

Planning for the Impacts of Climate Change on Traditional Communities:
A Case Study of the Mennonite and Amish Communities in
Southwestern Ontario

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INTRODUCTION

The global climate is changing, including precipitation patterns and rising average temperatures. Climate change brings new challenges, new risks and new opportunities for all human activities on the planet. Global implications of climate change due to increased level of greenhouse gasses in the atmosphere are becoming one of the most significant research and policy issues facing mankind (Reid, 2003; Wall, Smit, and Wandel, 2007)

Climate has important influences on daily life. Often, not conscious of it, humans have adapted to climate. The general population takes climate adaptation measures for granted because human activities have historically developed so they can exist under variations in climate. It is only when climatic conditions vary significantly do societies' adaptation measures become much more apparent (Smit, 1993).

Agriculture is inherently sensitive to climate conditions, and is among the most frequently cited human systems likely to be affected by global climate change. By the very nature of the relationship between the agricultural and weather, farmers are required to adapt to climate change (Reid, 2003). Although agricultural systems are vulnerable to the risks of climate change, they also have, to varying degrees, a capacity to cope with and adapt to changing conditions (Uri, 2006).

As a response to risks and impacts of climate change, adaptation has received increasing attention, and is now a fundamental concern of many governments and institutions. Adaptation refers to the actions of individuals, groups, communities, and governments to actual or expected climatic stimuli (Dolan, 2001). Adaptation efforts are a response to reduce vulnerability to adverse impacts, or to realize opportunities associated with climate change.

There is an immense number and variety of potential adaptation options available to deal with climate change risks. However, to determine which adaptations should be implemented or promoted adaptation measures need to be evaluated (Dolan, 2001).

Consideration of agricultural adaptation initiatives as they relate to climate change are critical to the future success of agriculture in Ontario and Canada. Prior to identifying which adaptation initiatives be implemented across the Canadian agricultural sector it is critical to consider lessons and techniques from traditional agricultural communities practising non-modern, low input agricultural production methods.

The Mennonite and Amish community in Southwestern Ontario are a unique case. Living in a quasi-agrarian society (Reaman, 1970; Smith, 1957) based on self sufficiency, they have extensive working knowledge of low input agriculture systems. This group has endured centuries of religious persecution which drove them into marginal agriculture areas, where they developed new methods of farming (Mage and Fletcher, 1989; Hostetler, 1980). This knowledge of marginal, low input agricultural production which is sustained through their religious beliefs is invaluable and may serve to guide the adaptation of the Canadian agriculture sector in the face of an uncertain, changing climate.

The Mennonite/Amish farming system methods are dictated by religion and rely on low technology, self-sufficiency and skill acquired over time (Winfield, 1989). As a result the system is very reliant on weather patterns and extremely vulnerable to climatic variation. This climatic vulnerability exists in part because possible mitigation measures utilizing high technology and government programming are not used. The Mennonites/Amish refuse use of most services and rarely participate in the public process. Utilization of government support programs (i.e. public education and health care), income stabilization and crop insurance protection is extremely limited. As a result they have adapted measures to maintain farm,

community, and family sustainability in spite of weather related events such as crop loss (Mage and Fletcher, 1989; Winfield, 1989).

To cope with climate variation, production flexibility and crop diversity are emphasized. The production methods used by Mennonites, as compared to a conventional average Canadian farm, are much more diversified and rely very little on intensive production methods. There is also an element of resiliency that can provide important lessons to conventional agriculture (Mage and Fletcher, 1990; Stinner et al., 1989).

This research aims to contribute to developing a sustainable response to the dynamic challenges of climate change. In particular, consideration of low input agricultural adaptation initiatives as they relate to the future success of agriculture in Ontario and Canada and the sustainability of traditional agricultural communities such as the Mennonites/Amish in a climate change scenario.

PURPOSE

The purpose of this study is to identify if the traditional Mennonite and Amish agricultural practices of Southwestern Ontario can serve as a mitigation or adaptation strategy for modern Canadian agriculture in a climate change scenario, and to understand how the Mennonite/Amish methods of agricultural production and adaptation, as they relate to municipal land use planning policies will be impacted by climate change.

Several studies have been completed which have identified a need for research that will improve farm level adaptation to climate variations (Dolan, 2001, Chiotti and Johnston, 1995, Smit, McNabb and Smithers, 1996, Wall et al., 2007). To encourage and prepare farmers to adapt to climate change it is necessary to understand farmer's perceptions of climate change, and the potential responses to climate variability.

