canadian agriculture to contribute to a healthy world, we need to go 'back to basics', with a farm enterprise mission statement of 'Nourishing Communities', instead of 'feed the world'.
3. Three case studies reveal the need for: self-reliance by scaling-up agroecology; enabling policies to preserve biodiversity, culture and heritage landscapes; and the honouring of place-based (traditional) foods and practices to achieve vitality of all who eat and the empowerment of smallholder farmers.

Gayl's complete report including a glossary and on-going work will eventually be available at www.theinnovativefarmer.com. Stay in touch by following her blog at farmviability.wordpress.com and tweets @gumbootgourmet. Find more details on Linkedin.

ACKNOWLEDGEMENTS

A very big thank you to Nuffield Canada for igniting my passion even more by making this work possible. Being awarded a Nuffield scholarship gave me the opportunity to travel for 10 weeks and explore agriculture around the world. I am most indebted to the many people I met on my travels, and most specifically to those I consider my mentors, Barbara Knowles, Senior Science Policy Advisor, Society of Biology (UK); Gergely Rodics, Director, Pogány-havas Association; Steffen Schneider, Director of Farming Operations at Hawthorne Valley (USA); Ralph Martin, University of Guelph Professor and Loblaw Chair in Sustainable Food Production; Chris Rust; and Sarah Singla, 2011 Nuffield Scholar (France). This has been an opportunity to start what feels to me like a necessary conversation, to talk about the elephant in the room, and has given me the courage to speak up about my experiences and what I have to share.

I would like to especially recognize those who have encouraged my writing: Wally Doerksen (1988 Nuffield Scholar), Harris Ivens, Chris Rust, Maria Weijs, Bruce Skillen, Ross Dobie and all of you who follow my blog. My travel and time dedicated to studying and writing all that I wished to explore, would not have been possible without the support, including 2 months of dog care that was necessary while I travelled.

I am grateful to the numerous organizations who are doing work on the ground, and conferences for which I have been fortunate to attend and present at, where I learned the language I needed to express the ideas that follow. Presenters and colleagues offered me insights and understandings, especially in helping me realize that there are favourable aspects to all forms of agriculture from industrial agriculture to biodynamic farming.

In memory of Peter Noddle

To truly acknowledge everyone who has made this report and knowledge guide possible, I would have to go back to when I started farming sheep in 2000 and my involvement since, in the many different stages of the local food value chain. There are many people who believe in change for agriculture and who are participants in the transition. These people have kept me company along this journey, providing me with the opportunity for some engaging discussions.

I also wish to recognize a special person who supported and encouraged me, Peter Noddle, who passed away on June 24th, 2012, a day before my Nuffield interview. With every hardship, there is a hidden gem, a positive that emerges from the rubble. There is a smile in my heart despite all that happened in 2012, and because of it all, I've been able to make extra time to study and write about a topic that is very important to me, which brings me great pleasure.

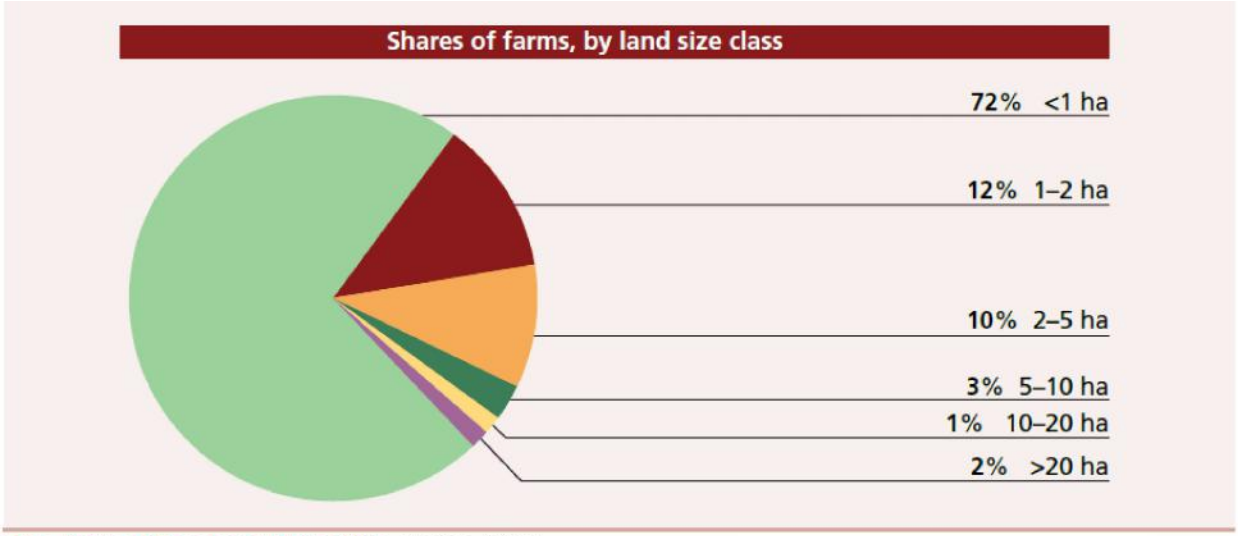
In gratitude, *Gayl Creutzberg* (February, 2015)

1.0 INTRODUCTION

As a Nuffield Scholar, I have been seeking to define a new paradigm for the future of agriculture, by asking:

> If Agriculture 1.0 is subsistence farming that uses traditional farming practices, and Agriculture 2.0 is industrial agriculture, which is creating serious health and environmental concerns in Canadian communities and communities world-wide, then what might Agriculture 3.0 look like, that offers farmers more choice and also addresses the many concerns of feeding 9 billion by 2050? (Please note that the use of version 1.0, 2.0 and 3.0 is tech talk, used to indicate the version of software used by computers).

Why? Agriculture 1.0 is still the reality on over 97% of farms worldwide. These farms are smaller than 25 acres in size.[5] Agriculture 2.0 has a mandate to feed 9 billion by 2050.[6] But Ag2.0 farmers are caught in a "one-recipe-fits-all" agriculture. Many seem to do things in very much the same way as the next farmer. This is surprising because as farmers and entrepreneurs, we don't like being told what to do! These three words "Future of Agriculture" are headlining even more articles and videos this year (2015) than in the past 3 years (the period of time in which I have been working on this study), so change is coming. Is Canada prepared to participate?



The State of Food and Agriculture, Rome, 2014
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS,farms by farm size covering a total of about 460 million farms in 111 countries. Countries included are those for which data were available from the World Census of Agriculture and for which the World Bank (2012a) provided regional and income groupings. All figures are rounded.
Source: Authors' compilation using data from FAO (2013a; 2001) and other sources from the FAO Programme for the World Census of Agriculture. See Lowder, Skoet and Singh (2014) for full documentation. See also Annex tables A1 and A2.

[5] *The State of Food and Agriculture: Innovation in family farming*. Food and Agriculture Organization (FAO) of the United Nations. Rome, 2014.

[6] United Nations Department of Economic and Social Affairs. 2013. *World Population prospects, the 2012 revision, highlights and advance tables*. esa.un.org/unpd/wpp/Documentation/pdf/WPP2010_Highlights.pdf.

Agriculture 2.0 could also have a significant negative impact should it be adopted in areas that have preserved their culture, traditional foods and distinctive landscapes by continuing to practice traditional farming (Ag1.0). The lure of industrial farming (Ag2.0) and the cash it generates is hard to resist. Can these regions leap from Agriculture 1.0 to Agriculture 3.0 if presented with a clear set of measurable indicators and best practices? This happened with the telephone, where many undeveloped countries progressed from 'telephone 1.0' (ie. the telegraph or other) directly to 'telephone 3.0' (cellular technology). What might that look like for agriculture? I elaborate on this in Case Study 2 about Transylvania.

In his work in the early 1900's, Sir Albert Howard came to realize that traditional methods of farming were necessary to keep crops and people healthy:

> "Mother Earth never attempts to farm without livestock; she always raises mixed crops; great pains are taken to preserve the soil and to prevent erosion; the mixed vegetable and animal wastes are converted into humus; there is no waste; the processes of growth and the processes of decay balance one another; ample provision is made to maintain large reserves of fertility; the greatest care is taken to store the rainfall; both plants and animals are left to protect themselves against disease" (from The Soil and Health, published in 1947).

Part of this study is in response to the IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development) Global Report,[7] which concluded that "business as usual is not an option."[8] It recognizes that: "There are some major challenges, but we believe that by combining local and traditional knowledge with formal knowledge these challenges can be met." Suggestions have been made in many reports since this one to address the challenges but, except for Miguel Altieri's work on designing agroecological farm systems, researchers have not really brought the information down to the level of the farm in the form of best practices and indicators that can be used to measure progress. They also have not elaborated on what a new paradigm for agriculture might look like around the world.

It was Oliver de Schutter as the United Nations Special Rapporteur on the Right to Food[9] who said what needed to be said. "We can scale up these sustainable models of agriculture, and ensure that they work for the benefit of the poorest farmers. What is needed now is political will to move from successful pilot projects to nation-wide policies," he said.[10] De Schutter reported on how smallholder farms can feed the world, speaking of agroecological,

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[7] McIntyre, et al. 2009.

[8] The IAASTD report is the first global assessment of agriculture, science and technology that took 4 years and over 400 experts from around the world. It was initiated at the Earth Summit in 2002 by the World Bank and the FAO and sought to assess the impacts of agriculture on reducing hunger and poverty, improving livelihoods, and assessing the role and importance of agriculture on development within the United Nations.

[9] Professor de Schutter was appointed the Special Rapporteur on the right to food in May 2008 and completed his appointment in 2014. In that position, he was independent of any government or organization and served in an unpaid capacity. He was expected to fulfil his mandate by reporting on several priority areas around food.

[10] De Schutter, 2010.

energy-efficient smallholder based food-sovereignty as the new paradigm. Scaling up agroecology is important, and information on this and the work of Olivier de Schutter and Miguel Altieri is well documented in *Scaling-up agroecological approaches: what, why and how?*[11] by Oxfam-Solidarity.

This international work has motivated me to explore what the future of agriculture might look like - on the farm. I set out to define a new paradigm, determine some principles and research best practices, indicators and benchmarks with the goal of 'cataloguing' the information in a score card. The score card turned out to be a task that needs a team of researchers to properly collect and reference all the data, especially the benchmarks. In Appendix E, I present a template to do that, but the data is far from complete and is beyond the scope of this scholarship opportunity.

This study is also following through on some contracts that I completed in the past, where it has always come back to "what makes a viable farm enterprise?", especially for those just starting out, who have smart business sense and are looking for answers for their business plans, as well as farmers who chose to market directly to the local consumer. I explore local food and traditional foods in Case Study 3.

I have been fortunate to have visited Cuba a few times. I always find Cubans to be such pleasant people, despite having plenty they could complain about. I have told their story in Case Study 1. It is a success story about post-peak oil agriculture, scaling-up with agroecological principles, as was mentioned above, and reinforces how we need to take responsibility for securing food for ourselves and our family.

Finally, another driver behind this study is my personal pursuit of community, nutritious food and the sacred work of agriculture (or Reclaiming the Miracle of Food and Farming, as my blog is called). There is something about cultural heritage and heritage landscapes, and rituals and traditional food practices that attracts me because I sense that these aspects of so many people's lives worldwide hold answers for the future. There is something distinct in them that we don't have, but which we are seeking in North America. "There is growing evidence that when we took out the sacred, we took out the substance, and have left our lives shallow and empty. Humanity is beginning to ask new questions. The old questions of how can I "get" more are being replaced with the questions of how can I "be" more?"[12] Maybe I am admitting that my life feels a bit empty too!

I am also concerned about the decrease in human health and vitality due to our current food system. Why is it ok to sell people so much junk (often without them knowing it)? In an article posted on Integrated Regional Information Networks (IRIN), Tim Lang, professor of food policy at City University London, calls it a world sleep-walking into disaster, despite plenty of evidence of what has been happening: "For years we have been churning out stunning demographic and epidemiological data documenting the problem. It's almost like seeing, in

[11]Parmetier, S. 2014. *Scaling-up agroecological approaches: what, why and how?* Policy Advisor on Food and Agriculture, Oxfam-Solidarity, Belgium, January 2014, posted at www.fao.org/fileadmin/templates/agphome/scpi/Agroecology/Agroecology_Scaling-up_agroecology_what_why_and_how_-OxfamSol-FINAL.pdf.

[12]Ikerd, 2012.

slow motion, populations walking over a cliff, and us just watching it, counting them as they are going over and saying, 'Well, isn't this terrible?'."[13] This was very apparent in the couple of visits I made to the US. In order for a nation to stand, it needs healthy real food (see glossary).

The number of adults who have been diagnosed with diabetes worldwide has more than doubled since 1980 to nearly 350 million and increased by nearly 3 times in the U.S.[14] In 2009, the Canadian Diabetes Association issued a report that indicates that 10% of all Canadians risk having diabetes by 2020. That equals a $17 billion economic burden.

> "The indifference; ... a tolerance of poor food and health choices; and a society that has accepted little responsibility for the resulting health crisis will mean that the next generation will have a shorter lifespan and poorer health than ever before. That phenomenon has likely never happened before in the history of the world. It is a shameful legacy for our society and its leaders."[15]

According to a study by researchers from All Children's Hospital and the Johns Hopkins Children's Center, twenty-five per cent of children in the U.S. going into Kindergarten are obese or overweight.[16]

Infertility is also on the rise in Canada. "Estimates of the prevalence of current infertility ranged from 11.5% to 15.7%."[17] If we keep consuming low nutrient density food, there won't be 9 billion to feed in 2050 (see Weston Price and Francis Pottenger in the glossary for more information about this topic).

On March 4, 2013, The Special Rapporteur reported on his mission to Canada (the report is available at srfood.org). His report was hard for many Canadians to accept because again, he spoke the truth with facts. For example, he reports that "Canada has a duty to respect, protect and fulfil the right to food. Yet, Canada does not currently afford constitutional or legal protection of the right to food" (the 1982 Canadian Charter of Rights and Freedoms). "In Ontario, Ontario Works rates for a single person are $599 per month for basic needs and shelter, yet the average rent for a single apartment is $715, leaving a deficit and no money for food, let alone a nutritious diet."

"Overweight and obesity combined affect 62.1 per cent of the population. Obesity rates have increased significantly since the early 1980s, and it is becoming more severe. On-reserve First Nations have particularly high obesity rates (36 per cent in 2002-2003). In 2008, obesity alone cost the Canadian economy at least Can$4.6 billion in direct (health care) and indirect (lost productivity) costs," $7.1 billion when the other diseases associated with diabetes are

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[13] Blunt, E. 2014. *Future diets and the world's expanding waistlines* posted on January 15, 2014 at www.irinnews.org/report/99472/future-diets-and-the-world-s-expanding-waistlines.

[14] Ezzati, M. 2011. Study published online by The Lancet journal on June 25, 2011 at www.thelancet.com/journals/lancet/article/PIIS0140-6736%2811%2960679-X/fulltext

[15] Hume, 2010.

[16] *A new look at our food choices: The Local Food Revolution (Hume, 2010) examines the connection between food and municipal responsibilities* published in the Londoner on June 2, 2010.

[17] Bushnik,T. et al. 2012. *Estimating the prevalence of infertility in Canada* published online January 17, 2012 in Oxford Journals: Human Reproduction at www.ncbi.nlm.nih.gov/pmc/articles/PMC3279129.

taking into account.[18]

When Indigenous communities address the government, recognizing that their health issues arise from the loss of their traditional food source (and their land); "Government bureaucrats look at you a little bit sideways when you raise the issue of human rights. It's only credible when you raise the issue in Sudan or South America," says a representative for the Kauk people, who are downstream from a dam on the Klamath river.[19]

1.1 Goal and Objectives

The goal for this study is to envision a new paradigm for the future of agriculture that:

1. offers farmers more choices,
2. is resilient with an ability to adapt to climate change, environmental events, political issues, market fluctuations, changing consumer demand and the rising cost of fuel, and
3. is health promoting; for people, communities, the soil, ecosystems and the planet.

To put it even more simply: We are being called to rewrite the farm enterprise mission statement to 'Nourishing communities' instead of 'Feed the world.'

To achieve this study's goal, the objectives are to:

1) Complete an extensive literature review (section 2.1),

2) Refine what farm viability really means today, by challenging the concept of sustainable farming and developing a new conceptual framework for resilient agriculture (sections 2.3, 2.4),

3) Assess whether the 'local food movement' and farm-direct marketing are viable business models by exploring this in Europe and how policy plays an important role (Case Study 3),

4) Identify and organize principles and best practices that help define agriculture 3.0 (section 2.4.), and present them in a knowledge guide for farmers, to encourage those practicing Ag1.0 to leap directly to Ag3.0,

5) Collect input from young adults and farmers (Rural Ontario Institute conference, Sir Sanford Fleming Sustainable Agriculture program, Guelph Organic conference and in numerous conversations),

6) Experience agro-cultures (see glossary) that incorporate some of the principles that have been identified, with a study tour, made possible with a scholarship awarded to me by Nuffield Canada (see the three case studies presented in Appendix B).

