Supporting Environmental Stewardship and Livelihood Benefits in Ontario's Greenbelt: Assessing the Potential Contribution of the Alternative Land Use Services Program

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final versions, as accepted by my examiners.

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Abstract

Ontario's Greenbelt is key to the region's sustainability and plays an important role in stopping urban sprawl, preserving agricultural land and maintaining ecological goods and services. However, there have been concerns expressed in the literature and by non-government organizations that the Greenbelt legislation, on its own, will not ensure the viability of the farming economy in this region, or ensure adequate ecological stewardship. These concerns point to the need for other programs and policies to complement the Greenbelt legislation, and to help ensure that the goals of the Greenbelt are met. This research study assesses the potential of the Alternative Land Use Services Program (ALUS) as a tool for promoting agricultural viability and associated land stewardship in Ontario's Greenbelt. An Alternative Land Use Services program would pay farmers for the provision of environmental services in the public interest. Using a qualitative methodological approach based on a literature review, a review of government and non-government organization documents and interviews with key stakeholders, this study compares the potential contribution of the ALUS program with that of other reasonable alternatives currently available to promote farmland protection and farm stewardship. The research also provides an analytical framework and a comprehensive set of criteria for selection and design of programs in support of sustainable agriculture in the Greenbelt. The primary research findings indicate that an ALUS program in the Greenbelt, established as a stand-alone regional project or as part of a provincial or national program, could help to strengthen the Greenbelt's roles in stopping urban sprawl, preserving agricultural land and maintaining ecological goods and services. The ALUS concept and means of applying it could also play an important role in discussions regarding how to support the farm economy and rural communities in the Greenbelt. ALUS may be particularly appropriate as a means of enhancing the economic and ecological aspects of peri-urban agriculture. One of the thesis conclusions is that while ALUS could play a positive role in the Greenbelt, the program would be insufficient if it were applied on its own. ALUS will need to be packaged with a suite of existing programs that would be able to complement ALUS and address some of its weakness in order to make a stronger contribution. This research has identified new opportunities to promote land stewardship and enhance livelihoods in the agricultural sector as well as a new agenda for sustainable agriculture in the Greenbelt. More generally, the framework for analysis that was applied in this research has a broader applicability and usefulness in sustainability-based decision making processes. The approach outlines how sustainability assessments might specify sustainability considerations and integrate them together in particular applications.

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Table of Contents

List of Tables

Chapter 1 **Introduction to Research Problem**

1.1 Thesis Agenda

This thesis will test the potential contribution of the Alternative Land Use Services program (ALUS) to the building of a sustainable agricultural economy in Ontario's Greenbelt. The Alternative Land Use Services program (ALUS) provides payments to farmers for the provision of ecological goods and services in the public interest. The program is being field tested in several locations across Canada, including Norfolk county in Ontario.

The research will include the creation of an assessment framework and criteria, which will draw upon the general sustainability literature and the literature on food systems.
The framework and criteria will aid in defining a sustainable agricultural economy in Ontario's Greenbelt. The framework will also provide a means of assessing the potential contribution of the ALUS program and comparing this contribution with that of existing programs.

The research will provide a set of key design considerations for the creation of an ALUS program in Ontario's Greenbelt, a list of concerns that will need to be addressed in creating such a program, and a plan for how some of the existing programs could work with ALUS in order to make a stronger contribution.

1.2 Rationale for Current Study

Greenbelts are swatches of natural and open land surrounding cities and towns. They often contain a mix of public land and privately held land on which development restrictions are placed. They are a major element in regional planning, and play an important role in delimiting urban sprawl and preserving open spaces. Greenbelts essentially divide the regional landscape into distinctly urban, greenbelt, and exurban[1] components (Nelson 1985; Erickson 2004).

There are many arguments for the value of greenbelts. Greenbelts represent relatively unspoilt parts of the environment and make towns and cities better places to live. Greenbelts offer a wide range of public goods and amenities. Greenbelts provide such public goods as air cleansing, groundwater storage, flood control, and elimination of waste. Amenities include pleasing views and privacy (EAIS 2007; Nelson 1985, 44). Ontario's Greenbelt is key to the region's sustainability and plays an important role in stopping urban sprawl, preserving agricultural land and maintaining ecological goods and services. However, there have been concerns expressed in

[1] A region or settlement that lies outside a city and usually beyond its suburbs and that often is inhabited chiefly by well-to-do families (Merriam-Webster online dictionary, www.merriam-webster.com/dictionary).

the literature and by non-government organizations that the Greenbelt legislation, on its own, will not ensure the viability of the farming economy in this region. Some of these concerns are discussed in section 1.4. These concerns point to the need for other programs and policies to complement the Greenbelt legislation, and to help ensure that the goals of the Greenbelt are met. The main rationale for conducting this study is to examine how the Greenbelt's roles in stopping urban sprawl, preserving agricultural land and maintaining ecological goods and services can be strengthened.

Although Ontario's Greenbelt is an important venue for testing ALUS type initiatives, it is not the only one. Conclusions about the applicability of ALUS to the Greenbelt may have important implications for applications in other jurisdictions. A second important rationale for the current research is to draw conclusions about the potential benefits of ALUS-type programs for agriculture in peri-urban areas more generally.