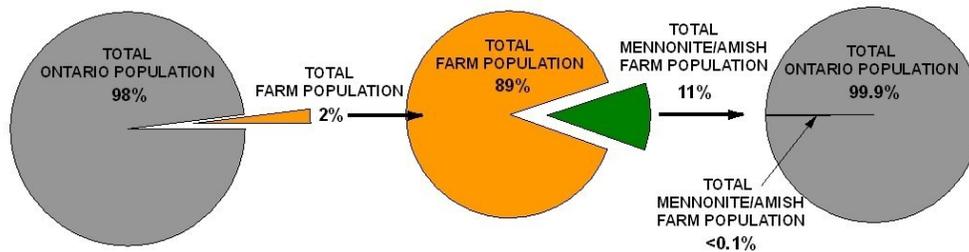
OBJECTIVES

1. Understand the Mennonite/Amish methods of agricultural production and how they might be jeopardized by climate change.
2. Identify how Mennonite/Amish agricultural practices can serve as a mitigation or adaptation strategy for conventional Canadian agriculture in a climate change scenario and determine the degree of adoption suitability for the rest of the Canadian agricultural sector.
3. Identify possible planning measures and policy changes which promote agricultural sustainability. Specifically, identify municipal land use planning policies that support Mennonite/Amish practices and how these policies affect the ability of this group to respond to climate change. In particular, identify policies which influence the diversity and intensity of agriculture and minimize the effects of climate variability.
4. Identify opportunities for Mennonites/Amish groups to comfortably engage in the public process related to promoting climate change adaptation measures in their community.

SINGIFICANCE OF STUDY

The active farming population in the Province of Ontario represents approximately 2% of the total provincial population. The Mennonite/Amish population of Ontario represents approximately 11% of the total Ontario farm population. Therefore, the Mennonite/Amish farming population represents less than 0.01% of the Ontario population, see Figure 1. This very low proportion of total population implies that less than one tenth of one percent of Ontarians have working knowledge of low input, marginal agricultural production methods. This makes the Mennonite/Amish population an invaluable source of alternative agriculture production knowledge (Agricultural Census of Canada, 2001).

FIGURE 1: Mennonite Proportion of Ontario Population



While there no debate over the unique agricultural knowledge Mennonites/Amish possess. Questions arise however, whether their methods of agricultural production and climate change adaptation strategies are transferable to modern agricultural production. Additionally are the traditional agricultural practices of Mennonite/Amish more sensitive in a climate change scenario compared to modern agricultural practices.

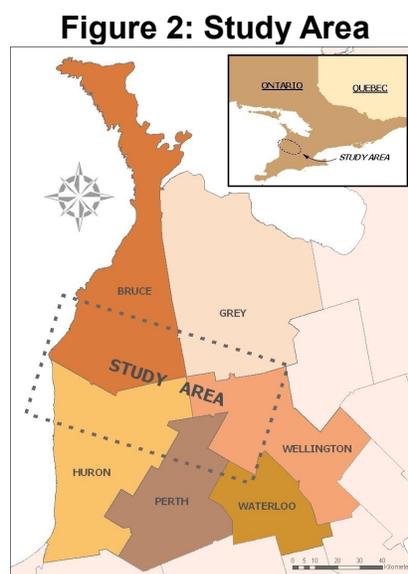
The Mennonite/Amish community is a *special case with special needs* which require sensitivity on the part of municipal planners and the land use planning system. Religious beliefs (Anabaptist) dictate every aspect of their existence. Anabaptism is found to influence farm size, crop diversity and intensity, fertilizing practices, persistence in farming, technology use, general land use and attitudes towards community (Mage and Wandel, 1998; Jackson, 1988). Theirs is a culturally closed community with strict adherence to self-sufficiency. The closed nature of the community protects against absorbing outside customs that erode the purity of their religion. Due to their religious beliefs Mennonites/Amish refuse use of most services and rarely participate in the public process. Utilization of support programs such as crop insurance protection is extremely limited. As a result they have adapted coping measures to maintain farm, community, and family sustainability in spite of weather related events such as crop loss (Mage and Fletcher, 1989; Stinner et al., 1989).

The knowledge gained from this study can be used to understand the impact climate change may have on traditional agricultural communities in Ontario and if traditional agricultural climate change mitigation methods can be utilized by the rest of the Canadian agricultural sector.

STUDY AREA

The geographic area selected for study is spread over six upper tier municipalities in Southwestern Ontario. The selected municipalities include the Counties of Huron, Perth, Bruce, Grey, Wellington, and the Region of Waterloo. This general area was selected due to a number of considerations which include: the large number of Mennonite/Amish farm operations; the large number of modern farm operations; the significance, importance and dominance of agriculture in the area; and the close geographic proximity of multiple municipal jurisdictions.