1.2 Defining the Different Agricultural Paradigms

To define the different agricultural paradigms, see Appendix A, where I have reprinted parts of a book written by Michael Roads. His writing effectively tells the stories of Ag1.0, Ag2.0, transitional agriculture and Ag3.0; therefore, I asked for permission to use it. The stories tell it just as I would like to have and could do so without quoting reference after reference with all kinds of annotated evidence!

[18] De Schutter, 2012.

[19] LaDuke, p. 63.

Below, I tell the story of the farmer(s) in each of the paradigms, and in Appendix C, you will find a categorized list of the many practices of farming.

1.2.1 The Agriculture 1.0 Farming Culture

My favourite story about Agriculture 1.0 is not so much about the farming practices, as it is about cultural heritage of food, a beautiful food story told in a video by UNESCO (on youtube[20]) about traditional eating in Michoacán, Mexico.

Why is a story like this important? Many societies have come and gone, for various reasons, but some have disappeared because there was no longer enough food to sustain them. Some would argue that our society is in the process of slowly crumbling and disappearing too. The Michoacán case demonstrates that effective culinary customs can keep a nation well fed throughout time. The traits of this food and farming culture may guide us to the way of the future and for that reason efforts are being made to make this culture and many others more visible, preserving traditional knowledge for the future.

The Michoacán, is a culture with a 7,000-year history, who still use the original farming crops of corn, beans and chili peppers, where meal preparation is still connected with the communities' religious and ritual ceremonies, and where food connects them, reinforcing social bonds and identity. This is a food and farming paradigm where their cuisine is interwoven with community life and a cultural network of practices that preserves it.

The story that follows has been extracted from the application for Michoacán' s inscription on the Representative List of Intangible World Heritage (www.unesco.org/culture/ich/RL/00400). Traditional cuisine in Michoacán has the "role in the complex cultural system encompassing rituals, ceremonies and celebrations that is a powerful factor in social cohesion and national identity. The key moments in the natural group and individual life cycle –birth and death, community, festive or labor activity– are closely related with cooking and turned into an expressive focus for artistic and artisanal creativity and the rest of the cultural network."

Communities still prepare food using the time-tested methods. Their cuisine is based on corn, beans and chili and particular practices such as a cooking technique that increases corn's nutritional value. The production of food is a collaborative activity along the entire traditional food chain, from planting and harvesting to cooking and eating. Within community life, eating tends to maintain a sacred nature related to the cosmos and the gods and cooking is a heritage that has been handed down from generation to generation. The milpa, where corn is grown, protects other crops in a complex ecosystem where plants share nutrients and interact staving off pests and weeds.

"To this day, the native peoples conceive the universe in terms of food. Humankind was shaped from corn, and food is the vehicle for interaction between people and the deities, as well as with the rest of the community. Ritual and ceremonial offerings always eloquently focus on local foods, while also implying an equally powerful way to demonstrate reciprocity among the living and between them and their ancestors."

[20] www.youtube.com/watch?v=VhZ-EKPPQkU.

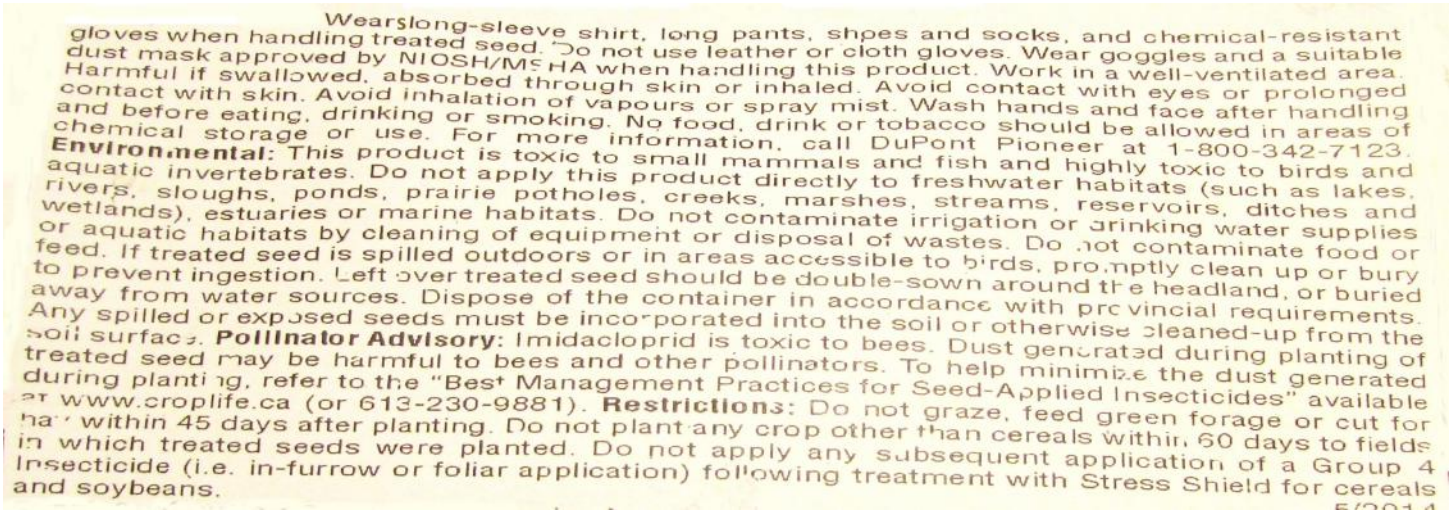
This part of the story of how human life comes from corn, is told in a beautiful film called The Gift, produced by the National Film Board of Canada. It was the inspiration for my study topic.

Agriculture 1.0 is subsistence farming (sometimes called peasant farming) that uses traditional farming practices that are labour and knowledge intensive, but this is meaningful work. The farm family has a good knowledge of soil, of the landscape, of the natural interactions between flora and fauna in their environment, of the value of biodiversity, and the knowledge required to preserve food, whether through cheese making, fermentation, dehydration, to produce a nutritious food product. This highlights the importance of knowledge transfer between generations. It's slogan is: 'feed my family'

1.2.2 The Agriculture 2.0 farmer

Wendell Berry speak of a different kind of work, which he calls"mind-numbing work." He says that "if you have several thousand acres of corn, and you're getting up in the morning to spend all day long driving a cultivator, or a sprayer, or a combine through those identical rows, day after day. . . that's dull. And it would dull your mind. But suppose you have, say a hundred or a hundred and fifty acres of rolling land," he continues, "maybe twenty-five Jersey cows, a few hogs, a garden, flowers everywhere, cliff swallows nesting against the barn wall, and children playing and wandering about. That isn't dull. That requires hard work, of course. But it also requires constant attention and intelligence; it gives a lot of pleasure, and you'll probably find that it depends on love."[21]

This label from DuPont Pioneer, which I found on one of my dog walks, defines the Ag2.0 farmer best.


Wearslong-sleeve shirt, long pants, shpes and socks, and chemical-resistant gloves when handling treated seed. Do not use leather or cloth gloves. Wear goggles and a suitable dust mask approved by NIOSH/MSHA when handling this product. Work in a well-ventilated area. Harmful if swallowed, absorbed through skin or inhaled. Avoid contact with eyes or prolonged contact with skin. Avoid inhalation of vapours or spray mist. Wash hands and face after handling and before eating, drinking or smoking. No food, drink or tobacco should be allowed in areas of chemical storage or use. For more information, call DuPont Pioneer at 1-800-342-7123. **Environmental:** This product is toxic to small mammals and fish and highly toxic to birds and aquatic invertebrates. Do not apply this product directly to freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, ditches and wetlands), estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not contaminate food or feed. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. Left over treated seed should be double-sown around the headland, or buried away from water sources. Dispose of the container in accordance with provincial requirements. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. **Pollinator Advisory:** Imidacloprid is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the "Best Management Practices for Seed-Applied Insecticides" available at www.croplife.ca (or 613-230-9881). **Restrictions:** Do not graze, feed green forage or cut for hay within 45 days after planting. Do not plant any crop other than cereals within 60 days to fields in which treated seeds were planted. Do not apply any subsequent application of a Group 4 Insecticide (i.e. in-furrow or foliar application) following treatment with Stress Shield for cereals and soybeans.

When plants become hosts to parasites, it is because there is a deficiency. If there is a deficiency in a crop, then it is not suited for human consumption and therefore, should be lost to pests. Crop loss due to insects has doubled since 1945, yet pesticide use has increased ten

[21] Leonard, 2012.

fold.[22] Healthy plants grown in healthy soils will resist most insect pests:

> "Insects, in Nature's balance, are intended to eat and destroy that which is not fit for human consumption." - Dr. Charles Northen to the 74th Congress, 2nd session, June 5, 1936[23]

Farms produce food. Industry produces commodities. Just because someone drives a tractor does not make them a farmer, but if they can eat that which they harvest, then they are farming. Agriculture 2.0 is industrial agriculture and is input intensive and expensive. It's slogan is: 'feed the world.'

1.2.3 The Agriculture 3.0 farmers and Generation Z

Ag3.0 farmers are soil farmers, and we know who they are because we can take a handful of their soil, and with a microscope, we can observe many bacteria, and quite a few protozoan, fungi and nematodes, and as well as see humic acid which gives the soil a deep brown colour. And those little soil predators are releasing nutrients in plant available forms, so that the Ag3.0 farmer does not have to apply them.

In Ag3.0, we speak of farmers in the plural, because farmers don't work alone anymore, but are part of larger food and farming enterprises - interconnected networks of producers, perhaps connected with consumers and others.

As soil farmers, Ag3.0 farmers produce nutritious food which can be verified using an infra-red device that measure nutrient density. " Dan Kittredge of the Bionutrient Food Association, is working on quantifying plant nutrient levels.[24] Measuring nutrients would allow growers to charge more for nutritious food, and would allow consumers to 'get what they pay for'. "What we're proposing is a near-infrared spectroscopy device (to measure crop nutrient levels in detail), which looks like a little flashlight or a pointer." He anticipates that it will be available in a couple of years.

Agriculture 3.0 ranges from food grown in one's garden for self-reliance to food grown by smallholders using Ag3.0 principles and best practices, similar to agroecological practices which will double production when smallholders are facilitated. Global fair traded food such as bananas, avocados, chocolate, coffee, tea, sugar and spices, these being luxuries from afar and being expensive.

Soil farmers use regenerative practices such as carbon farming (which involves applying compost), livestock, no-till, agroecological principles and grass farming to grow nutritious food. Knowledge is key to the shift to Agriculture 3.0.[25] Farmers have a good "working knowledge of chemistry, physics, and plant biology as applied to agriculture... what weeds are trying to tell"

[22] Chaboussou, 2005.

[23] www.senatedocument264.com

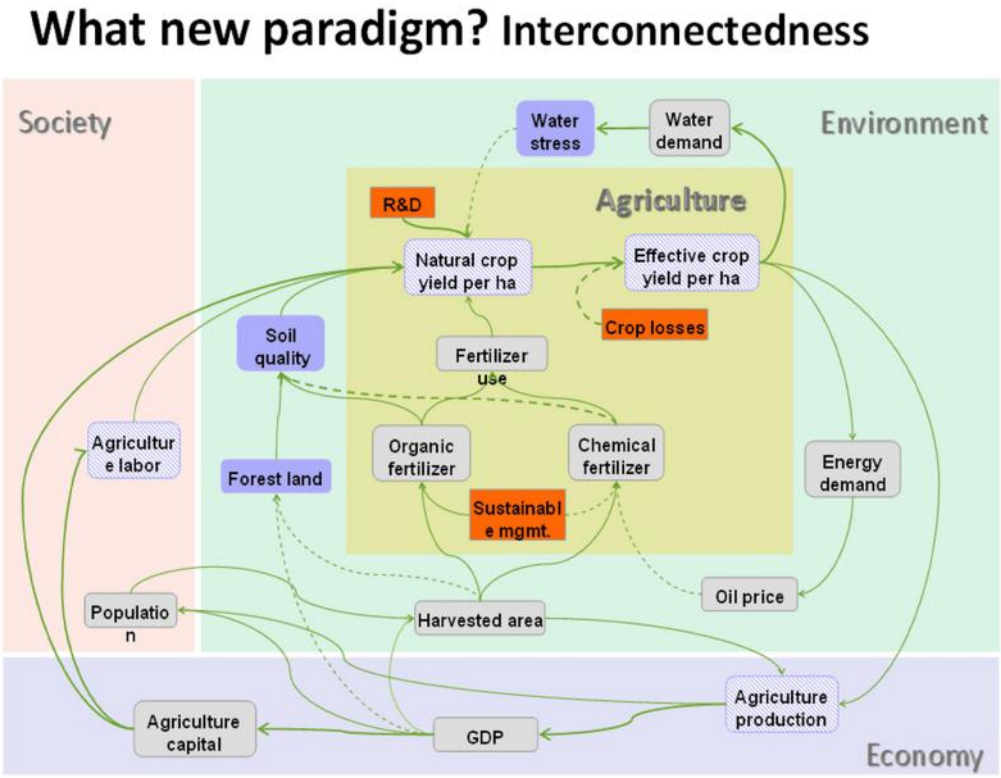
[24] http://www.bionutrient.org/news/farming-nutrient-quality.

[25] Knowledge is key to a point - we need an understanding of how Nature works, such as in pasture management, where understanding the biology of forages means that we don't over-graze only to stunt plant growth. However, I don't believe agriculture needs to be as complicated as science has made it out to be. It is complicated when we focus on the wrong things, instead of allowing Nature to be our teacher and focusing our practices on feeding the soil.

them about the soil's fertility needs, for balanced nutritional content in crops.[26] Carbon can be measured and in California, the more carbon farmers sequester through good soil management, the more credits they earn. Farmers receive tradable greenhouse gas emission reduction credits. Through a grant from the U.S. Department of Agriculture (USDA), the program is going national. "Once the carbon in the soil is measured and formally registered, organizations or companies can buy the credits."[27]

We are witnessing a consciousness shift that will contribute significantly to transforming the future of agriculture. The Ag3.0 farmer will be responding to the resulting consumer demand, especially from Generation Z. MacLean's magazine writes that the oldest Gen Z are now 18 (although there is no agreement on exact dates) and define this generation as:

1. having grown up in hard economic times and with news about climate change,
2. digitally sophisticated,
3. socially conscious, engaged in social activism,
4. high achievers, very aware, and wanting things to be better,
5. smoking, drinking and fighting less, and
6. children of GenX (GenY are children of Boomers).[28]



From Herren, H.R. 2011 powerpoint presentation.

[26]Andersen, quoted from the book's description.

[27]Mellino, C. 2015. *Farmers Rewarded for Practicing 'Carbon Farming'* posted on January 26, 2015 at http://ecowatch.com/2015/01/26/farmers-rewarded-carbon-farming.

[28]Kingston, A. 2014. *Get Ready for Generation Z* in MacLean's magazine, Issue 15 July 2014.

Agriculture 3.0 is resilient agriculture (beyond sustainable) that is health promoting; for soil life, plants, watersheds, ecosystems, bees, animals, people, communities, and the planet. These farms are dotted around everywhere, interconnected in networks of networks. The farmer is rewarded for their skills and ecoservices, and for feed and food that has higher nutritional value, making their enterprises viable. Imagine the future when the consumer carries an instrument similar to an infra-red thermometer, that measures the brix level of a piece of fruit in the grocery store. This is empowerment. Coming soon!

The Ag3.0 farmer is resilient and innovative, where the farmer is the price setter, marketing directly and taking back the middle. They do not hesitate to open their farm-gate to public scrutiny and engage their customers. They have an open door policy and make important contributions to the health of communities. The slogan for Ag3.0 could be: "producing food as if people mattered" (Ernst Friedrich Schumacher).

1.3 Defining Canada's Opportunity for Being the Change

Canada has the opportunity to become a role model for the rest of the world. Is the way we farm collectively in Canada meeting our national goals and global image for food production? And are we being good stewards of our "natural, pristine environment" (source: Agri-Food Trade Service)?

Hans Herren is the President of the Millennium Institute and collaborated in the IAASTD Global Report (see footnote 7). He wrote an article for the *Embassy*, a Canadian foreign policy news weekly (May, 2010 *'Supporting a True Agricultural Revolution*'), which was also published in the Union Farmer Quarterly (Fall 2010). In his article to Canadians, he calls out to Canada to be a role model for global agriculture and to spearhead the evolution to resilient farming: "Here lies a great opportunity for Canada to affect a different kind of revolution. Canada's recently released Food Security Strategy contains some heartening elements. It states that the current agricultural paradigm is not sustainable and that we need to look beyond food production in order to affect real transformation in the food system." We will achieve the greatest impact, he says, by adopting "an agriculture that is in harmony with its environment, the people that practice it and those who enjoy its multiple benefits."

2.0 Agriculture 3.0: A Vision for the Future of Agriculture

This study grew far beyond my original ideas. I came across so many new concepts, acquired new skills for working through problems (ie. wicked problems) in group settings, learned about economics and policy - two disciplines that I would have completely ignored before, and discovered much from my Nuffield travels. As I delved deeper, new elements came to the surface and I needed to speak out about them. Of particular concern are the health-related issues revolving around food coming in from our fields. This is an awakening that we all need to have.