1.3 Ontario's Greenbelt

Ontario's Greenbelt is an area of permanently protected green space, farmland, vibrant communities, forests, wetlands, and watersheds. It surrounds the province's Golden Horseshoe – the most populated area in Canada, and is vital to the quality of life in Southern Ontario. The Greenbelt protects about 728,000 hectares of countryside, including some of the most valuable agricultural land in Canada (MMAH 2005b). The Greenbelt Plan includes lands within, and builds upon the ecological protections provided by the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP). In addition, it contains 400,000 hectares of newly protected countryside lands which are "intended to enhance the spatial extent of agriculturally and environmentally protected lands currently covered by the NEP and the ORMCP while at the same time improving linkages between these and surrounding major lake systems and watersheds" (MMAH 2005a, 3). The Greenbelt extends 325 kilometers from Rice Lake in Northumberland County to the Niagara River and is about 80 kilometers wide at its widest point (FGBF 2007).

The Greenbelt was created by legislation in February of 2005, with the purpose of protecting key environmentally sensitive land and farmlands from urban development and sprawl. The Greenbelt identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape

(MMAH, 2005a, 3). The Greenbelt "will protect prime agricultural and specialty-crop land[2] in the Golden Horseshoe from urbanization, and ensure that these lands can continue to provide Ontarians with fresh produce, a secure food supply and residual health benefits now and into the future" (MMAH 2005b).

The total area of farmland in the Greenbelt in 2007 was 500,000 hectares, with 345,000 hectares of crops (corn, wheat, grapes, potatoes), 28,000 hectares of pasture and 42,000 hectares of natural pasture. The Greenbelt permanently protects over 97,000 hectares of prime agricultural lands. This includes 40,000 hectares of Niagara Peninsula tender fruit and grape specialty crop areas and the entire Holland Marsh specialty crop areas (6,000 hectares). Sixty-three percent of the Greenbelt is farmed, and there are more than 8,000 farms on the Greenbelt (Turvey and Konyi, 2006, 31). The southern Greenbelt produced over $1.2 billion in farm product sales in 2001, and generates $4.1 billion in estimated economic spin-off activity (e.g., employment, farm services and supplies) (FGBF 2007a).

Provincial authorities describe the Greenbelt as the cornerstone of Ontario's proposed Greater Golden Horseshoe Growth Plan, "which is an overarching strategy that will provide clarity and certainty about urban structure, where and how future growth should be accommodated, and what must be protected for current and future generations" (MMAH, 2005a, p.3).

1.4 Limitations of the Greenbelt

One limitation of the Greenbelt legislation that has been raised in both the academic literature and by the key informants interviewed as part of this research is that while the Greenbelt legislation attempts to provide some permanence to the protection of agricultural lands, it does not address the viability of the farming economy in this region. It has been argued that the focus in creating the Greenbelt was on protecting greenspace or providing amenity protection, rather than supporting rural communities and the rural economy. Farmers, farm organizations, and their supporters have argued that the best way to protect farmland is to ensure that farmers can make a decent living.

It has been pointed out that land use designation alone can ensure the sustainability of the farming system to achieve the objectives of the Greenbelt – mainly, to "ensure that these lands can continue to provide Ontarians with fresh produce, a secure food supply and residual health benefits now and into the future" (Ontario 2005a). Bunce and Maurer point out that "[t]he vulnerability of some farm sectors, the unprofitability of many farms, the extensive use of land

[2] Specialty crop lands are areas where specialty crops such as tender fruits, grapes, other fruit crops, vegetable crops and greenhouse crops are predominantly grown.

rented from developers, the widespread dependence on non-farm income, the prevalence of "lifestyle" farming and the lack of generational stake in the farm enterprises indicate the need for targeted strategies to improve the prospects for a sustainable farm economy (Bunce and Maurer 2005, 43). As Bunce and Mauer point out, the policies for the Protected Countryside areas of the Greenbelt are supposed to provide a continuous and permanent land base to support long-term agricultural production and economic activity. Yet, the authors note, "the realities of farming indicate that securing the long-term sustainability of agriculture in the Greenbelt will require more sophisticated strategies than mere land use regulation" (Bunce and Maurer 2005, 43).

In his discussion of the contribution of the province's smart growth polices to protecting farmland, Davidson notes that "a singular focus on protecting agricultural land has not helped rural communities in the past and will not assist them in the future." The focus, he argues, needs to shift from restricting land use to fostering the long-term sustainability of rural and agricultural communities. Davidson outlines four critical elements in the agricultural community: the resource base (agricultural land in this case), the economy, the community, and the natural environment.