A sample of 40 Mennonite/Amish farm operators were drawn from the study area. Particular consideration was given to ensure an equal number of farms were selected from each municipality. Figure 2 indicates the approximate location of the study area.



METHODOLOGY OF DATA COLLECTION

Data related to Mennonite/Amish agricultural characteristics and climate change adaptation strategies collected for this study involved individual interviews and questionnaires of forty separate Amish/Mennonite farmers in the study area. The farmers selected for interview were drawn equally from each of the 6 municipalities within the study area. Each interview lasted approximately one to two hours and was conducted on sight at the individuals farm or residence. Using a set interview guide and questionnaire, each farmer was asked to answer and discuss questions related to their farm operation, climate change and associated municipal land use planning policies. The questionnaire and introductory letter used to establish initial contact can be found in Appendix 1 and Appendix 2.

Data related to municipal land use planning policies which support climate change adaptation was collected through focus group sessions with the planning staff from each of the six upper tier municipalities in the study area. The focus groups were held at the municipal office of each of the respective municipalities and lasted approximately one hour.

THE MENNONITES AND AMISH OF SOUTHWESTERN ONTARIO

The terms Mennonite and Amish are blanket labels used to describe a wide range of Protestant congregations. A commonality among all Mennonite and Amish groups is a heritage of 16th century Anabaptism (Schreiber, 1962). It is important to note however, not all Mennonites have the same cultural background. They are comprised of three separate immigrant groups each with its distinct origins in Europe, Swiss-German, Dutch and Russian.

The different backgrounds account for the unique traits such as language, dress, religious practices and distinctive customs. (Wandel and Mage, 1998). Additionally there are varying degree of conservatism which exist within the community. In general, old order or

conservative Mennonites/Amish live more traditional lifestyles than their counterparts, the progressive Mennonites, who utilize modern technology. It should be qualified however, neither conservatives nor progressives are definitively one or the other. The most significant sociological differences in the Mennonite/Amish community are those between rural and urban practices and lifestyles (Regehr, 1996; Winfield, 1989).

For the purposes of this paper, the Mennonite and Amish have been divided into two groups, old order and modern. Old order's lead a traditional conservative lifestyles including plain dress, retention of language, and rejection of technology (Winfield, 1989). Old order Mennonites unlike modern Mennonites continue to exclusively rely on horses and buggies for transportation and refuse the use of electricity. Modern Mennonites are not easily identifiable. Like the rest of main stream secular society they believe in individual decision making rather than community based discipline which is common in old orders of the Anabaptist religion. As the focus of this study is principally traditional communities, this research will focus exclusively on old order Mennonites/Amish as their lifestyle is most dissimilar from the majority of mainstream secular society (Hostetler, 1980).

The the first Mennonite/Amish immigrant group to inhabit North America and eventually Southern Ontario came from Switzerland in the 16th and 17th centuries. They first settled in Pennsylvania before moving to upper Canada in the early 19th century. The second immigrant group were the Amish. They too came from Switzerland and also Holland. The third immigrant group and the most recent came from Russia. This group originally settled in Manitoba, Saskatchewan the and Alberta. During the great depression many moved to the Southern Ontario region. Of the three Mennonite ethnic Mennonite groups that immigrated to Southwestern Ontario, the best known are those of Swiss background who arrived from Pennsylvania (Regehr, 1996; Winfield, 1989).

Canada specifically, Ontario attracted many Mennonites/Amish. The province provided productive lands and was an accepting, tolerant society. The most important factor was Ontario did not have an individualized and compulsory social security program, or agricultural and farm assistance programs, like existed in the United States, which the older order Mennonite/Amish found religiously unacceptable. Old order's appreciated Canada's system. The financial benefits of tariffs and governments supply management, marketing, and the price supports in Canada were usually incorporated into the price the farmer received for their products and did not require applications by individual farmers for direct government payments to them (Regehr, 1996; Winfield, 1989).

The population of Mennonites/Amish in Southern Ontario continues to grow. The Waterloo/Southwestern Ontario Mennonites and Amish are the largest population of Mennonites practicing traditional agriculture in Canada (Wandel and Mage, 1998). This group rejected modern farm machinery and agricultural technology, particularly electricity and modern automotive and communication innovations. Their way of life has for hundreds of years been based on collective community interests, strongly supported by mutual aid and cooperative efforts is relatively unchanged.