My reading list is extensive, and from these readings and some great speakers, I was able to find the words to better express my ideas. So much of this report seems to be about language. I hope that I accurately depict the situation of food and agriculture and what the future of agriculture could look like. There are many individuals, farmers and organizations of like-minded people who are already adding momentum to what is being called the 'Great Turning,' which I mention next. I have received much inspiration from these writers.
Note: The *italized* text highlights possible principles of Ag3.0.

2.1 Summary of Findings in the Literature

There are many suggestions in the literature about what the future of agriculture should look like, and generally, they all tend to lead to similar conclusions, with slightly varying themes. One of these is the proposition that we are already witnessing a shift, or the Great Turning.

Calling the shift the Great Turning became better known with the workshops and writing of eco-philosopher **Joanna Macy**, in her work 'The Work that Reconnects.'[29] The best way to explain the Great Turning in just a few words is that it requires that we do our inner work, opening to a wider understanding of the Earth, the whole of humanity and beyond. This can happen through new forms of thought, and understanding the Universe Story, which we are a part of. This shift is necessary for us to fully realize agriculture 3.0.

Brian Swimme explains the Universe Story (www.storyoftheuniverse.org) nicely in this quote: "We must come to understand that these dreams of ours do not originate in our brains alone. We are the space where the Earth dreams." and, "The human being is the agent for transformation and we each have a piece of work to do. In agriculture, we find that the best work can be done, because we are working within the rhythms of nature."[30]

Agroecological farming is the approach most often documented in discussions about the future of agriculture, however I believe that there is so much more that contributes to shaping the agriculture 3.0 paradigm. There is not enough space in this report to go into the details of agroecology; therefore, I will simply use the following quote from the Oxfam-Solidarity report referred to earlier. We know that "business as usual is no more an option."

[29] workthatreconnects.org/the-work-that-reconnects/#more-1146 and www.joannamacy.net/three-dimensions-of-the-great-turning.html.

[30] Swimme and Tucker, 2011. Movie.

> "Within this context, the notion of scaling-up agroecology benefits from an increasing international recognition. La Via Campesina (LVC), the largest peasant movement worldwide, is strongly advocating for it (LVC, 2013a; LVC, 2013c), along with many other civil society actors including hundreds of non-governmental organizations (NGOs) in Africa, Latin America and Asia which have been promoting thousands of agroecological projects since the early 1980s (Holt- Giménez and Altieri, 2013). The United Nations Special Rapporteur on the Right to Food, Olivier De Schutter, has compiled evidence demonstrating not only that agroecological approaches can provide enough food for all, but that *smallholder farmers can double food production within 10 years in critical regions by using agroecological methods* (De Schutter, 2010a). ... Drawing from many other studies and global assessments (including the IAASTD report -see footnote 7, and the report mentioned next), the evidence and results speak for themselves as to the credibility of scaling-up agroecology for helping the world to feed itself sustainably today and in the future."[31]

"There is a clear and urgent need for a reorientation of agricultural development towards systems that use fewer external inputs linked to fossil energies, and instead use plants, trees and animals in combination, mimicking nature instead of industrial processes." This was the message from the Special Rapporteur (see footnote 9) in his contribution to the Trade and Environment Review 2013.[32] "The world needs a paradigm shift in agricultural development: from a "green revolution" to an "ecological intensification" (holistic) approach... *mosaics of sustainable, regenerative production systems* that also considerably improve the productivity of small-scale farmers."

The **Common Agricultural Policy (CAP)** of the European Union (which was recently reformed in 2013-2014 with greater attention to 'sustainable agriculture') states its Rural Development Priorities in Chart 6:[33]

1. *Fostering knowledge transfer and innovation* in agriculture, forestry, and rural areas
2. Enhancing farm viability and competitiveness of all types of agriculture in all regions and promoting *innovative farm technologies* and sustainable management of forests
3. Promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture
4. Restoring, preserving and *enhancing ecosystems* related to agriculture and forestry
5. Promoting *resource efficiency* and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors
6. Promoting social inclusion, poverty reduction *and economic development in rural areas*

[31]Parmentier, S. 2014. *Scaling-up agroecological approaches: what, why and how?* Oxfam-Solidarity, Belgium, January 2014.

[32]United Nations Conference on Trade and Development (UNCTAD). September 18, 2013. Trade and Environment Review 2013: *Wake up Before it Is Too Late. Make agriculture truly sustainable now for food security in a changing climate* available at unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=666.

[33]European Commission, 2013.

Appropriate Technology Transfer to Rural Areas (ATTRA) suggests these land-use strategies as best practices:[34]

1. keeping the soil covered throughout the year;
2. avoiding moldboard plowing;
3. increasing biodiversity wherever possible through crop rotation, intercropping, use of sod and cover crops, farmscaping, and integrated pest management;
4. applying animal manures or compost;
5. *diversifying enterprises* and planning for profit;
6. *integrating crop and animal enterprise*;
7. minimizing tillage, commercial fertilizer, and pesticides;
8. buying supplies locally;
9. employing local people; and
10. including *quality of life* in your goals.

Hans Herren, President of the Millennium Institute, writes that the question is not how do we feed the world, but "How do we rethink our global food system so that it can feed people, create healthy communities and economies, and sustain the planet?"[35]

> "Business as usual is not an option.... we must take into account the multi-functionality of agriculture .... we need to invest in technologies that *blend farmer knowledge and innovation with formal science*. We need to support an agriculture that fosters rural economies; that restores, not erodes, biological diversity and soil fertility; and builds resilient food systems that can withstand shocks like climate change." We need to enact "policies and practices that *ensure equitable access to food, reduce food waste and post-harvest losses, build vibrant local markets*, and redirect the land and resources increasingly being used to feed cars, animals and industrial processes, to nourish humans.

Fritjof Capra with the **Center for Ecoliteracy** says that ecological literacy is at the center and that we need to understand *how nature sustains ecosystems*. “Creating communities that are compatible with nature's processes for sustaining life requires basic ecological knowledge. We need to teach our children - and our political and corporate leaders - fundamental facts of life:

- Matter cycles continually through the web of life
- Most of the energy driving the ecological cycles flows from the sun
- Diversity assures resilience
- One species' waste is another species' food
- Life did not take over the planet by combat but by networking"[36]

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[34]Sullivan, P. 2003. *Applying the Principles of Sustainable Farming* at attra.ncat.org/attra-pub/summaries/summary.php?pub=295.

[35]Herren, H. 2010. *Supporting a True Agricultural Revolution* in Embassy (a Canadian foreign policy newsweekly, Issue May 2010) and in the Union Farmer Quarterly, Issue Fall 2010.

[36]Capra, F. 2008. *The New Facts of Life* posted at www.ecoliteracy.org/essays/new-facts-life.

John Ikerd, whose writings I refer to very often, puts it very simply:

"The new farm economics of today is about making enough profit to meet the material requisites for a *desirable quality of life* while:

- building healthy relationships within farm families and with employees, customers, neighbors, and society,
- taking care of the land and farm animals that support them and being *good stewards of nature*, and
- meeting the agricultural needs of human society.

The new farm economics treats farming as a business, but more importantly, as a *way of life*."[37]

I did not truly understand this 'way of life' until I visited Transylvania and explored the true meaning of efficiency. There is a good discussion about this in Case Study 2 and in Appendix D. This way of life is an entirely different state of mind. It is not unusual for the farmer today to be satisfied with making just enough money to meet their desired quality of life. What is more important to many farmers is building healthy relationships within their farm system, which includes their family and the people in their community.

Wendell Berry is well known for some famous quotes in his books about food and farming. He talks a lot about place; about listening to the land and the genius of place:

"On all farms, farmers would undertake to know responsibly where they are and to 'consult the genius of the place.' They would ask what nature would be doing there if no one were farming there. They would ask what nature would permit them to do there, and what they could do there with the least harm to the place and to their natural and human neighbors. And they would ask what nature would help them to do there. And after each asking, knowing that nature will respond, they would attend carefully to her response."[38]

I also have to quote Wendell Berry on urban agriculture, because I have a bit of an issue with the term 'farming' being used for gardening in urban settings. I have to agree with Berry that there is a difference between farming and urban agriculture. As always, he is able to make a bold statement and say it just right:

"We have everything to gain from urban agriculture. But that's not farming. Louisville, Kentucky, for example, is not going to feed itself from gardening alone. They need milk and meat- things that you can't produce in the city. Every time someone in Louisville plants something to eat, we're better off out here. Urban gardeners know something of the biology, the art, and the chanciness of growing food, which makes it possible for them to imagine the life and work of farming out in the countryside. From this and the interest in local food, you get an urban agrarianism that I think is simply indispensable."[39]

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[37] Ikerd, J. *New Farm Economics.* University of Missouri posted at web.missouri.edu/ikerdj/papers/SFT-New%20Farm%20Economics%20%281-08%29.htm.

[38] Berry, W. 2009 Bringing it to the Table: On Farming and Food, Counterpoint Press, Berkeley, CA. Taken from book excerpt posted at www.culinate.com/books/book_excerpts/bringing_it_to_the_table.

[39] Leonard, 2012.

Credit is due to **Steffen Schneider** of Hawthorne Valley Farm, who gave me the clever terminology that helped me express this study topic more precisely. He made a presentation about his work at the Sacred Agriculture biodynamic conference in November, 2012, in Madison, Wisconsin. To continue with his trend of using tech talk, he suggests that we need a completely new operating system to communicate a new narrative for the future of farming. Essentially, he says, Ag3.0 will be related to our state of consciousness or awareness, as a society. "We need to find a way to connect any living soul back to soil, farming, and food. That is what I describe as the "Soil to Soul" connection. We also need to shift into a place of awareness from 'me' to 'we.' " It is all about connectivity and the resulting collective creativity.

Steffen makes some very good points in his presentation:

1) The perception of the social status of farmers needs to change. Steffen elaborates on our levels of awareness using Otto Scharmer's work. By using awareness-based collective action, we can create a new environment of trust between farmer and consumer.

Otto Scharmer's book *Leading from the Emerging Future: From Ego-system to Eco-system Economies* (2013) is about Theory U and how form follows awareness, that despite being far more connected, our awareness is still limited and local. We live in a time of death and rebirth. "What's dying is an old civilization and mindset of maximum "me" – maximum material consumption, bigger is better," he writes in the introduction, and we have ended up with results that nobody wants. "What's being born is less clear but in no way less significant. It's something that we can feel in many places across Planet Earth… It's a future that requires us to tap into a deeper level of our humanity, of who we really are, and who we want to be as a society."

2) To elaborate on the requirement of a new operating system, we need a narrative for farming that is progressive enough for young people. The lure of technology is irresistible despite the consequences.

3) The new agriculture is not retro agriculture. Agriculture 3.0 is a narrative for the future of agriculture. And that narrative has to be cool, catchy and trendy!

Steffen continues this work through founding the Institute for Mindful Agriculture, which is "Uncovering agriculture's potential for the co-evolution of the Earth and her inhabitants."[40]

Bioneers, is a non-profit 'hub' for social and scientific information that "highlights breakthrough solutions for *restoring* people and planet." They advocate for "revolution from the heart of nature." Bioneers are social and scientific innovators who are *mimicking nature's operating instructions* to serve human ends (coined by Founder, Kenny Ausubel in 1990).

> "In the face of increasing economic, political and climatic crises, people across the globe are working to create resilience at the local and regional level. Creating increased *self-reliance* in relation to our food supply is a critical first step."[41]

[40] www.instituteformindfulagriculture.org

[41] Promotional words for their webcast: *Resilient Communities, Resilient Food Systems* on Friday, August 22, 2014.

If any organization is making me feel that I am 10 years late doing this work, it's this one! Last year, they celebrated their 25th anniversary.

Patrick Holden founded sustainablefoodtrust.org and talks about what he believes are unifying principles of sustainability:[42]

- soil - *build soil fertility*, the future of civilizations depend on this.
- health - pests, parasites and diseases reveal our efficiencies (Albert Howard). People and plants were vigorous. Investigate the causes of good health, instead of treating symptoms.
- diversity - nature can co-exist with agriculture ie. bird song on the farm vs a silent spring. Don't protect nature against agriculture, we need to *co-exist*!
- *resilience - to survive and thrive through change*. Minimize inputs including seeds. Holistic grazing management.
- culture - and social dimension. Rich, rewarding places. *Spiritual fulfilment*. To persuade young people to become farmers.
- economics - subsidising the industrial farms that are using chemical inputs is hard on the smaller farm. 5% is not enough to break into mainstream and make a difference. Why? Because polluters don't pay. And sustainable farmers are not being rewarded for the ecological services.

Unless we get *true cost accounting* applied into our food and farming system, we will not achieve a sustainable food system. The only pillar that is missing here is policy; so that polluters do pay and sustainable farmers benefit. I have written more about Patrick Holden's work in my blog: farmviability.wordpress.com/ 2013/07/04/thoughtful-thursday-sustainable-food-trust.

In his final report as **Special Rapporteur on the right to food**, Olivier De Schutter observes that "The eradication of hunger and malnutrition is an achievable goal. Reaching it requires, however, that we move away from business as usual and improve *coordination across sectors*, across time and across levels of governance."[43]

We need to:

1. *empower communities* at the local level,
2. adopt *enabling policies,*
3. work across all relevant sectors (agriculture, rural development, health, education and social services), and
4. realign areas of trade, food aid, foreign debt alleviation and development cooperation to ensure food security and *adequate nutrition for all* (globally). Despite a goal for community based food systems, we are players in an increasingly interdependent world that requires deepening the cooperation between countries.

[42]Holden, P. 2013. TEDxExeter on *Making our food safe and sustainable* published on Jun 5, 2013 at tedxexeter.com/2013/06/05/patrick-holden-making-our-food-safe-and-sustainable.

[43]De Schutter, 2014.

To achieve this:

1. We need sustainable production:

"Agroecology is often misunderstood for organic farming or even worse, for a return to traditional ways of practicing farming...we need to find ways to work with nature instead of working against nature and that is what agroecology is about."

2. We need sustainable consumption.

"With markets today increasingly globalized, where land and water have become commodities that are essentially traded across borders, the issue of sustainable consumption is an increasingly important one."

3. We need to reduce wastes and inefficiencies in the food systems.
4. We need to address poverty:

"Rural poverty in the Global South cannot be reduced easily because we have developed an export led agriculture on which many poor countries have come to depend upon and we have cheap subsidised food in the North."

5. Food system needs to be remunerative.

All stakeholders in food production from farmers to chefs, need to work for good wages.

Stéphane Le Foll, French Minister of Agriculture, Agri-Food and Forests, announced in September, 2014 that France will back agroecology to fight climate change. In his writing for the Huffington Post, he says *"less gasoline in your tractor, less pesticides, less time spent tilling,* all this requires us to rethink our agricultural practices."[44]

He continues: "Basically, I define agro-ecology as a *state of mind*, a willingness and also a form of optimism and confidence in nature itself and human intelligence. This is not a dream. We simply don't always use the potential that nature as to offer. When we plow a field for example, we do not allow the worms to work the soil instead of tractors... There is a tremendous potential for research and development of an entire green industry as bio- control. What I want is to develop a *knowledge intensive agriculture*!"

Phil Ferraro says that "By demonstrating how growing practices and *social enterprise* can be integrated into a sustainable model that fosters food *self-reliance* and local economy, he has demonstrated that visionary ideals can be transformed into practical and sustainable social enterprises."

An example of an agricultural network is one of **Ashoka changemakers**' projects, which demonstrates how *social innovation* that includes healthy soil makes healthy people. The primary work is feeding the soil. The soil then becomes the link between human health and environmental health and from this link, they have started social enterprises that meet the increasing consumer demand for nutrient dense food:

"They are insisting on foods rich in actual nutrition (not just in bulk, calories, or raw

[44]Le Foll, S. 2014. *L'agro-écologie : l'agriculture autrement* posted on September 19, 2014 at www.huffingtonpost.fr/stephane-le-foll/agriculture-autrement-agro-ecologie_ b_5840936.html.

ingredients) as essential for meeting the needs of a growing world population, and they're leveraging the power of women-led farm families who understand this point better than anyone else on Earth. In doing so, they're putting into play farming practices at wide scale that supply *nutritional foods*, enrich soils and thus surrounding ecosystems, and ultimately *foster communities* that are both nourished and nourishing."[45]

One of most all-encompassing definitions for the future of agriculture is from **ActionAid**, because they are doing it. They are on the ground assisting farmers to transition to more sustainable agriculture but it's more than that, because they are also making considerations for climate change. ActionAid considers sustainable agriculture a *way of life* based on *self-reliant* and *agro-ecological systems* which encompass all forms of livelihoods for smallholder farmers, farm workers, landless people, pastoralists, livestock farmers, fisherfolk, and hunter-gatherers. "It is based on ... the design and implementation of *site-specific adaptation strategies* aimed at reducing vulnerabilities and increasing the *resilience* of the smallholder production systems."