CULTURE AND AGRICULTURE

Mage and Fletcher, 1989 explain how cultural components include a culture group's collective customs, language, traditions, religious beliefs and values. The two most identifiable components of culture are language and religion. Language is connected to the geographic origin of a linguistic group and has been more broadly studied under the heading of ethnicity. The term ethnicity refers to the geographic origins of shared ancestry of a culture group or population. Ethnicity can include other less easily categorized cultural components

such as value systems, which may continue to exist even after a common language is no longer in use. A religious group may encompass one or several ethnicities. Where a religious or ethnic group is the same as it is the case with the old order Mennonites/Amish, it can be expected that the most abstract cultural components of values, traditions and beliefs will be best expressed.

REVIEW OF LITERATURE

Old order Anabaptist farmers traditionally take a yeoman farming approach. A number of studies have been conducted on old order Amish and Mennonite groups in the State of Ohio (Jackson, 1988; Stinner, Paoletti and Stinner, 1989; Sommers and Napier, 1993, Reaman, 1970), and the Province of Ontario (Mage and Fletcher, 1989, 1990). As can be expected, adherence to conservative Anabaptism was found to influence farm type, size diversity and intensity, fertilizing practices, persistence in farming, technology use, general land use, and environmental attitudes.

In many countries, traditional farming societies are rapidly disappearing. The Mennonite/Amish communities represent one of the few remaining traditional farming societies in temperate regions (Stinner et al., 1989). These societies can be viewed as archives of agricultural knowledge which have endured over much longer periods of time than conventional farming technologies but are often forgotten by larger, more modern cultures. In many cases, including the Mennonite/Amish, the farming systems developed by these societies have sustained their culture for hundreds of years (Regehr, 1996; Winfield, 1989). Today, more and more agricultural producers, are seeking to grow food with greater consideration for sustainable production and minimal environmental degradation and are looking towards the practices of traditional producers for new methods.

The study of farming systems, which use low inputs of energy, chemicals and machinery such as the Mennonite/Amish can enhance the repertoire of modern farmers. The study of sustainable agricultural systems can create basic knowledge of how and why the old systems work and what aspects could be applied to new systems. However, perhaps even more importantly, study of traditional cultures can help larger societies rediscover traditional farm wisdom which has often been significantly diminished in conventional agriculture (Ehrenfeld, 1987).

The Old order Mennonites/Amish represent one of the most conservative branches of the existing Anabaptist faiths (Smith, 1957; Schreiber, 1962). The Anabaptist Movement began early in the sixteenth century in Switzerland, spread into Germany, Italy and Holland. (Smith, 1957). Modern Anabaptist groups include Mennonites, Amish and Hutterites.

The distinct separateness of the Mennonites/Amish from main stream society is achieved by very strict sets of socio-religious rules, called the Ordnung, which create boundaries between them and the world (Hostetler, 1980). For example, the Amish pace of life is very different from the modern world as horses are used for transportation instead of automobiles.

At the core of Amish society is an agrarian lifestyle. Tilling the soil has religious significance for the Amish based on biblical interpretations (Hostetler,1980). The Old order Mennonites/Amish are one of the most persistent and successful subcultures in North America in spite of predictions that they would be absorbed into the larger American society (Huntington, 1956; Hostetler, 1980). The basic farming systems practiced by the Amish have sustained Amish society and are an integral part of its persistence and growth. Sociologically, farming has allowed the Amish a large degree of self sufficiency which reinforces their cultural separateness from the world.

The combination of environmental pressure to produce food on marginal land and their socio-religious orientation resulted in Anabaptists becoming renowned as innovative and superior farmers in seventeenth and eighteenth century Europe. (Smith, 1957; Seguy, 1973; Hostetler, 1980; Meyers, 1983). The Anabaptists were said to "apply themselves with extraordinary care to agriculture, an occupation for which they have admirable knowledge" (Seguy, 1973) they transform "sterile and dry lands into tillable lands and the most beautiful pastures of the province" (Hostetler, 1980).

Agricultural practices

As mentioned, to the outside observer the Mennonites/Amish may appear very homogeneous, however there is an appreciable diversity in farming practices from one community to another (Hostetler, 1980), and therefore generalizations can produce a biased perception. However, there are certain general practices which characterize and distinguish Mennonite and Amish agriculture.

General farming

To the Mennonites and Amish general diversified farming has higher social status than specialized farming (Stinner et al., 1989; Hostetler, 1980). Social pressure necessitates a diversified farming system which involves multiple crops and a variety animal husbandry. Traditionally, organic methods of crop production utilized green manures and lime for fertility sources, cultivation for weed control and rotations for pest control. Today, most Mennonite and Amish farmers use petro-chemicals and commercial fertilizers to some extent. However, for economic reasons, when petro-chemicals and fertilizer are applied, the rates are often about half (Stinner et al., 1989).

Horse farming

Probably one of the most well known Mennonite/Amish farming traditions is the use of horses instead of tractors and trucks. The Amish give many reasons for their insistence on this form of farm labour (Huntington, 1956; Hostetler, 1980). It is generally felt the horse slows things down, imposes limits, and symbolizes some of the deepest meanings of Amish life. Additionally riding in a horse and buggy is a visible symbol of ethnic identity, unmistakable to the insider and the outsider alike. It leaves no doubt that if the boundary lines of Amish society.

Other on farm activities

In addition to highly diversified crop and animal production, many Mennonite/Amish farmers also manage woodlots for lumber, maple syrup production and fuel (Hostetler, 1980). Many Amish farmers have a saw mill on their farm and sells lumber or furniture. Some craftsmen make and sell furniture or horsedrawn vehicles on the farm. The family vegetable garden, run by the women, not only supplies food for the family, but is an additional source of income when surpluses are sold. Fruit orchards are another component of many Amish farms, as well as bees for honey (Stinner et al. 1989).

Because the Mennonites and Amish have such a long history of experience with low-input agriculture, researchers and modern practitioners of sustainable agriculture could learn a great deal from Amish farmers; not only in terms of determining what types of sustainable systems are economically and environmentally viable, but also in terms of understanding why they work.

BROAD APPROACH USED IN RESEARCH

In order for a study to factor a cultural component, it is not enough to simply attribute

observed patterns to culture. The systems approach requires that culture is considered within its functional role and therefore any existing patterns must be related back to characteristics, values and beliefs of the cultural group. (Wandel and Mage, 1998).

CLIMATE CHANGE AND AGRICULTURE

Agriculture is inherently sensitive to climate conditions and variation, and is among the most frequently cited human systems likely to be affected by global climate change (Wall, Smit, and Wall, 2007). Global climate change is widely recognized as one of the world's greatest environmental, social and economic threats (C -CIARN Summary Report for Agriculture Meeting, 2004). Many academics and policy makers believe that there are serious implications of climate change for agriculture (C-CIARN-Agriculture Workshop: Final Report, 2001).

Several studies have illustrated the vulnerability of the agricultural sector to climate change. The studies indicate more frequent loss of crops and livestock and greater soil losses from erosion of agricultural lands. However by far the biggest risk to agriculture from global warming is uncertainty, and historically farming has experienced enough uncertainty (C-CIARN Workshop Steering Committee, 2001).

Risk is inherent to farming. Agriculture can adapt, but with low margins, there needs to be economic benefit to farmers (C-CIARN Workshop Steering Committee, 2001). From perspective of the producers, the crucial dimension between climate change and agriculture is economics. Climate change matters to farmers in terms of its impacts on the financial success of their operations. Producers recognize that their business depends on a number of other factors (including those related to the environment, policy, infrastructure, and social issues (Caldwell, Reid, and Smit, 2006).

AGRICULTURAL ADAPTATION

Adaptation refers to changing behaviour, planning or building techniques in order to better cope with the impacts of change. Adaptation occurs at multiple levels in a complex environment, and is generally evaluated as better-worse, based on multiple criteria. Efforts to manage agricultural climate risks can involve many decision-makers, conflicting values, competing objectives and methodologies, multiple options, uncertain outcomes and debatable probabilities. Identifying the best adaptation response is difficult, and as a result, farmers delay or defer important actions to reduce the associated negative impacts (Reid, 2003; Wall et al., 2007).

Climatic variations, particularly variations from normal conditions, represent significant and long term risks to agricultural producers (e.g. increased drought). Variation also has the potential to create opportunities (e.g. longer growing seasons). The future success or failure of individual agricultural producers will depend on the management of their specific climate adaptation measures (C-CIARN Workshop Steering Committee, 2001).

Climate change adaptation literature identifies a number of options available for farmers and others in the agricultural sector for decision-making regarding climate change risks. Two most prominent options are directly related to farm management and include production practices and financial management (Smit and Skinner, 2002).

- Farm Production Practices include the use of diverse crop and livestock types and varieties; alternative tillage practices; implementation and/or improvement of irrigation systems; and effective land and water resource management (Smit and Skinner, 2002; Caldwell, et al., 2006).

•Farm Financial Management refers to modifications in crop insurance use; the investment in crop shares and futures; participation in income stabilization programs; and diversifying sources of farm household income (Smit and Skinner, 2002).

Successful adaptations require support from the entire agri-food sector, including provincial and federal governments. Government and industry partnerships in programming play an important role in promoting strategies to limit climate change risks; such as developing technological developments in crop varieties and hybrids, innovations in farm management practices, irrigation systems, livestock facilities, and climate information systems (weather forecasting) (Smit and Skinner, 2002).