"A whole-systems approach to food, feed, and fibre production that sustains the *health of soils*, ecosystems and people. It relies on ecological processes, *biodiversity* and cycles adapted to local conditions, rather than the use of inputs with adverse effects. It *combines tradition, innovation and science* to benefit the shared environment and promote fair relationships and a good *quality of life* for all involved. Inherent in this definition is the idea that sustainability must be extended not only globally but indefinitely in time and to all living organisms including humans."[46]

Agriculture Solutions hosted James Hoorman from Ohio State to speak about soil health:

"We need to let the microbes do the work, not machinery. The key is *biodiversity*, where different plants feed different *soil organisms* and the cycle expands even further to ultimately decrease disease pressure. And who is our teacher? Mother Nature."

If any organization or organism is 'sustainable', it is the Earth. To envision resilience, we need only look to how Earth has demonstrated *resilience, adaptability, cooperation and interconnectedness* for over the past 3.8 billion years. Sometimes, it is hard for us to remember that, as human life, we are only a small blip on the Earth's timeline. Whether we decide to stick around by changing our ways, or not, has little bearing to the Earth. She has a way of balancing herself, as she has done many times before.

We can model agriculture, human communities and social enterprises after the *patterns and systems found in Nature*, as well as on the practices of traditional societies that have

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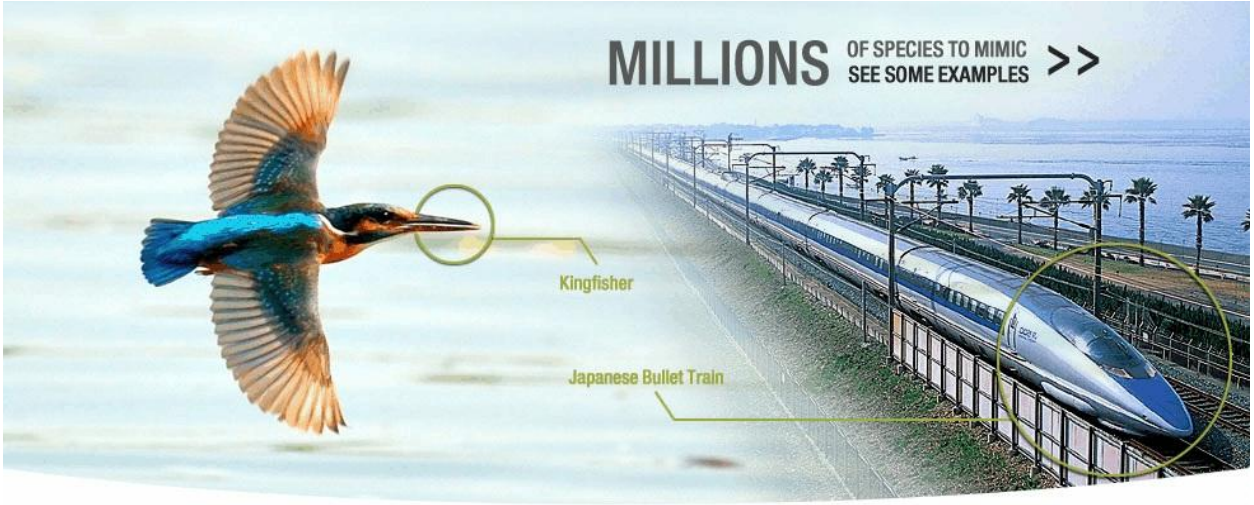
[45] *Getting Our Hands Dirty: Social Innovators Show How Healthy Soil Makes Healthy People* posted on May 19, 2014 at www.changemakers.com/community/changemakers/blog/getting-our-hands-dirty-social-innovators-show-how-heal.

[46] ActionAid, 2011. (Note that this report was updated May 2012 replacing this definition with one for agrocecology).

preserved themselves and their culture for centuries. **Janine Benyus** co-founded the Biomimicry Institute (biomimicry.org) and popularized the term biomimicry in 1997 with her book: Biomimicry: Innovation Inspired by Nature.[47] "We're awake now, and the question is how do we stay awake to the living world? How do we make the act of *asking nature's advice* a normal part of everyday inventing?"

The organization Biomimicry 3.8 (biomimicry.net) has been established to train people in biomimicry design and innovation, which can be applied to almost any discipline.



Holistic Management International stated in one of their newsletter issues:

> "Now is the time for rising up, for engaging our lunatic ingenuity, our *systems design* frameworks, our Holistic Management® policy design and decision-making skills, our Permaculture farms, our *Keyline* designed water harvesting, our *holistic planned grazing*, our powerful animal impact, our *living soil organisms* and food web, our resilient local food systems, our abundant local jobs and regenerative *carbon sequestering* ecologies, our payment for ecosystem services, and with everything running and thriving ever more and more *simply, using air, water, and sunlight*; the abundant bounties of Nature. A blessed revolution, indeed."[48]

The ideas that **Ernst Friedrich Schumacher** wrote about in his book *Small is Beautiful: Economics as if People Mattered* (1973), keep coming back, maybe because we are finally coming to a time when we are ready to embrace them. He had many theories on business and the workplace and as it turns out, they are also relevant to Ag3.0:

"Ever bigger machines, entailing ever bigger concentrations of economic power and exerting ever greater violence against the environment, do not represent progress: they are a denial of wisdom. *Wisdom* demands a new orientation of science and technology towards the organic, the gentle, the non-violent, the elegant and beautiful...

From scientists and technologists... we need methods and equipment which are:

[47] Benyus, 2010.

[48] Holistic Management (HMI) In Practice, Jul/Aug 2010, Issue 132.

- Cheap enough so they are accessible to virtually everyone,
- Suitable for *small-scale* application, and
- Compatible with man's need for *creativity*."

The above statement by Schumacher is further emphasized by **Miguel Altieri** in a youtube video:[49]

> "We know that the problem of feeding the world doesn't have anything to do with production. The matter of scale is not the area but the *number of farmers* and the productivity per hectare.... In one hectare, they produce enough food to feed 15 to 20 people.... the systems that small farmers have are the ones that are *resilient*, they are the ones that resist impact and recover faster from the impact."

Daniel Deffenbaugh, Professor of Philosophy and Religion at Hastings College, has been an organic gardener and seed saver in southern Ohio for over thirty years. His current work focuses on the notion of integrated health, where *well-being* is a balance between *spirituality, physical vitality, community involvement, and ecological integrity*. In his book, he writes about farming as sacred work:[50]

> "We realize that the earth is a living being, just as we are. Tending earth's soil, plants, animals and landscapes is sacred work, the work of a farmer. Farms not only produce food, but are centres where we experience our society's culture and where communities come together to participate in all stages of food, from growing it, preserving it, preparing it and eating it, by knowing (once again) the life force that is in our food, farms and communities. Farmers who work on the land recognize that a *spiritual practice* is integral to the task of growing *real food*. This is when agriculture becomes a sacred act."

And finally, to wrap up this literature review with a quick oneliner: "feeding the world's growing number of inhabitants, one small plot at a time," says Dan Weins, water and food product coordinator for the **Mennonite Central Committee**.

2.1.1 Literature Review Conclusion

I conclude this review by suggesting that farmers can contribute to a healthy world by revising their farm enterprise mission statement to 'Nourishing Communities', instead of feeding the world (or only livestock and gas tanks). It is also the responsibility of each individual to be self-reliant - to take responsibility to feed themselves and their family, however they might undertake this challenge. Whether they grow the food themselves or contract a farmer directly to do it for them, each and every one of us must take care of the supply of our food.

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[49] Video: *Why is agroecology the solution to hunger and food security?* www.youtube.com/watch?v=2yFvD8wuLmU.

[50] Deffenbaugh, D.G. 2012. Learning the Language of the Fields: Tilling and Keeping as Christian Vocation. Cowley Publications, Cambridge, MA, USA.

According to **Peter Rosset**, Executive Director of Food First/The Institute for Food and Development Policy (www.foodfirst.org) and author of *The Greening of the Revolution: Cuba's Experiment with Organic Agriculture*, he states in an article that "if the history of the Green Revolution has taught us one thing, it is that increased food production can, and often does, go hand in hand with greater hunger. If the very basis of staying competitive in farming is buying expensive inputs, then wealthier farmers will inexorably win over the poor, who are unlikely to find adequate employment to compensate for the loss of farming livelihoods. Hunger is not caused by a shortage of food and cannot be eliminated by producing more."[51] It's about empowering smallholder farmers as the centre of the rural economy, and gender equality through the pillar of policy.

2.2 Seeking Principles of Agriculture 3.0 from Nuffield Travels

In Appendix B - Notes from the Field, I present three case studies for exploring the principles of Agriculture 3.0, from my Nuffield travels:

Case Study 1: Self-Reliance and Transitioning to Agroecological Practices in Cuba

Case Study 2: Farm Efficiency and the Value of Preserving Biodiversity and Cultural Heritage in Transylvania

Case Study 3: European Traditional Diets of Place and Ontario Local Food

Note: *When possible principles are mentioned, they are* **bolded** *for easy reference back to them.*

2.3 Replacing Outdated 'Sustainability' with Resilience in Agriculture3.0

We seem to value systems in three's: in a trinity, a triad, 3 pillars, 3 cornerstones, or 3 elements in a 3 circle venn diagram. These models most often reflect human-designed propositions. Nature, on the other hand, is often designed in five's, as well as with the golden mean and other ratios. For example, when you cut an apple crosswise, a pentagon is revealed.

An apple cut crosswise

My first task in defining Agriculture 3.0 was to investigate the use of the term 'sustainability.' Perhaps it works in the corporate world, but in food and farming, I was finding the term 'sustainability' outdated. 'Resilience' is in! Resilience is especially popular in discussions about climate change. All of this meant that we needed a new conceptual framework for resilient agriculture.

2.3.1 The Wobbly 3 Legged Sustainability Milking Stool

There are many definitions for 'sustainability.' John Ikerd calls the three cornerstones of sustainable agriculture ecological soundness, economic viability, and social responsibility which rests upon a foundation of intergenerational equity. He says that sustainability "applies the Golden Rule across generations which means meeting our current food and nutrition needs

[51] Rosset, P. 2000. *Lessons from the Green Revolution: Do We Need New Technology to End Hunger?* posted at www.soc.iastate.edu/sapp/greenrevolution.pdf.

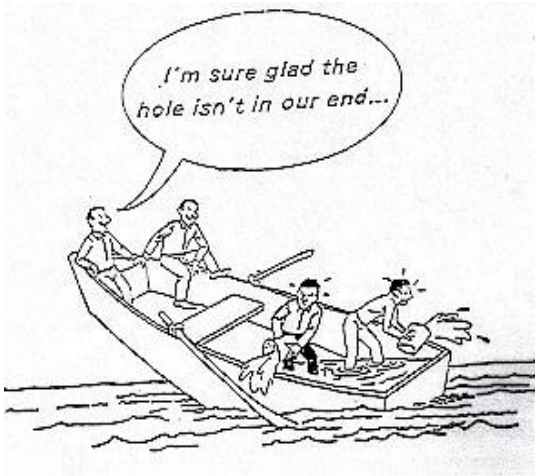
without compromising the ability of the system to meet the needs of future generations."[52]

The triple bottom line was coined by John Elkington in 1994. That makes it 20 years old - a lot has happened in this time period! It is often depicted as 3 circles in a venn diagram, or a 3-legged stool. I argue that this makes for a very wobbly milking stool, and that it cannot stand for 'resilience'. In this metaphor, the seat is sustainability, supported by three legs; the social, environmental, and economic pillars, or the 3 P's: people, planet and profit.

In the case of food and farming, it's wobbly because it needs policy to facilitate a framework for a democratic food system that considers the interests of people, their health, and the health of their communities. It also needs to be place-based with consideration for where people live. ActionAid says it perfectly: "There is no one-size-fits-all model or technological package to climate resilient ... agriculture. Real alternatives are rather site-specific; they are highly dependent on the cultural, social, economical, and environmental contexts in which they are generated."[53] 'Real alternatives' are also 'highly dependent' on the political context as well. The European Union's CAP policy discussed in Case Study 2 is illustrative of how powerful policies can be.

2.3.2 Resilience in Nature

What are the characteristics that make an organization or system persist? The way to sustain life is to build and nurture community. A community is a network of relationships. The network of relationships is the basic pattern of organization of all living systems. These are networks of communication whether chemical between plant and insect or between you and I through the internet.



Not systems view of thinking!

Fritjof Capra, founder of the Centre for Ecoliteracy (ecoliteracy.org) defines this interconnectedness as:

1. the property of a web of relationships (like ecosystems)
2. well networked communities that interact with other communities

Nature works through interconnectedness to create a resilient system. It's this resilient system that we can call 'sustainable,' when we view the system as a whole. "Our mind conditioning makes it tough for us to think of the whole"[54] after science has broken it out into

[52] Ikerd, 2012.
[53] Action Aid, 2011.
[54] Benyus, p. 46

separate pieces, but we need to begin seeing things in whole again, in a systems view of thinking.

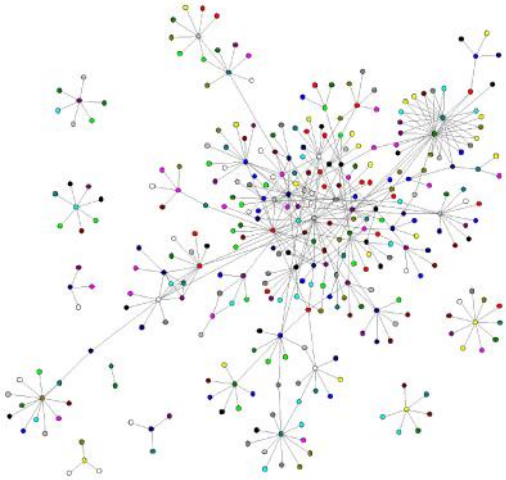
What does this mean for our farms? To be resilient, we need to garner the support of healthy soils and ensure the health of all components in, surrounding and connected to the farm system. We need to consider that:

1. Farms are living systems,
2. Farm businesses need to work together,
3. Since we all have to eat, we all need to be involved in food production in some way.

How do we bring farm viability into the equation? "Profitability dwarfs all other issues when we are talking about creating a sustainable local food system - if we can't make a living, nothing else matters." - Brent Preston, The New Farm (Creemore, Ontario)

If we apply Nature's interconnectedness to farms and bring in farm viability, we can infer that a viable farm is:

1. a well networked farm business whose web of relationships creates a community
2. part of several communities (including a local group of farmers) that are well networked and interact with other communities and networks in the practice of network weaving that creates an ever greater web of relationships.



from www.networkweaver.blogspot.ca

What must we do to have viable Ag3.0 farms? We must strengthen our connectivity with others, collaborate on projects, contribute to our local community, and build our networks (and web of networks) so that our farm business is part of strong resilient communities, that work together on challenges and adapt more easily to change.

Since I have worked with several Mennonite and Amish communities in Huron County and appreciate how much they work together as a community and support each other, I appreciated this observation from Wendell Berry about how good agriculture is a community enterprise.[55] “The Amish prosper and net a high percentage of gross, partly because they are good neighbors to one another. The great Amish asset is neighborliness. That’s a religious principle; Love thy neighbor as thyself. But it’s also an economic asset. If you’ve got a neighbor, you’ve got help, and this implies another limit. If you want to have neighbors, you can’t have a limitless growth economy. You have to prefer to have a neighbor rather than to own your neighbor’s farm.”

[55] Leonard, 2012.

2.3.3 Agriculture 3.0 is 'Back to Basics' and Farming in Nature's Image

The basic principles of farming remain the same in Ag3.0. We cannot take short cuts and skip over the basics. Agriculture 3.0 is solar-powered. Nature depends on the sun to grow life. Energy flows when sunlight is converted into plant growth, which is then consumed by animals and so on. The more a farm can capture energy with plants, the more viable it will be, capturing sunlight in cover crops, perennial vegetation and other year round plant growth, converting it to food dollars. The alternative is to spend dollars on inputs. But it's much more simple to mimic Nature by using biomimicry principles.

Wendell Berry was quoted in an interview, quoting another farmer: " 'It is good to have nature working for you. She works at a minimum wage.' If you work against her, as we are now doing, she'll work against you. The penalties may be severe."[56]

When I was touring with Sarah Singla, 2011 Nuffield Scholar from France, she pointed out how left undisturbed, growth is plentiful. When we look around, where Nature runs her own show, we don't see loss caused by drought or pests. A forest, a grassland, the vegetation along the sides of the road, they survive, because diversity leads to resilience. It is always lush on the edges of roads throughout the growing season. "Everywhere about us is evidence that the undisturbed surface of the earth produces a healthy growth."[57] This is what we want to emulate in agriculture, by applying biomimicry principles.