Federal and provincial government support is also fundamental to viable income stabilization, disaster relief, and crop insurance programs; farm financing, crop insurance, and government relief programs (Smit and Skinner, 2002).

Significant capacity exists to deal with climate-related risks in the agricultural sector but these adaptive strategies are not being realized to the extent that they should be (Smit and Skinner, 2002).

SUSTAINABLE AGRICULTURE

Sustainable development integrates environmental, economic, and social interests in a way that allows the needs of today to be met without compromising the ability of future generations to meet theirs. In the agriculture sector, sustainable development implies a way of producing agricultural products that can be continued in perpetuity, in a manner that supports or enhances the high quality of life currently experienced today (Reid, 2003; Food and Agriculture Canada, 2007).

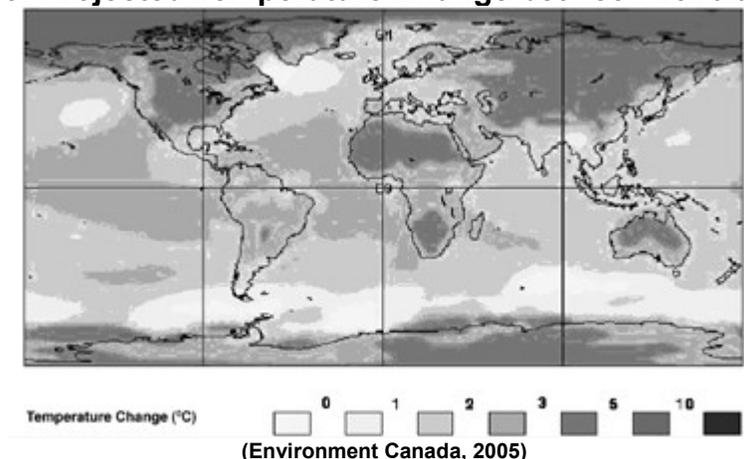
CLIMATIC RISKS IN SOUTHWESTERN ONTARIO

Climate change poses many risks to human activities, such as those vulnerable to increasingly frequent and extreme weather events, and changes in water availability and quality. It is important to consider all climate risks will not occur simultaneously. Additionally, many of the observed and projected climate changes for Canada, and their associated risk issues, already are having impact to some degree (Environment Canada, 2005; Nobel, Bruce and Egener, 2005).

According to the Intergovernmental Panel on Climate Change (a global scientific body of expertise on climate change), the world's average surface temperature is expected to increase by 1.4 to 5.8°C over the period 1990-2100 (Mehdi, 2006).

The Southern Ontario climate models give conflicting signals as to whether annual precipitation will increase slightly or decline, so a hypothesis of little future change in total might be assumed, but with more of the precipitation in rain and less in snow (C -CIARN Summary Report for Agriculture Meeting, 2004).

Figure 3: Projected Temperature Change between 1910 and 2040



Evidence in literature suggests that the climate of Ontario is already changing. The Great Lakes-Upper St. Lawrence Basin, Southern Ontario and South West Quebec, average

annual temperatures have increased by about 0.6°C to date. A further increase of 2-3°C is projected by 2050, see Figure 3 (Nobel et al.,2005). It is anticipated average temperatures could rise by another three to eight degrees Celsius over the next 100 years. This change has significant implications for agricultural systems as agriculture is particularly sensitive to climatic variations. Researchers expect to see future changes in our ability to grow food and potential costly changes to the methods we use to produce it (Environment Canada, 2005; Hengeveld, 2000).

Climate change risks to agriculture include:

- Warmer and shorter winters
- Increasing annual average temperatures
- Summer droughts affecting quality and quantity of water resources
 - Increased competition for declining water supplies will increase
 - Increased agricultural drought intensity
- Increasing frequency of severe weather events such as, ice storms, tornadoes, floods, droughts and heat waves
- Heavier shorter duration rainfalls resulting in increased erosion, flooding and runoff of nutrients, pesticides and other toxins from agricultural operations.
- Increasing risk of non-native (invasive) pests and diseases to crops
- Longer growing seasons, but crop yields may be impacted by increased and longer droughts.
- Increasingly strong winds during storms could increase crop damage (Environment Canada, 2005; York Region, 2008; Hengeveld, 2000).

Economically, it is not surprising that higher energy efficiencies of Mennonites/ Amish farmers lead to greater economic security and stability. While small-scale horse farming may not have the potential to make large gross financial returns like large-scale mechanized farming, in general, Mennonite and Amish farmers are not suffering the financial difficulties which currently are driving so many modern farmers off their farms (Stinner et al., 1989).