One example of where this is being practiced is at the Land Institute (www.landinstitute.org), where Wes Jackson is studying prairies as a model for an agriculture that features edible, perennial polycultures and that would sustain the land. Benyus writes about the Land Institute in her book.[58]

Jerry Glover is an agroecologist and Emerging Explorer (National Geographic) who works at the Land Institute in Kansas with plant breeders and agricultural scientists developing prototypes of viable perennial crops:

> "Who knew a farm field could be so exciting? What if it holds the key to saving biodiversity, polluted ecosystems, and starving people? What if, in fact, it all comes down to a new grain of wheat? Before agriculture, natural plant communities ruled the earth and kept ecosystems in perfect balance. How? Those plants were perennials, alive year-round and incredibly efficient at regulating processes like nutrient cycling and water management that protect ecosystem health."
>
> "Why does this world beneath our feet matter so much? Many nutrients essential to human health come from the soil. Plants are the delivery system. When we lose the health of our soil through erosion or degradation, crucial nutrients are no longer carried up to plants and passed on to humans."[59]

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[56] Leonard, 2012.
[57] Montgomery, 2007.
[58] Benyus, 1997.
[59] www.nationalgeographic.com/explorers/bios/jerry-glover.

2.3.4 Defining Resilient Agriculture 3.0

We need a recipe for a future of good food from beef to bass that is a "radically new conception of agriculture, one in which the food actually tastes good."[60]

Agriculture 3.0 is a narrative for the future agriculture. Resilience is the new trend, but Ag3.0 is much more than that. Agriculture 3.0 is a new paradigm that opens up our minds to choice; choice in food for the consumer, and choice in farming practices for the farmer.

We need a radical change and it needs to be a 'no-brainer.' It needs to be applicable to all regions of the world because "if business as usual is not an option any more and if governance as usual is not an option any more, then it's time to act, not time for another report!"[61]

So what does Ag3.0 look like?

Agriculture 3.0 is resilient agriculture that produces nutritious (nutrient dense) food from rich healthy soils, and results in healthy communities, viable farm businesses and empowerment, especially of women farmers and smallholder farmers. Agriculture 3.0 is defined by farming practices that build the soil.

<u>The practice of Ag3.0 farming is sacred work that</u>:

builds soil life and sequesters carbon

+

respects place-based knowledge, tradition and culture

+

uses resource conserving innovation and technologies

+

gives thanks (acknowledging the mystery and that which is the sacred)

+

uses regenerative practices that mimic nature (biomimicry), mitigate climate change, and preserve natural resources within diversified agricultural systems

=

resilience

surviving and thriving through change

Resilient Ag3.0 is social and contributes to a healthy society. It is about networks, collaboration and the interconnectivity that we witness in nature. It is also regenerative, helping to restore the health of communities by re-balancing diets (through re-balancing soils), strengthening local economies, and building healthy relationships between food, culture and all stakeholders across all sectors connected to the food value chain. It creates quality jobs on the land and in the kitchen, especially for young adults, and offers farmers choice to suit their interests, skills and business style.

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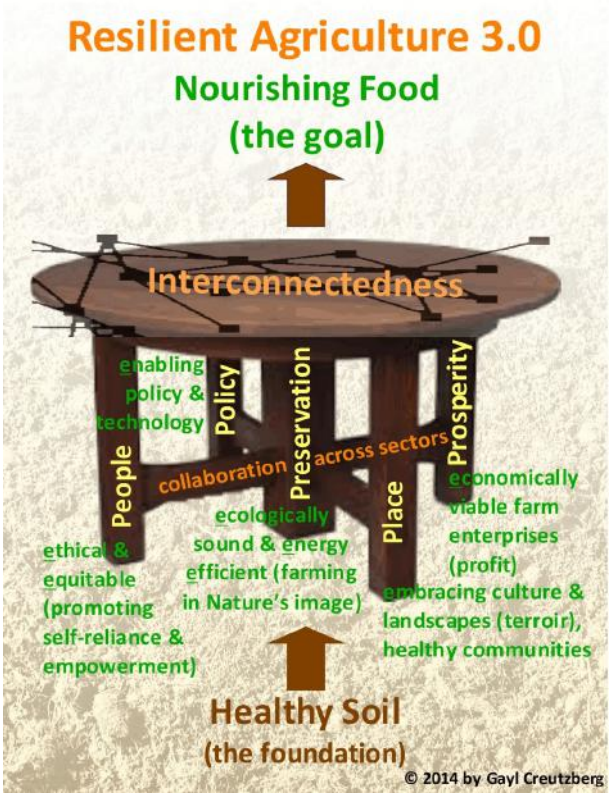
[60]Barber, D. 2010, in a TED talk *How I fell in love with a fish* posted atwww.tedtalk.com.

[61]Markus Arbenz, Executive Director of IFOAM in a powerpoint presentation to the United Nations.

Ag 3.0 farm enterprises have a social mission as well as an enterprise mission of 'nourishing communities,' similar to a social enterprise (a business that has both social and commercial goals - see glossary). Ag3.0 provides that which so many of us are seeking; a sense of vitality; experiencing the miracle of life by being engaged in the growing, harvest and preparation of real food (see glossary); a sense of community from the sharing and celebration of food (or maybe from participating in a Canadian food culture - TBD!); and a feeling of gratitude for the abundance that we eat and the ecosystem services that farming provides, which also preserve aesthetic and heritage landscapes.



"There is hope if people will begin to awaken that spiritual part of themselves, that heartfelt knowledge that we are caretakers of this planet." - Brooke Medicine Eagle

2.4 A New Conceptual Framework for Agriculture 3.0

I decided that it was necessary to build a new conceptual framework for Agriculture 3.0 using a sturdy 5-legged table to replace the wobbly milking stool. Ag3.0 is a collection of best practices and values that comprise a way of life together with meaningful work to produce food, and that attests to the 5 pillars in a model of resilience. These practices mimic Nature, for there is much wisdom and many answers to be found there when we ask, and embrace the attributes of place, being site specific and honouring culture, heritage landscapes and local knowledge.

The 5 pillars or 5 P's of resilient agriculture 3.0 are:

People - Preservation - Place - Prosperity - Policy

The 5 Ps are enabled by the e's defining the scope of Ag3.0 farming:

- empowering *people* by being engaging, equitable and ethical,
- ecologically sound and energy-efficient farm practices that mimic the interconnectedness of Nature, while *preserving* biodiversity and natural resources,
- embracing local conditions of *place*, and honouring culture and heritage landscapes,
- enterprise diversification and employment leading to economically viable businesses and stronger local economies, resulting in *prosperity* for all, and
- enabling *policies* and technologies that facilitate our shift to Ag3.0.

These are expanded on in Appendix F, with a larger image.

If these pillars are balanced, we have a resilient food system that can survive climatic events, market variability, changing consumer demand and increasing input costs. These pillars address the principles of being :

- respectful to the environment, decreasing impact to biodiversity, reducing greenhouse gases and being non-polluting to water,
- remunerative to all actors in the system including farmers and those in food production,
- culturally appropriate, adapted to place (site-specific), producing nutritious food that is appropriate and honouring cultural heritage including traditional food production.
- ethically and socially responsible by being equitable, and honouring social diversity and the need for spiritual fulfilment,
- enabling with policies that facilitate and support a healthy food system, rather than over regulating it.

And it all begins with farming practices that feed the soil, with the goal of producing nourishing food, not simply keeping people alive by alleviating hunger.

2.4.1 Agriculture 3.0's Twelve Principles for Resilience

It was difficult to narrow all this down to just a few principles to guide agriculture 3.0. Here are 12 principles for resilience of Ag3.0:

1) Back to Basics - Feed the soil, capture water (keyline design) and soak up the sun, then all organisms, including humans, in the agricultural cycle of life, will benefit. Regenerative practices (see glossary) build soil life.

2) Awaken - Become educated and educate consumers so that they become aware of the story behind their food.

3) Self-Reliance - We must all take responsibility for ours and our family's food supply. Get growing and keep a few hens!

4) Attitude - We need to revolutionize our attitude:

- to relearn our place on this planet.
- to get away from the 'feeding 9 billion' mentality of corporations going for profit.
- to understand that being efficient involves the 5 pillars, not simply productivity and profit (which is only one pillar).
- to realize that we can chose to live differently. In North America, if we are not busy, we are seen as lazy (or retired!). Our value is determined by how many hours we put in, but according to Masanobu Fukuoka in his book *The One Straw Revolution*, we could be practicing 'do nothing' farming, or at least, do less.

5) Don't dominate. Listen to the land. We cannot control Nature.

6) Biomimicry - Farm in Nature's image. Practice that which has stood the test of time (for centuries in traditional cultures and for millennia in Nature).

7) Connect - The farm system depends on healthy relationships within farm families and with

employees, customers, neighbours, and community. It should provide a desirable quality of life, which is socially and spiritually fulfilling. Become transparent by opening your doors and communicating what you do to consumers. This builds trust and social networks.
8) No-till - We mess way too much with the soil today. Plowing is definitely a practice of the past, despite the fact that the plow has been the universal symbol of agriculture for centuries.
9) Diversification - Diversifying is not just with the integration of different crops and livestock on the farm, but also of different income streams from diversified enterprises.
10) Consumer-directed - A new generation and a new economy have arrived. As we adapt to changing consumer demand, we will be expected to meet the demands of the local community through a shorter food value chain.
11) Sacred - Agriculture is a place-based, cultural and sacred practice.
12) Agriculture 3.0 is a lifestyle choice, perhaps within a new food culture, similar to the Mediterranean way of life.

2.4.2 Best Practices and System Design for Ag3.0

In the field, the above principles are translated into best practices, based on the farm goal and objectives, and the local terrain. The idea behind best practices is that there are already many excellent ideas out there and many different ways of doing things. Best practices offer farmers choice, empowering them to operate more resilient farm businesses, adapted to place and to their personality and skills set.

We can begin the design of the farm system with agroecological principles but there are other components that come into the design equation for agriculture 3.0 to be a reality, such as the policy and people pillars, and the fact that resilience is the goal not just for the farm system but for all systems that food production touches in the complete agricultural cycle. This includes our ability to continue to thrive as a society and the empowerment of all people, from farmers to eaters. I suggest that Ag3.0 calls for a heavier emphasis on those non-rational or subjective attributes - those elements that characterize quality of life. But let's start the design with agroecology.

2.4.2.1 Agroecological Practices

Agroecology promotes the use of simple farming techniques that improve crop yield by promoting naturally beneficial (and more cost effective) interactions between soil, nutrients, crops, pollinators, trees and livestock.[62] Miguel Altieri calls the farm system that mimics nature's cycles an agroecosystem.

According to Altieri, agroecology provides guidelines for designing agroecosystems. The idea is that by using the strategies below, we design farm management systems that are in tune with the local resource base, policy frameworks and socioeconomic conditions. Farmer

[62]Wright, J. 2012. *How Agroecology Can Support Food Security.* Posted by Dr Julia Wright, Deputy Director of the Centre for Agroecology and Food Security at Coventry University on June 16, 2012 at www.huffingtonpost.co.uk/dr-julia-wright/how-agroecology-can-suppo_b_1520229.html

participation and the use of local and traditional knowledge is strongly encouraged for adapting the system to local conditions.

Agroecosystems incorporate these strategies:[63]

- vegetative cover for most of the year to maximize the capture of solar energy, a free input into the system (cover crops, mulching, no-till),
- intercropping, crop rotations and polycultures (cropping systems in which two or more crop species are planted in proximity of each other creating diversity, and resulting in competition or complementation),
- enterprise diversification with integrated crop/livestock enterprises so that if one crop does not do well, income from another enterprise can compensate, and to achieve optimal nutrient recycling and yield,
- fence rows and forestry systems maintenance (to enhance relations and create habitat and species diversity, including natural enemies to pests, but also to create diversified food sources/ income streams),
- low input farming practices that optimize the use of the sun, soil nutrients, rainfall and natural cycles such as nutrient cycling and 'waste' recycling (recycling organic matter generated from manure, compost, crop residue and other 'waste,' where waste from one enterprise becomes the input for another enterprise, the ultimate closed loop farm cycle),
- species diversification by incorporating many different crops and livestock, by managing pasture for many different plant spacies, and by maintaining various habitats and microclimates so that beneficial soil micro-organisms, flora, pollinators and fauna can thrive and co-exist within the farm production system, all with the goal of increased natural resistance to pests from weeds, fungi and insects to herbivores and carnivores.

By following these strategies, we achieve the goal of designing an agroecosystem that simulates a natural and local ecosystem. This is also the goal of Ag3.0 systems. The ultimate goal of ag3.0 is to strengthen relationships and networks between people, communities and within the ecosystem, so that we create even greater connectivity (inter-connectedness). This improves resilience, and the capacity to be self-reliant (individually and as a community).

2.4.2.2 Key Realities in Selecting Best Practices

In North America, it is likely the lack of cultural practices that has resulted in many health issues that we see today, especially in people, but also in our environment. We only have to compare cave aged cheese in France and compare its dietary qualities with Kraft cheese slices, Cheese Whiz and hard orange cheese. (What's with the orange dye anyway?) The problem lies in the fact that when science was finally able to tackle agriculture, it stripped it and our lives of the sacred. When we took the sacred out of agriculture and food, we took depth and meaning from our lives. For change to happen, we need to put it back.[64]

[63] Altieri, M.A. 1995 (approx).
[64] Ikerd, 2012.

Farm best practices can only do so much to address the problems however! In selecting best practices, the following key realities need to be considered:

- The future will look nothing like the past and will likely to be very different from today.
- Global markets and the reality of trade will continue to cause price fluctuations.
- The speed and amount of information has drastically changed and will continue to change agriculture, including communication technologies.
- The increasing interest by consumers in where their food comes from and how it is grown will become a bigger influence on production practices.
- The link between food (nutrient density) and health maintenance is a reality.
- Technology will continue to change the way we do business and live our lives.
- The price of petroleum based products will continue to rise, whether or not peak oil is real.
- Soil is the miracle that we have been taking for granted. Soil health needs to be the focus of farming practices.
- Insects, fungi and micro-organisms are an integral part of nature and agriculture.
- Water is a vital element needed by all living organisms on earth, including humans.
- Seeds are sacred, nobody owns them, and they belong to everyone. Seeds are one of the keys to biodiversity.
- Just as livestock operations are regulated to have enough land to spread manure (in Ontario), it works both ways. Crop land needs livestock to provide adequate fertility.
- Animals are an essential part of agriculture, for organic nutrients, draft-power, and transport for traditional agriculture, besides being a source of milk and meat for humans.
- Diversity is the guiding principle for resilience, self-reliance and health, including the foods that make up our diet.
- Precision technologies help deliver optimal amounts of inputs, including water.
- Natural fertilizers such as cover crops and manure are better than chemical fertilizers.
- There may be twice as many people to feed, and it has been proven that smallholder farmers have the capacity to double their production within 10 years in critical regions by using agroecological methods (from literature review).
- The basics of agriculture remain the same: sunshine, grass and livestock.
- The design of the farm system and implementation of strategies is site-specific and adapted to local terrain and vulnerabilities with best practices selected to optimize resilience of the smallholder's farm system.