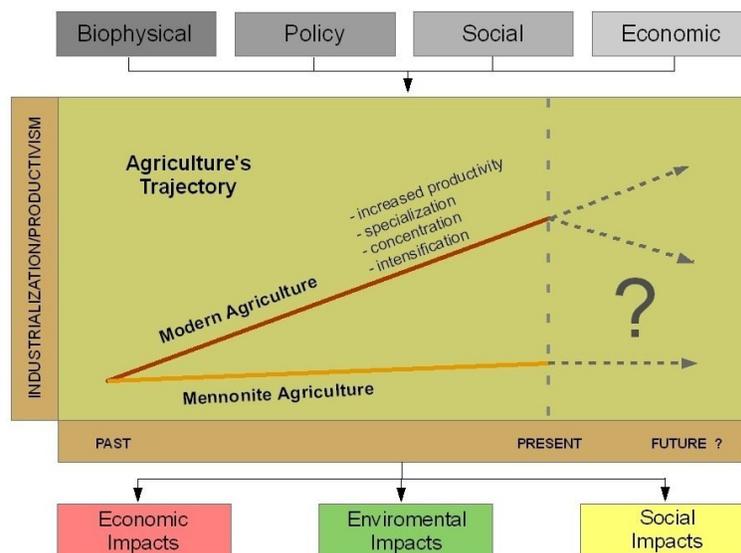
DISCUSSION

Large families provide the Mennonites/Amish with an important source of farm labour.

Physical labour is a religiously sanctioned aspect of Amish culture including farming (Wandel and Mage 1989) and it is an important component of their efficiency and success as farmers today and historically (Stinner et al., 1989).

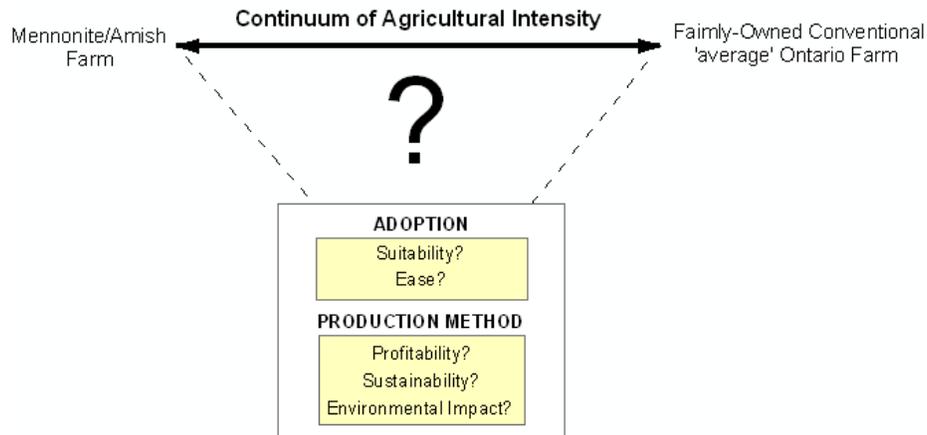
While most modern day farmers would not be willing to utilize as much hand labour as Mennonite and Amish farmers and give up their tractors for a team of draft horses, and legally cannot deprive their children of high school education, many of the basic principles of Mennonite/Amish agriculture such as diversification, crop rotations, use of animal and green manures are feasible for small-scale modern farmers seeking to farm with lower inputs than conventional systems require. Considering how many modern day farmers and their spouse must work off their farms at full-time jobs in order to keep their farms and maintain their lifestyles, the Amish may actually spend less labour hours than non-Amish farming families. As Figure 4 and 5 illustrate the outstanding questions related to the degree of adoption suitability for Mennonite/Amish practices to the rest of the Canadian agricultural sector.

Figure 4: Agriculture's Trajectory



Modified from: Bradshaw 2007.

Figure 5: Continuum of Agricultural Intensity



Many of the sustainable agricultural practices that researchers discuss are incorporating innovative blends of old practices with new ideas into experimental designs. Study of the integral relationship between Mennonite/Amish society and Mennonite/Amish agriculture suggests the importance of a close relationship between social and technological concerns for successful sustainable agriculture. Although many aspects of Mennonite/Amish culture are not desirable for general society, the Amish are a living preservation of traditional farm wisdom and the study of their agricultural methods and society has important implications for sustainable agriculture particularly in a climate change scenario.

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APPENDIX 1: INTRODUCTORY LETTER TO FARMERS REQUESTING INTERVIEW

March __ , 2008.

Dear _____,

I am contacting you as part of the research I am undertaking at the University of Guelph, School of Rural Planning and Development.