The examples of best practices below are in addition to those specified by agroecology, but with more people and place-based practices. To be determined still are all the indicators that can be measured against a set of benchmarks so that a farmer can measure progress.
Best practices for a farm system might include:

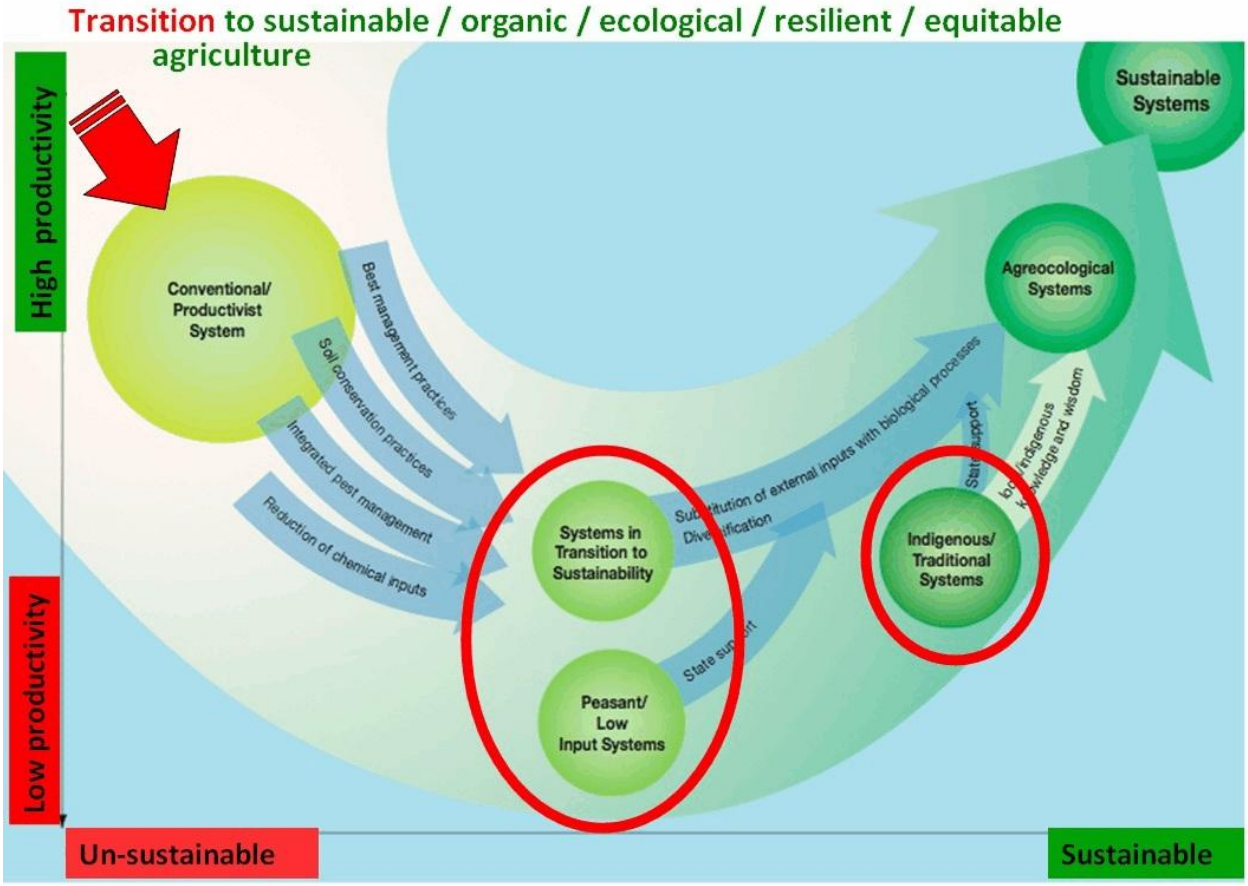
- heritage breeds and diverse seed stock
- carbon sequestration from adding compost, growing hay and grazing herds of animals
- knowledge sharing
- social media
- regional branding initiatives
- policy enabled culinary and agro-tourism farm direct to market
- more farmers telling their story
- small tracts of land, many more farmers
- the use of practices that are regenerative and innovative
- the community coming together in celebration to ask for abundance and to express their gratitude for the harvest
- pastoralism and grass farming
- communication technologies
- new and appropriate technologies and innovation (big data technologies, precision agriculture, robots, solar-powered technologies

In response to 'business as usual is not an option,' Hans Herren proposes radical change and a paradigm shift to new approaches that recognizes the multi-functionality of agriculture. He does a great job of painting a visual of what Ag3.0 could look like in his presentation to university students. It is actually quite incredible how his vision (or that of the IAASTD) is very similar to mine, reminding us that a shift in consciousness is happening world-wide in a process that is seeing a 're-birthing of this planet.' He proposes a transition to a resilient, equitable agriculture that incorporates some Ag1.0 and Altieri's agroecosystem principles presented earlier:[65]

- the answer might be in the revival of the small farms
- there is a far greater involvement of women
- better education ie. more intensive training of future farmers in the agroecological, organic, bio-dynamic methods of farming
- revamping of available financing and fair wage for farm work
- promotion of responsible policies at all levels of government (subsidies, fair trade, etc.)
- nourishing not feeding the billions
- changes will have to happen on a regional basis (ie. regional development of small farms)
- improvement of market access and related infrastructure, increased value-adding, promotion of local markets, farm-direct marketing
- adding back some traditional practices and more research into those farming practices that are sustainable and productive, with investment in long term solutions and rural communities
- analysis of all sectors for a better understanding of the whole system: global warming,

[65] Herren, H.R. 2011 powerpoint presentation.

energy sector, population (density and growth), food production and waste, fresh water, migration to higher standards of living, health catastrophes (ie. famines), land loss and flooding - all sectors that touch food.



It is important to be aware of the fact that by empowering even more women farmers, there will be fewer hungry people on this planet.[66] The female way of nurturing makes women excellent farmers. It is women who have traditionally tended to food production.

According to the USDA's Economic Research Service, women are "breaking the grass ceiling." The number of women who are principle operators of a farm increased by 30% over the past 5 years (2007 US census on agriculture). Women now run about 14% of the nation's 2.2 million farms. Also in the US and likely in Canada as well, a third of new farms are being started by women.

The new image of the *farmher* looks very different. Women are naturally conservation minded, and they make great leaders and farm business managers, keeping an eye on more than just the financial bottom line. She's serious about farming real food, she's sassy, she's sophisticated, she's smart, she's sensible, she's spiritual, she can be silly, she makes a significant contribution to her local community and she cares deeply about you, me and the planet.

[66]Food and Agriculture Organization (FAO). 2010. *The State of Food and Agriculture 2010: Women in Agriculture* and *Our secret weapon against hunger: gender equality and women's empowerment* by De Schutter, O.

2.4.2.3 Places of Ag3.0 Practice

Elements of the Ag3.0 'whole' (the practices that satisfy the 5 principles) already exist, in 300 year old food forests, in hot spots of rich culture and biodiversity all over the world, such as the Pagan Snow Cap (Pogány-havas) Region of the Carpathian Mountains in Transylvania explored in Case Study 2, and on farms practicing what I call transitional agriculture (see glossary) where we can witness the shift towards Ag3.0 already happening in North America. Just some of these places include:

- Genesis Farm and the work of Miriam MacGillis, who describes the farm as 'a learning center where people of good will are welcome to search for more authentic ways to live in harmony with the natural world and each other';
- Hawthorne Valley Farm and the work of Steffen Schneider mentioned earlier;
- Vermont, where I sense that there is a lot of progressive activity with many different projects including the Intervale Center, 'a unique and innovative community built around growing, eating and celebrating locally grown food', two sanctuaries for Sacred Seeds, an international organization that offers a buffer against the rapid loss of biodiversity and cultural knowledge around the world,' and the Mad River Food Hub;
- Neustadt, Ontario where young farmers have started farming on a cluster of farms, forming a community where they are proving that we can operate viable small farms, by growing nutritious food marketed directly (featured in the award winning film '*To Make a Farm*'), and
- places growing medicinals and herbs such as Avena Botanical, St. Francis Herbs, and Clef de Champs.

When we map these locations where transitional agriculture and agriculture 3.0 are being cultivated, we have a world map covered in dots. The elements being revealed at these sites however, have not come together yet to master the full essence of the Ag3.0 system, a system that can sustain its own without much meddling, that produces viable livelihoods for the stewards of the land as 'operators' of farm production systems, and that generates quality of life that extends beyond the farm to all life, in the local ecosystem, and within families, communities and whole societies.

We might say that this is all happening at the margins of agriculture 2.0, but these 'demonstration' sites are all over the place, and as they become more numerous and as we start to see more clusters and then communities forming, we can begin to connect the 'dots' and to work together within interconnected networks, to make significant strides towards change.

Perhaps this is where I come in - spreading hope with my vision and by connecting the dots. This is not just an idealist's vision. To refer back to the words of Phil Ferraro again, he has demonstrated that visionary ideals can be transformed into resilient social enterprises that serve up real food, when social enterprise is integrated with growing food in a model that

fosters self-reliance and local economy.

We still have to do our inner work to get to the next phase, the Ag3.0 phase, or what Joanna Macy calls the Shift in Consciousness. We are progressing towards the shift at an increasing rate, and as we get closer, it just might be that we will be called to experience more Ag1.0, "in the resurgence of wisdom traditions, reminding us again that our world is a sacred whole, worthy of adoration and service."

These dots of places where change is happening, "cannot take root and survive without deeply ingrained values to sustain them. They must mirror what we want and how we relate to Earth and each other. They require, in other words, a profound shift in our perception of reality - and that shift is happening now, both as cognitive revolution and spiritual awakening."[67]

2.4.2.4 Agriculture 3.0 is Sacred Work

> *"Few realize that the processes of plowing, planting, sprouting, growing, and harvesting are magnificent ones, and fewer still realize they are working in cooperation with*" something Greater. - adapted from Walter Jack's The Furrow and Us (1946)

We are forever seeking; it's the North America predicament. We wander around malls looking for it, we buy fancy things hoping that the object will bring it into our lives, we eat ourselves silly trying to feel it and we plan elaborate outings trying to connect with it. Its lack is the cause for a society that is generally depressed. What is it? And why is it missing?

> "Food is something we all have in our genes to care about ... If we could once again regard the act of growing food as a sacred, biological act that connects us to all living creatures, perhaps we could clamour for a system"[68] of food production that is also part of a right livelihood, that feels right and ethical, not a source of suffering for our self, others or any other forms of life.

The earth is "calling out to us for recognition, for healing, and for sacred and sustainable ways of tending her soil, plants, animals and landscapes. In an age when we are so disconnected from the land, from rich agrarian traditions, and from the people who grow our food, farming must accomplish so much more than food production." (Robert Karp, Executive Director of the Biodynamic Association in an invitation to the 2012 Sacred Agriculture conference in Madison).

"Yes, we have a right to be here, with deference to the Earth. Earth is the ecosystem of all ecosystems, evolved to survive as a whole. Retaining our right to stay may depend on how well we relate to sacred land in the places we know it," writes Ralph Martin.[69]

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[67] www.joannamacy.net/three-dimensions-of-the-great-turning.html

[68] Benys, p.57.

[69] Martin, R.C. 2014. *Is Ignatius Jesuit Centre land more sacred than other land?* posted on June 17, 2014 by Ralph C. Martin at www.guelphmercury.com/opinion-story/4581998-is-ignatius-jesuit-centre-land-more-sacred-than-other-land-/

2.5 Summary of Findings

I set out on this Nuffield scholarship to determine what the pathway forward to a future agriculture might look like that puts healthy food and healthy soil back into the design of the farm system.

I came across several prominent themes. These first 3 themes kept bringing me back to the local food situation in Ontario:

1) locally produced place-based (terroir) products need policies to protect the cultural heritage and landscapes associated with these products;

2) smallholder farmers are invaluable to the future of agriculture and nutritious food;

3) community and collaboration is the way of the future. We need to move from 'me' to 'we'. Everything and everyone is interconnected, and like Nature, we need to leverage this interconnectivity in agriculture, from the farm, to food product marketing and consumption.

There is still too much 'me' in the Ontario local food 'movement,' within local food organizations and with farmers who are doing local food 'by themselves.' This is not sustainable. It leads to volunteer and eventually farmer burnout, because the farmer cannot do it all and farm.

Other findings include:

- Farm direct marketing is active and very much a part of a way of life for Europeans. Local food just is and does not need to be labelled, because it always has been the way.
- Despite poverty and employment issues, young farmers in Transylvania believe they are in the best place in the world "should something ever happen" to the global supply system. They also believe in preserving their landscape, one of the most biodiverse regions in Europe.
- Maintaining biodiversity (Pagan Snow Cap Region, Transylvania), landscapes (Gozo, Malta) and in many cases livelihoods, in areas where industrial agriculture practices are not yet used predominantly, is dependent on continuing with traditional food and agricultural practices, and policy that reduces the amount of imports.
- Traditional farming practices have stood the test of time and demonstrate that they are resilient and often sustainable socially and environmentally.
- Travelling from undeveloped to developed European countries by train, one witnesses hands-on highly skilled and knowledge based food production shift to hands-off, low skill operation of tractors going back and forth all day long. Is this meaningful work?
- When working and speaking with young adults under the age of 30, it is clear that a new generation of consumer is here and that this generation is far more conscious than the generations before. They are beginning to change our food system. They want to be involved, know how their food is produced and that it is nutritious.
- Since agriculture is a sector that works so closely with Nature, natural systems offers a template for what it means to be sustainable (by demonstrating resilience). The 3 legged stool for sustainability may work for human designed systems of industry and corporate structures,

but it is wobbly when applied to the food and agriculture sector that is so dependent on the natural system.

- For agriculture to contribute to a healthy world, we need to go back to the basics, with a mission statement of nourishing communities.

3.0 CONCLUSION

With Generation Z becoming adult consumers, food production will be forced to change, because this generation cares about what they eat and the people who are producing their food. To accommodate the new generation, I recommend that farmers evaluate the options available to them to operate more resilient farm businesses and respond to consumer demand as we witness a conscious shift that is helping shape the future of agriculture.

Without a strong local farming community to supply the basics: vegetables, fruits, meat, diary, grains and pulses, food must be imported. This is already happening in Malta and will ultimately lead to less availability and access to local food, if importing does not decrease. When we become dependent on imports, as was the case with Cuba, we are not food secure, and our food is vulnerable to the ebb and flow of international economic conditions, global political issues and climatic events that are beyond our control. Eating locally and/or traditionally connects us, and when we are a player, we experience belonging, as the Szekely people in Transylvania do by being part of their rich culture defined by heritage landscapes.

By maintaining a local demand for locally and/or traditionally produced products, there is increased **prosperity** within the local community and the local economy. Although it seems obvious, there can always be a local market for nutritious food grown near a surrounding community, because we all have to eat!

However, we need **policies** to facilitate this - policies that support local marketplaces and only allow for imports when demand cannot be met locally (such as coffee, bananas, avocados, etc.). We need to **preserve** the environment, primarily by reconnecting with it, by eating seasonally and by being more efficient in the use of resources. We need to realize the value of culture and creative skills and make excuses to come together as family, friends and as **people** who are active participants in our community, whether simply to connect, to share food, or to be involved in something together. Because this is truly living - these are the activities to feeling good. We also need to realize that who we are and what we do as a society is determined by our **place**[70], our heritage landscapes, our lakes and rivers, our land, our sea and our climate. And finally, to be resilient, farmers need to feed soil life and maximize the harnessing of free energy from the sun, because this grows into the best part of all - tasty, healthy, wholesome real food. “We want our farmers to be breaking off an ear of corn to taste a kernel right before

[70] In his book, Jared Diamond puts forward the case that it is geography and the distribution of animal and plant species, and not race, that shapes us across different societies around the world. This is also reflected in our food systems and ecosystem services (1998. Guns, Germs and Steel: A short history of everybody for the last 13,000 years. Vintage Publishing, UK).

harvest," and to grab a handful of soil, to smell it and know what's good or not good about it.[71] Get growing and become more self-reliant!

Dear Farmer: Nature is ultimately our teacher. Mimic her processes and design.

1) Listen to your animals (yes, there must be animals) - observe them.

> "I don't think I have ever known a good stockman who didn't talk to his animals. For the good stockman, ownership becomes a complex relationship, based on liking and familiarity," says Wendell Berry.[72] A good farmer knows their livestock from one individual to the next and each animal knows them. They have the right number of animals so that they can know each one of them.

2) Listen to the land - touch the soil. This is to farm. When we tap into the 'genius of a place,' we are guided. Enabling this guidance is what makes food and farming sacred. "If you want to know how to use the land, look at the way Nature uses land. Look at how Nature does her farming" (from An Agricultural Testament by Sir Albert Howard, 1940).

> "Farming by the measure of nature, which is to say the nature of the particular place, means that farmers must tend farms that they know and love, farms small enough to know and love, using tools and methods that they know and love, in the company of neighbors that they know and love."[73]

4.0 RECOMMENDATIONS

How do we make the shift to this new paradigm for agriculture? Does it mean engaging the consumer (which would require a behaviour change communication strategy) or the producer, where we might consider rewarding the farmer for landscape management, soil health and the nutrient density of food?

4.1 Knowledge Guide

In Appendix G, is the beginning of a knowledge guide to transfer this work to the field: *Best Practices of Agriculture 3.0: a Knowledge Guide for Innovative Farmers Who Want Choice*. It's main feature is the score card. The progress of shifting to Ag3.0 is measurable. We can recognize when we get to where we were going by measuring certain indicators that define Ag3.0. As mentioned earlier, this work of developing a scorecard is one that would require a team of researchers to identify all the indicators from soil health to community health and the health of societies and then the benchmarks for scoring them. These indicators exist in the literature and whether this work can be completed or not, remains to be seen. It may or may

[71] Benyus, p.57.

[72] Berry, W. 1979. *Getting Along With Animals.* From the New Farm® archives, New Farm magazine, Issue September/October, 1979 posted at www.newfarm.org/features/0103/wendell_berry/print.shtml.

[73] Berry, W. 2009 Bringing it to the Table: On Farming and Food, Counterpoint Press, Berkeley, CA. Taken from book excerpt posted at www.culinate.com/books/book_excerpts/bringing_it_to_the_table.

not be part of my next steps, depending on whether support comes forward for such an initiative.

The knowledge guide offers many answers, however, the real problems with our food and farming systems cannot be addressed with the knowledge guide.

> "The only logical champions of (a) revolution are consumers who care about how their food is grown, small independent farmers, and a government that represents them."[74] We need to facilitate the world to feed itself, one small farm at a time.

We have the knowledge of best practices and we have been practicing that knowledge with tools, practices and techniques for centuries. Few of the ideas that I have presented are new. As Wes Jackson says, "This is not really a new fangled thing we are inventing here. It is just a matter of discovering what is already there and mirroring it."[75] I may be re-organizing ideas to imagine a new agriculture, but these are practices that have been around for a long time.

4.2 Policy

Since I have the opportunity to go way out on the limb here, I shall! As practical measures to be accomplished by policy, I suggest these three initiatives:

1) Instead of the 'old school' military service required in some countries after graduating from high school, we need to initiate farm service to reconnect young people with where their food comes from and what it takes to produce good food. This would change the world!

2) Again, on the subject of re-integrating livestock in crop agriculture, I recommend that Nutrient Management Act (NMA) regulations be two directional to ensure not only that livestock farmers have land to spread manure, but that crop farmers have animals to feed their soils.

3) It is a problem when we live on farm land. This is not always the case in Europe, where tracts of farm land surround small rural villages, where farm families live. In this way, lands don't become locked in when a farmer retires. Adding to this problem, renting the land out encourages mining of the soil because it is not ours to be a steward of.

4.3 From Soil Chemistry to Soil Biology

The health of soil can be assessed under a microscope, where we can see the soil life in a soil sample, not in a laboratory measuring soluble minerals. This misconception went unnoticed for several decades (and still does in Ontario) because there was still enough organic matter to sustain yields. However, disease and insect pressure eventually started to increase.

It is now well documented, thanks to many like Albert Howard and Elaine Ingham, that we need to use farming practices that build humus and soil life in the soil, not focus on amounts of N-P-K. In *Soil and Health* (1947), Howard proved what traditional cultures knew, that the soil

[74] Benyus, p. 55.
[75] Benyus, p. 57.

was living, supporting healthy crops by making nutrients available directly to plants. We need to get away from N-P-K and back to feeding the living soil. Farmers who violate the "Law Of Return" (the cycle of what comes from the soil must be returned to the soil), Howard claimed, are "bandits" stealing soil fertility from future generations.

5.0 NEXT STEPS

Having been awarded a Nuffield Scholarship inspires in me the desire to give back. The first thing I did was to become a 4H Leader. I am thrilled to be back in the barn, sharing my farming experience with the next generation of agricultural leaders. Next, I have been asked to become a board member of a farming organization, one that I feel I will have much to contribute to, with the completion of this study.

I quote Mike Vacher, Nuffield Director for the UK, describing Nuffield 'in a nutshell,' in an article about UK 2013 Scholar Liam Stokes' scholarship study: "We are looking for forward thinking and innovative candidates who are committed to driving change."[76]

I am committed to driving change, and how I will achieve that still remains to be determined. There is so much work to be done. We are in a transformational stage in our evolution. The many smaller models of agriculture that I call transitional agriculture are happening all over the world, but are still scattered, isolated 'dots' on the world map. They need to become better connected into a web, or networks, as in Nature. We remain in transition until these farms are feeding communities everywhere.

I am inspired by the work of so many great leaders who I have quoted throughout this report and aspire to become a practitioner of one of their great works. Perhaps it is my task to connect the dots, because we need to work together in an interconnected way in and between networks of 'transitioners'. Right now, clusters of these sites are very cliquey and segregated, constantly reinventing the wheel.

There are 3 steps that we can take to facilitate the shift to a new agriculture:

1) Start a Community of Practice to connect the dots, an online meeting place where transitional farmers can engage. "A community of practice (CoP) can be described as a group of people who have made a commitment to be available to each other to: offer support to share learning, consciously develop new knowledge, and share discoveries with anyone engaged in similar work, in order to advance individual and organizational practice."[77]

2) Ask 'how can we be the change' (rather than being forced to change because of a crisis).

a) As farmers - think before you go and do what you always do. Is there another way?

b) As policy makers - reward, don't tax. California's carbon credit program is a good example.

[76]The Farmers Club New Year Journal 2015, Issue 254, p.10.

[77]Lusk, E. and Harris, M. 2010. *SHRTN Collaborative Community of Practice Orientation Guide. SHRTN Collaborative* (a partnership between the Senior's Health Research Transfer Network, the Alzheimer Knowledge Exchange and the Ontario Research Coalition), Canada.

c) As consumers - Behaviour Change Communication (BCC) strategies for consumers. Diabetes education programs are a good example.

3) Write a new story for agriculture and begin to tell it.

5.1 Connecting the Dots

"The great thing is that there are many of us who are creating the models, who are preserving the sacred knowledge. Our farms are the repositories of this very important knowledge that has been disappearing, so that when the time comes, and awakening happens, there will be places in every single community around the world where folks can go to, to be guided in terms of how to shift this thing." - Michael Ableman

Currently, there are isolated clusters forming that are good at practicing some of the principles of Ag3.0. With good facilitation, clusters can transfer the knowledge or spread the teachings. Some of these clusters are precious remnants of Ag1.0, which need to be preserved and transitioned directly to Ag3.0, as discussed in Case Study 2.

Others are 'right-living' projects, such as the Land Institute projects at Mansfield Green and Sunshine Farm. Benyus calls these 'eddies' (of calm water) in a turbulent river, as opposed to 'dots.' Getting a boat into an eddy is hard, just like transitioning to resilience "must be a deliberate choice to leave the linear surge of an extractive economy and enter a circulating renewable one."[78]

And always, it comes back to the question: "How can Ag3.0 be viable?" This viability work belongs to another report that was drafted a couple of years ago with colleague Harris Ivens. The probing into efficiency (in Appendix D and in Case Study 2, section 3, 4), thanks to Barbara Knowles, has been an important exploration. There is also a lot to be said about becoming self-reliant, based on the findings in this report. Or maybe ducking into one of those eddies and choosing a simpler way of life, as Wendell Berry has done on his farm, to live the life that we preach, and to hopefully one day find our farm a part of a mosaic of regenerative farms, just like I saw in Transylvania.

Whether we participate in connecting the dots, working across sectors, or duck into an eddy to focus on a particular project or our own transitional farm that is contributing to the creation of a new economy or a new agri-culture, or whether we simply choose to live more lightly (decrease our carbon footprint), we are helping to create choices for more people and healing our culture, our communities and our planet.

5.2 How Can We Be the Change?

How else can we be the change? This is not a topic for this report, however I feel that I should touch on it briefly.

First, the problem needs to be understood by more people. We need education that leads

[78] Benyus, p. 56.

to awareness. Patrick Holden, advisor to the Prince of Wales and founder of Sustainable Food Trust (sustainablefoodtrust.org) says it well:

> "Giant multinationals may own the current food system, but who is responsible for buying all their products? We are complicit in perpetuating the food systems that exist. Why are the fast-food restaurants serving food with a bad story behind it? It's because their customers would rather buy based on price than quality. That's because they don't know how bad the story is. We need to become better educated. We need to say "no." There is a way to buy food with a better story. As consumers and citizens, we have enormous power, and changing the current food system will require mobilization of the public on a large scale. We need to make it our business to learn the true story behind the food we eat and make sure it's a good story. The whole solution is in that. It's an empowering journey for us all to make."[79]

Second, although we know the solutions and that there are many choices we can make, they need to be communicated clearly. To be able to chose, we need to know what the options are, and this is particularly important in the case of growing food.

There will be "those who continue to apply their will to extending the old order and have the advantages of inertia and wealth."[80] And there will be those who will apply their will by becoming more resilient with the advantage that it is becoming trendy, important and a hot topic in the media. The tipping point will be reached when enough individuals become part of the latter which can be as low as five percent.

Kraft is a good example of creating a tipping point. For those who do not realize, the nutrient density in Kraft products is generally not very high. There are many ingredients in their products that do not contribute to health and vitality. Kraft would notice a decrease in sales if just 5% of us changed our buying habits and stopped buying Kraft food products. To Kraft, this would equal an $800 million loss (their grocery business revenues are $16 billion).[81]

Third, we identify and state the goal. Once we have a clear goal, there will be innovation. This is how Ag3.0 is brought from the margins to mainstream. Al Etmanski says social innovation (and I say innovative Ag 3.0) "is a bundle of new learning, technologies and methods with the best traditional approaches"[82] (best practices). The resulting innovation will also help us reach a tipping point.

Fourth, we need a map to get to where we are going, the language to be able to say what we mean to say to describe the vision, and even better, images and symbols to tell the new story, because our minds recognize these more.

Finally, we need to create a set of best management practices based on a measurable set of

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[79] Holden, P. 2013. *Eating Food With a Better Backstory* posted on April 3, 2013 at modernfarmer.com/2013/04/patrick-holden-eating-food-with-a-better-backstory.

[80] Nickerson, p. 311.

[81] www.huffingtonpost.com/2011/08/04/kraft-splits-two_n_918001.html.

[82] Etmanski, A. 2015. Impact: Six Patterns to Spread Your Social Innovation. Not yet released.

indicators. It was my intention to do this for the farmer, but it is a very big project! There are many best practices available on the internet for eaters, if one does a search for 'real food,' or visits westonaprice.org, referred to in the glossary.

The end goal of these steps is a resilient food and farming system and nutritious food. This helps create meaningful work (job creation) whether on the land or in the kitchen.

5.3 Telling a New Story: The New Agricultural Story of Place

> "We are stretched to shift our perspective and our actions from the dualism of either/or (Ag 1.0 /Ag 2.0) to holding the paradox of both/and. This allows for something greater and more creative to emerge" (such as Ag 3.0). The solution will be "the one that will create a genuine win-win and serve the greater good of the majority of people", and all livings things. Recognizing that there is value on 'both sides', we must look for the hidden unity.[83]

In Ontario, most of the food we produce is placeless because it doesn't have a story behind it. Case Study 3 discussed many of the reasons for this. Consumers are not connected to the farmers producing their food, or food is being manufactured. When we practice open door farming, where the consumer can walk the farm and discover the story behind their food, a food culture can emerge.

There are many projects in action globally recording traditional food systems, knowledge and sites. There are also many projects helping Indigenous communities regain access to the lands that were the sources of their food - food that was health-promoting for them.

Indigenous cultures are part of our story in North America. Due to their ill health, some communities are entering recovery. "What is being found, is that recovery is not simply a physical solution. When people go into recovery, they want to take the culture back."[84] If we can capture and gather the principles and stories in traditions from around the world, we can create a new story, and perhaps with it, a Canadian food culture (see Case Study 3).

I explored several processes of working with groups and gathering input. Working in groups, or perhaps in our Communities of Practice, we can begin to gather inspiration, input, tales and success stories for writing a new agricultural story. I have adapted the following approach, from 'Experiencing Mariposa: A Community Story of Place,'[85] by Michael Jones, to make it applicable to changing the story of agriculture. To change the future, we need to change the story. And to do that, we can write it or we can draw it.

5.3.1 Composing a New Story

In visioning the future of agriculture, "we take up the call to be anthropologists uncovering untold stories, forgotten" practices, the origins of traditional and cultural ways of growing and

[83] Arrien, A. 2007. *The Second Half of Life.* Sounds True, Canada.

[84] LaDuke, p.202.

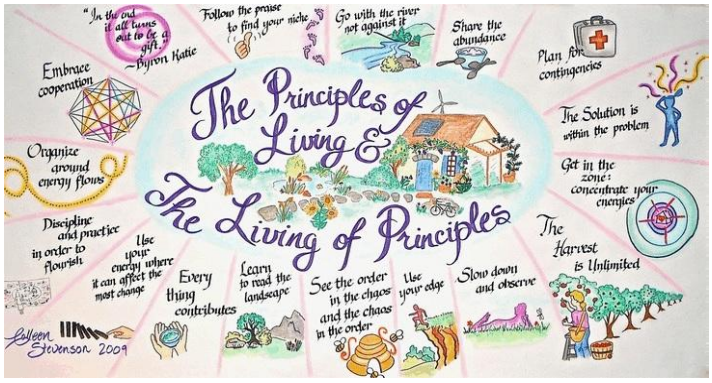
[85] Jones, M. *Experiencing Mariposa: A Community Story of Place* posted on January 6, 2015 at tamarackcci.ca/blogs/michael-jones/experiencing-mariposa-community-story-place.

preparing food and sacred meanings in the agriculture of different places. The story, in section 1.2.1 about the Michoacán that was shared to describe the Ag1.0 farmer, is just one of many examples of documented stories that are available to help create the new story for agriculture.

Next, we look at the elements of these stories and practices and their sacred meanings like something new that we can all learn from, and we allow ourselves to be open to how some aspects may help shape the vision for the future of agriculture, Agriculture 3.0. In viewing Agriculture 3.0 as a" mythic fable" unfolding that has "elements of a wisdom story, we may ask ourselves":

1. "What does (Agriculture 3.0) mean to us? What does it look like and how does it feel?"
2. "What can we learn from" all the stories of other agricultural practices, societies and cultures?
3. "What are the key images and themes" in the social dilemma of Ag1.0 and Ag2.0 and what can we take from them to envision Ag3.0?
4. "How do we turn these images and themes into a storyline that will capture the imagination" of eaters and farmers - "from around the world," that creates a narrative that is "cool, catchy and trendy" (from p.15)?
5. What are the key elements (representative of the 5 pillars) from listening to all sectors connected by food and from the diverse communities, cultures and networks? What are the key elements that we need to incorporate from policies, sacred and historical sites, and heritage landscapes and nature - "that interconnect in the telling of the (Ag3.0) story"?
6. "If we were to imagine (Ag3.0) in twenty, fifty, or one hundred years, what will be changed from what we are doing today and what will have stayed the same?"
7. "What would the storybook of (Ag3.0) look like"? How would the places where we grow food "be different from today"?

"We live in a world that is increasingly interconnected and interdependent. At the same time, it is more fragmented and polarized than ever before. In this turbulence," it may be these stories about agriculture connected to place "that serve as the bridge from our past to our future. We may not be able to" return to Agriculture 1.0, "but we may still be able to learn from it." This knowing and the preservation of traditional knowledge and cultural practices "may lead us to a vision for the future" of agriculture where, as farmers we have more choice. This is a story where we are stewards of healthy soils and where food is so nutritious that everyone can experience vitality, grow and thrive.



5.3.2 Illustrating the Ag3.0 Story

Next step might be to illustrate it! The drawing to the right is just a sample. Words are going out of style, as there is just too much information these days to take it all in; therefore, we are often just looking for

snapshots.

What follows is the process that Courtney White of the Quivira Coalition worked through to draw her 'Carbon Country' story.[86] You can find it by following the link in the footnote.

> "I also decided we needed a map. So I sat down one morning at my dining room table and began sketching on a sheet of paper. I drew every joyous, sustainable, resilient, regenerative, land-healing, relationship-building, climate-mitigating, local food-producing activity I could pull from my experience, putting them into a single mythical landscape. I knew a few things going in:
>
> - Carbon is key. It's the soil beneath our feet, the plants that grow, the land we walk, the wildlife we watch, the livestock we raise, the food we eat, the energy we use, and the air we breathe. Carbon is the essential element of life. A highly efficient carbon cycle captures, stores, releases, and recaptures biochemical energy, making everything go and grow from the soil up.
> - We don't have to invent anything. Over the past thirty years, all manner of new ideas and methods that put carbon back into the soil have been field-tested and proven to be practical and profitable. We already know how to graze livestock sustainably, grow organic food, create a local food system, fix creeks, improve water cycles, and generally build resilience into the land and in our lives.
> - It's mostly low-tech. It's sunlight, green plants, animals, rocks, mud, shovels, hiking shoes, windmills, trees, compost, and creeks. Some of the work requires specialized knowledge and some of it has high-tech components, but most of Carbon Country can be easily navigated by anyone.
> - Lastly, you're on the map too. Everyone is, whether you live in a city, go to school, graze cattle, enjoy wildlife, grow vegetables, hike, fish, count grasses, draw, make music, restore creeks, or eat food—you're on the map. You live in Carbon Country. We all do. It's not a mythical land; it exists.
>
> So, with my rough map in hand, I set out to explore this new land."

5.4 My Ag 3.0 Farm and Lifestyle

"Tell me what your agriculture 3.0 farm looks like," I was asked. It was a fair request that I have not had enough time in which to ponder it. But I think that all the pieces to the puzzle are here in this report.

I want to be a part of a farm and lifestyle that supplies food that nourishes us, our communities, our rural economies, our land, our soils and our souls. I am still unclear whether I have all the language and components of viability in place to be able to sketch it. The sketch below is the best I have to offer for now, except that the big house has to go, and the hammock is missing from between the trees!

[86] White, C. 2014. *Grass, Soil, Hope: A Story About Carbon Country.* Map and blog posted on August 15, 2014 at peoplefoodandnature.org/blog/grass-soil-hope-a-story-about-carbon-country.