I am particularly interested in identifying if Mennonite/Amish agricultural practices of Southern Ontario can serve as a mitigation or adaptation strategy for conventional or modern Canadian agriculture in a climate change scenario. Additionally, I hope to identify if municipal land use planning policies limit or encourage Mennonite/Amish climate change adaptation strategies.

I am very interested to gain insight into the experience and knowledge of low energy use agricultural producers such as yourself. I am eager to record your experiences as soon as possible. It is my intention to interview between 25 and 30 Mennonite/Amish farmers throughout the Counties of Huron, Bruce, Grey, Perth, Wellington and Waterloo before the end of July.

I received your name from _____ who suggested you might be interested in this research. I was hoping you would be willing to participate in a one to two hour interview at your home.

I will be stopping by in a few days to answer any questions you might have.

Sincerely,

Rian Allen
Masters Candidate,

My Contact Information

133 Nelson St. E.
Goderich, Ont.
N7A 1S1
519-524-4658
email: rallen@uoguelph.ca

The University of Guelph professor involved with this research is Dr. Wayne Caldwell from the School Environmental Design and Rural Development. His contact information is available below.

Wayne Caldwell
University of Guelph, SEDRD
50 Stone Road East
Guelph, Ontario, N1G 2W1
Phone: 519-824-4120 ext 56420.

APPENDIX 2: INTERVIEW QUESTIONNAIRE

Name: _____

Date: _____

As I mentioned in my previous conversation with you on month/day, the purpose of this study is to identify if Mennonite/Amish agricultural practices can serve as a mitigation or adaptation strategy for conventional Canadian agriculture in a climate change scenario. I will be asking you to share information regarding the methods of agricultural production of your farming operation, your understanding of climate change risks and how you are adapting to those risks, and your perception of how municipal land use planning policies help or hinder your adaptation strategies.

Do you have any questions before we begin?

Thank you for agreeing to participate in this study. I would appreciate it if you could answer the following questions to the best of your abilities.

Questions relating to the farm operation

1. What goals (*if any*) do you have for your farm?
2. Could you please describe the activities that occur on your farm? What do you produce on the farm?
3. How large is your farm (acres)?
4. How long have you been involved with farming operations?
5. What are your methods of crop selection?
6. What factors influence your crop selection (*i.e market factors, weather, ect.*)?
7. What are your cropping methods (*i.e. rotation, till, planting, ect.*)?
8. Do you consider your farm to be diversified?
9. Is your family involved in the farm business?
If yes: Could you please provide information relating to your family:
Number of children? Age? What is their level of involvement in the farm operation?
10. What percentage of your total (*family*) income is derived from agricultural production/other income?
11. What percentage of your time do you spend working devoted to: agricultural production/other income?

12. What percentage of your total (*family*) income is derived from agricultural production/other income?
13. How much capital do you invest or reinvest in farm buildings and machinery on your farm (*low/med/high*)?
14. Do you subscribe to crop protection insurance?
15. Do you utilize irrigate systems?
16. Do you participate in income stabilization programs?

Questions relating to climate change

1. How would you describe your experience with climate and farming?
2. Do you know what climate change is?
3. Are you concerned about climate change?
4. Do you think climate change will affect this region? If yes, what do think will the major impacts be?
5. Do you believe climate change will impact the future of your farming operation? *If so how?*
6. Do you perceive climate change as a threat or opportunity to your farming operation? Today and/or in the future?
7. Are you, or have you altered your farming practices as a response to climate change? *If so how?*
- current climate change adaptation strategies
-future climate change adaptation strategies
6. Do you believe your agricultural production methods are more or less vulnerable to climate change then more modern agricultural methods? *If so how?*

Questions relating to municipal planning policies

1. How would you describe your level of awareness of _____ County's municipal land use planning policies?
2. What is your opinion of the County's municipal land use planning policies as they relate to your farm operation?

3. What impact does your knowledge of municipal land use planning policies have on your ability to respond to climate change risks?
4. Do current municipal land use planning policies help or hinder your climate change adaptation strategies? *If so how?*
5. Did you participate in the planning process when _____ County's Official Plan and Zoning Bylaw were developed and/or reviewed? In what capacity? What was the result?
6. Describe what opportunities exist for Mennonite groups to comfortably participate in the public process related to promoting climate change adaptation measures in their community.
7. What role do you think municipal planning departments should have in helping farmers adapt to climate change?

Wrap up

1. Do you have any additional comments about climate change, your farm operation, municipal planning, and/or adaptation strategies?
2. Do you have any questions for me regarding the future of my research?
3. Would it be possible to tour your operation?
4. Would you like to receive a summary of the research results and conclusions upon completion of the entire project?

Thank you for your time today to discuss these issues with me. If you have any additional comments, questions or concerns about this research, please do not hesitate to contact me.