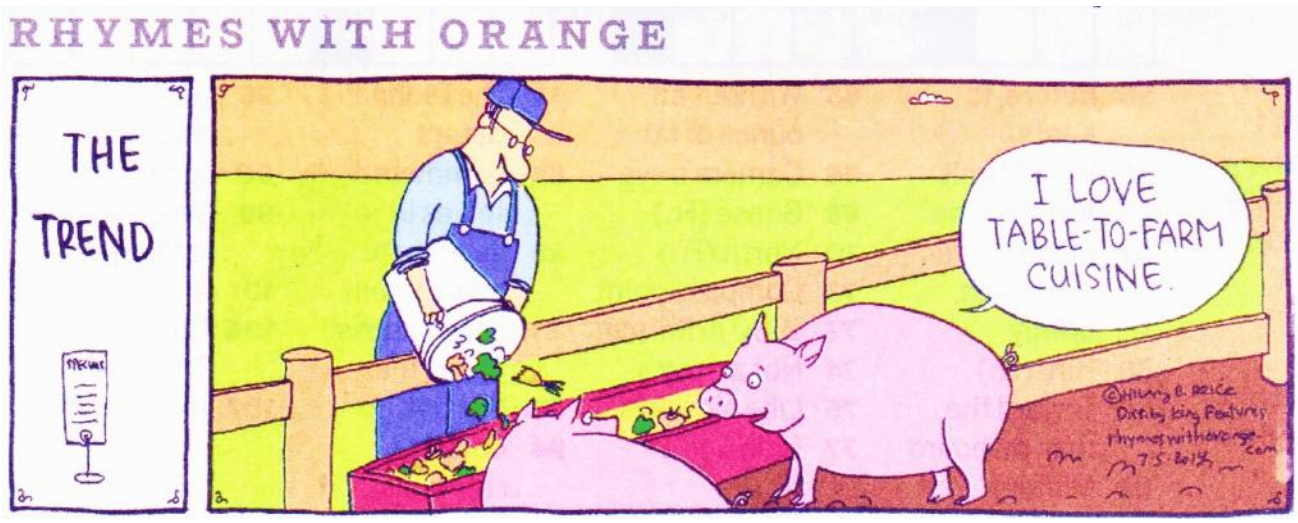
My Ag3.0 farm is of intelligent design, even more so than this image to the right, which is not a model for mimicking nature. This farm "must yield a decent crop and support animals, with minimal labour (and that includes driving a tractor), low management costs and good weed control. The system that seems to have the most success is where the tree crop offers some shade and overstory while producing nuts, fruit and timber, an understory that protects soil and retains nutrients, and ground cover where livestock graze and where biological nitrogen is produced. It's a bit like an orchestra, with all the different arrangements coming together in synergies to create a sustainable whole."[87]

Here are some videos to be inspired:

- 300 Year Old Food Forest in Vietnam (bit.ly/1aLF6yi).
- Many videos at www.geofflawton.com including these two which are wow! *From Desert to Oasis in 4 Years!* (www.geofflawton.com/fe/62176-desert-oasis?r=y) and *An Oasis in the American Desert* (www.geofflawton.com/fe/73485-an-oasis-in-the-american-desert) with a great (his)story.
- I find keyline design particularly interesting for Ag3.0: www.youtube.com/watch?v=CwDZxQwhJhw.
- Explore biomimicry at www.asknature.org/nuggets where you will find sample short videos on design in nature that is being applied in many sectors from engineering to medicine.

For lack of a closed-loop input-output flow diagram, where every component of the farm is interconnected and cycles into the next; from whey to pigs, from pig manure to fertilizer, and from lard to fruit pies, etc., thus depicting a whole diversified farm, that is socially interconnected in a web of networks in a larger community, I leave you with this comic.

[87] Benyus, p.42.



Stay in touch

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"For Canadian agriculture to contribute to a healthy world,
we need to go 'back to basics', with a revised farm enterprise mission statement of
'Nourishing Communities', instead of feeding the world." - Gayl Creutzberg

GLOSSARY

ACRONYMS, ABBREVIATIONS, AND OFTEN REFERRED TO ORGANIZATIONS

AKST Agricultural Knowledge, Science and Technology

ATTRA Appropriate Technology Transfer to Rural Areas, a program of the National Centre for Appropriate Technology (**NCAT**) in the United States under the National Sustainable Agriculture Information Service.

CAP Reform is the Common Agricultural Policy for the European Commission reformed in 2013.

EU European Union

FAO As a knowledge organization, the Food and Agriculture Organization of the United Nations (FAO) creates and shares critical information about food, agriculture and natural resources in the form of global public goods. Achieving food security for all is at the heart of FAO's efforts - to make sure people have regular access to enough high-quality food to lead active, healthy lives. FAO's mandate is to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy. Some of their focus areas where they share experience, expertise and knowledge to achieve results and impact on the ground, include: early warning of food crises; control of biosecurity risks to fisheries and aquaculture; establishing global entities to cope with land and water scarcity; and setting global standards, to be implemented through national policies and legislation.

IAASTD International Assessment of Agricultural Knowledge, Science and Technology for Development

The main goal of IAASTD is to provide decision makers with the information they need to reduce hunger and poverty, improve rural livelihoods, and facilitate equitable, environmentally, socially and economically sustainable development through the generation of, access to and use of agricultural knowledge, science and technology (AKST).

IFOAM International Federation of Organic Agriculture Movements

IFOAM is the worldwide umbrella organization for the organic movement, uniting more than 750 member organizations in 116 countries and responding to the issues of organic trade that is a rapidly growing reality all over the world.

La Via Campesina is the international movement which brings together millions of peasants, small and medium-size farmers, landless people, women farmers, indigenous people, migrants

and agricultural workers from around the world and promotes the knowledge transfer of agroecological farming methods. They promote learning through a **Farmer-to-Farmer** education methodology that "breaks the conventional of vertical transfer of knowledge from the technician who arrives in the countryside to teach the "ignorant peasant farmer" what to do. Here the protagonist is the peasant farmer him or herself, with experiences to share based on his or her practical knowledge in his or her own terrain. The farmer becomes a "promoter"—with the job of reproducing his or her own knowledge.

UN United Nations

UNESCO United Nations Organization for Education, Science and Culture

United Nations Special Rapporteur on the Right to Food (Olivier De Schutter) at srfood.org

Professor de Schutter was appointed the Special Rapporteur on the right to food in May 2008 and completed his appointment in 2014. In this position, he is independent of any government or organization and serves in an unpaid capacity. On March 4, 2013, The Special Rapporteur reported on his mission to Canada. The report is available at srfood.org.

UNCTAD United Nations Conference on Trade and Development

USDA United States Department of Agriculture

Weston Price and Francis Pottenger (Drs.), Price-Pottenger Nutrition Foundation

In the 1940s, a medical doctor named Dr. Pottenger did a study to determine how processed foods affected our health. He used 900 cats over a period of several generations, feeding some healthy food and feeding others processed foods. The cats died out completely by the fourth generation. (Francis Marion Pottenger. 1995. Pottenger's Cats: A Study in Nutrition).

"Pottenger's findings can be interpreted as follows: When the human diet produces 'facial deformities' - the progressive narrowing of the face and crowding of the teeth - extinction will occur if that diet is followed for several generations. The implications for western civilization - obsessed as it is with refined, highly sweetened convenience foods and low-fat items - is profound." (www.ppnf.org, www.westonaprice.org)

Dr. Weston A. Price (1870-1948) is another who showed that a nutritious diet created populations with healthy bodies, ease of reproduction, mood stability and less degenerative diseases. He studied isolated populations in isolated villages, who traditional diets were based on animal foods such as butter, fish eggs, shellfish, organ meats, eggs and animal fats.[88]

"Life in all its splendor is Mother Nature obeyed." - Weston A. Price, DDS

[88]Weston A. Price. 1939. *Nutrition and Physical Degeneration: A Comparison of Primitive and Modern Diets and Their Effects* and at www.westonaprice.org/health-topics/ancient-dietary-wisdom-for-tomorrows-children.

DEFINITIONS

Agro-culture - According to UNESCO, to face tomorrow's challenges, we need to develop a new "agro-culture" which maintains diversity and achieves resilience. To address the challenges of humanity, it is not only the way farmers produce agricultural commodities and make use of natural resources that needs to be looked into, but how all human beings (ie. eaters) from cities or rural areas, "relate to their environment, consume, and manage their biological and cultural heritage." Agriculture (through the practices of farming) and food (through the practices of eating) are intrinsically connected rather than separate areas of study.

Agroecology is both a science and a set of practices. It is the application of ecological concepts and principles to the design and management of sustainable agricultural ecosystems, and its practices are based on enhancing the habitat, both above ground and in the soil. Agroecological farming builds the health and resilience of ecosystem functions while reducing the reliance on external inputs such as synthetic chemical pesticides, fertilisers and fossil fuels that have high energy, environmental and health costs.[89]

Agro-ethnography is the study of people and cultures, within an agro-culture context. The study involves gathering information from participants in the local community or society about cultural phenomena that is integrated with agricultural opportunities and the 'production' landscape. Researchers observe the local community, inhabitants and culture from the point of view of the subjects as best they can (ethnography), by interacting with the local people around socio-economic questions and trying to understand their society's history through their stories, thus revealing the intricacies of everyday life as they pertain to that 'place' of study. This approach provides essential information to the study and creates a rapport with the local community that builds relationships of mutual dependancy and respect and avoids the risk of a study's results being in isolation from the local context. Allowing people the opportunity to voice why things are the way they are now, without passing judgement, can ground the dreams and aspirations of a community, bringing them closer to desired outcomes.

Biogeography seeks to understand the role of historical factors in shaping biodiversity, by studying the past and present distribution of the world's species and ecosystems in geographic space and through geological time.

Biomimicry is "an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The goal is to create products, processes, and policies—new ways of living—that are well-adapted to life on earth over the long haul." (biomimicry.org/what-is-biomimicry/#)

[89] ActionAid, 2012.

Food culture refers to socially produced values, attitudes, relationships, tastes, cuisines and practices exhibited through food. It is how food beliefs and behaviours are socially framed. "When people sit down to a meal together, every action they take; where they eat, how they eat and what they eat, is an indicator of food culture. It binds people together with shared assumptions, and opportunities for difference and distinction: people express their identities, and classes through food and derive cultural meanings from it." (Lang, T. & Heasman, M. Food Wars: The Global Battle for Mouths, Minds and Markets. 2004. Earthscan: London).

Food sovereignty - From the planting of a seed to farmers, workers and the act of eating, food sovereignty is the right and responsibility to become educated, ethical participants in the economic, social, cultural and environmental exchanges that compose our food system.[90]

Great Turning is what eco-philosopher Joanna Macy and many others are calling the space where humanity is upgrading itself to the next thing… "possibly into One Global Tribe which has learned to collaborate on a massive scale and upholds values of Love, truth, freedom, wisdom, transparency and creativity above everything else."[91] Macy describes 3 pillars to this Great Turning: holding actions, structural change, and shift in consciousness.

High Nature Value (HNV) farming is a conceptual framework that recognizes the strong connection between low intensity traditional farming and the provision of nature, where ecological values are ranked high. "HNV farming applies to situations in which nature co-exists and coincides with the farming activities as well as in situations where farming is supportive for higher biodiversity in semi-natural landscapes."[92]

Recognizing high nature value farming in a landscape encourages initiatives that "amalgamate traditional ways of farming with new options" for economically viable smallholder farming enterprises. This is important for keeping "a style of living which gives (the population) not only food, shelter and income but at the same time also a cultural identity." It is not just about production but preserving biodiversity and culturally and naturally significant landscapes, recognizing them as community assets that generate local goods and related economic income streams such as agri-tourism. (Nuppenau, E-A., Waldhardt, R., Solovyeva, I. 2011. 'Biodiversity and Transition Pathways to Sustainable Agriculture: Implications for Interdisciplinary Research in the Carpathian Mountains', Mountain Hay Meadows: Hotspots for Biodiversity and Traditional Culture, Ed. Barbara Knowles, Society of Biology, London).

Keyline design was developed by P.A. Yeomans, a farmer and engineer, in the late 1940s as a method of conserving and distributing water and nutrients efficiently through a landscape. Keyline is an ordered set of principles, techniques and systems. When fully utilised keyline

[90] www.bioneers.org
[91] www.joannamacy.net/three-dimensions-of-the-great-turning.html.
[92] Solovyeva, I., Nuppenau, E-A. June 2012, p.6.

designs produces strategies and tactics to develop the natural or existing landscape through regeneration and enhancement. Keyline is used primarily to build topsoil resulting in increased productivity of pastures and to catch water. The system is designed by observing normal land form and topography and plowing parallel runs parallelling any contour. Keyline cultivation utilizes this "off contour" drift in cultivating furrows to control the movement of rain water for the benefit of the land. (Wikipedia)

Nutrient density describes a food's nutrient composition relative to the amount of energy it contains. A food with high nutrient density contains a high amount of micronutrients (vitamins, minerals, antioxidants, etc.) relative to the energy it contains. For the purposes of this paper, a nutrient dense food has higher than usual nutrients as a result of the health of the soil in which it was raised. An organic vegetable can have low nutrient density if the soil in which it was grown is not fertile.

Real food is food in its most natural state. It is unadulterated, tasty and nutrient dense. Real food animal products are generally pasture-raised to ensure nutrient density and good quality of fat. It is whole (not low fat), unsweetened, not tenderized and none of the other fancy claims that they make about food these days.

Real food is very satisfying and therefore, when prepared, real foods only have a handful of wholesome ingredients. As a guideline, I suggest a maximum of about 12 ingredients. Compare Mapleton's Organic vanilla ice cream with a commercial brand, and you will understand what I mean.

Real food is often understood to be traditional food, but it isn't necessarily. It does however, resemble how food used to taste because there never used to be all those additives in food. A real food diet includes fruits and vegetables from all colours of the rainbow and a high enzyme and probiotic content.

Traditionally, seeds, grains, and nuts were soaked, sprouted, fermented, or naturally leavened in order to neutralize a portion of the naturally occurring anti-nutrients in these foods. This is still recommended. Plus, sprouts are super tasty. Refined or processed foods, including white flour, refined sweeteners, pasteurized and low fat milk products, protein powders, industrially made liquid or hardened (partially hydrogenated) oils and fats and foods with additives are not natural. Butter and lard are natural.

Regenerative agriculture is "healing the soil while growing food" (The Land Institute). Regeneration is the process of renewal, restoration, revitalization and growth. Practices build the soil; soil life and the amount of 'topsoil'. Regenerative practices include carbon farming, integration of livestock, agroecological principles, swale permaculture, keyline design, and grass farming and other perennial (no-till) agricultural practices for growing nutritious food.

Resilience is surviving and thriving through change. It applies to our farms, our economies, and our communities. We need to be able to adapt to periods of disruption of food supplies as Cuba was forced to, to crop failures due to increased pest resistance, to climate change and erratic weather events and to other disasters. During these times, we need to sustain potential financial losses, and be able to use innovation and resourcefulness with declining and/or increasingly expensive water and energy supplies, and other natural resources.

Social enterprise has an enterprise mission for profit generation and a social mission that the enterprise is committed to and which is its main reason for being. It is a business that has both social and commercial goals, created to further a social purpose in a financially sustainable way.

The **sacred** inspires respect and awe. Something becomes sacred when it manifests differently from a mere 'earthly' reality - a divine or spiritual force manifesting itself through the sacred object, person or sacred place that has deep psychological and spiritual meaning.

How can the sacred be experienced today? through the power of community, through learning from great teachers, through transformative agricultural practices and through celebrations expressing gratitude. Some say we can experience the sacred through food.

The living earth seeks our friendship -through sacred places where the earth communicates to us, or sings to us, and in agriculture. Some places in nature have special power (interpreted through geomancy). The Earth does have a communication system, despite not speaking English, and when people farm, and I mean truly farm (touch the soil and observe their livestock), they can feel how alive the Earth is. This is the sacredness of agriculture.

It is hard to prove all this because scientists usually live in cities. City folk just don't get it. Without experiencing the birth-life-death cycle on a daily basis and the connection that rural people experience, urban people rarely feel that deep connection between humanity and nature. This is why there is so much disconnect. Deep down, I believe that most farmers are feeling some sense of letting 'Mother Nature' down, when they practice Ag2.0.

Traditional agriculture depends on the passing down of knowledge. **Traditional knowledge** of food and agriculture has evolved over many generations with the domestication of plants and animals. Many products, including plant based medicines are derived from traditional products. Traditional knowledge is most often transmitted orally from generation to generation, in the form of stories, songs, chants, folklore, practices, rituals, community laws, and agricultural and cultural practices. It is valuable not only to those who depend on it in order to live in harsher climates and growing systems, but also to modern agriculture because traditional practices can help maintain healthy ecosystems, preserve genetics and promote biodiversity. Traditional farming and the practices of fishing, pastoral herding, foraging and forestry are based on the knowledge and practices that are related to cultural traditions and have been practiced for generations. Traditional farming incorporates diversity.

Traditional Farming systems are characterised by a lower degree of specialization and the use environmentally friendly farming practices. The decline in traditional farming is largely irreversible because it is closely linked to social transformation. With more and more areas and countries pressured to practice industrial agriculture when becoming part of the EU, consideration needs to be made for the loss of landscapes and biodiversity (Marini, L., Klimek, S., Battisti, A., Mitigating the impacts of decline of traditional farming on mountain landscapes and biodiversity: a case study in the European Alps. Elsevier. 2010).

Transitional Farming is an important phase as we shift to Agriculture 3.0 but it is missing the emphasis on the place-based and people focused pillars, and the policies necessary to support it. I argue that 'sustainable agriculture', as it is currently defined with its triple bottom line, is transitional farming.

In Joanna Macy's three dimensions towards making the shifts,[93] it is the second dimension or phase that defines transitional farming best: structural change - when we actively work to build new societal forms, new economies, and new ways of being together and organizing - creating structural alternatives for a new society within the old one. Sometimes, these initiatives look like they are happening on the margins, but they are all over the place, like numerous dots if we were to map them.

[93] www.joannamacy.net/three-dimensions-of-the-great-turning.html.

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Food Tank at www.foodtank.com
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Spiritual Ecology - the Cry of the Earth at spiritualecology.org
The Work that Reconnects at www.joannamacy.net