Davidson applies this four-dimensional matrix to his evaluation the Ontario government's Smart Growth policies (which include the Greenbelt Plan). In general, he notes, the Smart Growth suite of papers and plans tend to be very proactive in protecting the agricultural land resource, both through policies to promote urban intensification, stabilization of urban settlement boundaries, and policies to restrict urban development on rural land. In terms of the rural economy, Davidson notes that it is well known that protecting agricultural land does not enhance or stimulate the rural economy. Without a strong rural economy there is no sustainable rural community. Davidson concludes that the rural economy is a weak component in the Smart Growth initiatives for the rural community, both for agricultural areas and small rural towns. Davidson argues that the Smart Growth policies are also very weak in fostering the sustainability of the rual community, especially its social structures and institutions.

Davidson notes that protection of the agricultural lands and the natural environment, both functionally and aesthetically, helps both urban and rural communities. However, he argues, the burden of this protection falls more heavily on rural community residents than on people residing in urban communities. There is a need, he points out, to develop a mechanism to distribute these costs more equitably. According to Davidson, the policies for the protection and enhancement of the natural environment are the clearest of all the four dimensions that he analyzed.

In summary, Davidson notes that the concept of strong rural communities is tied too much to protecting agricultural lands and the natural environment. Both are important in themselves, he notes, but they do not constitute a recipe for strong rural communities.

Rural communities, he concludes, will not get much help from Smart Growth in their quest to rejuvenate and create sustainable balanced communities. They will have to develop their own methods through their individual communities (Davidson 2007, 208).

The limitations of the Greenbelt legislation discussed here suggest the need for a comprehensive policy for agriculture in the GTA region that would integrate land use regulation with strategies for a sustainable regional food system (Bunce and Maurer 2005, 43). This was the underlying theme of the 1999 Agricultural Economic Impact Study commissioned by the GTA Federations of Agriculture and four regional municipalities. The 2003 update of this study was explicit in recommending policies support the agricultural industry. This position is also reflected in the GTA Agricultural Action Plan: "Preserving farmland is much more than protecting areas with prime agricultural soils; it involves protecting the livelihood of farmers and agri-businesses." In its discussion paper, the Greenbelt Task Force said that "land use planning alone is insufficient to ensure that agricultural lands within the greenbelt will be farmed." In their representations to the Greenbelt Task Force, farmers and their organizations argued their livelihoods are not merely ignored but actually threatened by farmland preservation policies. They were unanimous in pressing for farmland policies driven by considerations for the farm economy (Bunce and Maurer 2005, 4).

1.5 The Role of Agri-Environmental Payments in Building a Sustainable Agricultural Economy in Ontario's Greenbelt

The concerns raised about the limitations of the Greenbelt legislation's ability to ensure the viability of the agricultural economy in this region point to the need for complimentary programs and initiatives. These programs would help to address the issue of how to build a countryside economy in the Greenbelt, but also help to distribute the costs of environmental protection more equitably between rural and urban communities. Addressing these issues is essential to the building of a sustainable agricultural economy in the Greenbelt.

One category of market interventions that has the potential to assist in addressing these issues is the recognition and valuing of the public benefits – the ecological goods and services (EG&S) – that agricultural lands and farmers provide. Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions. Ecosystem functions refer to the various habitat, biological or system properties or processes of ecosystems (Costanza, et al. 1997, 253).

Ontario farmlands contain water supplies and recharge areas, endangered species, habitats, and carbon sinks that help to decrease greenhouse gases (CFFO 2002, 3). There is, however, little

formal recognition of these "public services" offered by farmers. The Christian Farmers Federation of Ontario (CFFO) notes that "[t]hese public benefits all come from private land, with the farmer unable to recover any of his costs from the marketplace. And so far, farmers have received little public support for their efforts to preserve or enhance the resources that provide these public benefits" (CFFO 2002, 3). Olewiler points out that "[b]ecause farmers typically receive no payment for the ecosystem benefits generated by their lands and farming techniques, they have little incentive or ability to protect nature. In addition, there is often poor understanding of how changes in farm management might increase natural capital while also providing benefits to the farm" (Olewiler 2004, 17).

The CFFO also recognizes that the demand from the public for an increase in these types of public benefits has risen in recent years. However, some farmers are now finding themselves under a financial burden for being stewards of these resources; either it costs money to protect a resource, or it reduces the income from land that cannot be fully used for cropping any longer (CFFO 2002, 3). Farmers in Ontario are confronted with increasing income insecurity which has been driven by a number of factors including large capital costs for the increasing mechanization of industrial farming; the move towards global markets and pressures to compete internationally; concentration in the food industry; high levels of debt; uncertain crop prices; and a lack of access to affordable farmland by farmers. All of these factors make it difficult for farmers to focus on long-term sustainability of their agricultural lands. To sustain their livelihoods, farmers must focus on their private net returns from food production (Olewiler 2004, 17; CFFO 2002, 2; FGBF 2007a, 3). Keystone Agricultural Producers has similarly noted that "farmers are not making sufficient returns, even with significant adaptation, to afford the cost of ensuring the continuation of public benefits from their land and water" (KAP 2000, 6).[3]

According to the CFFO, the pressures to protect the environment will increase as Canadian governments move towards implementing strategies to curb greenhouse gases and global warming. In addition, consumers are increasingly demanding that food be produced in conjunction with environmental services. These trends add to the income insecurity of farmers by either adding costs or cutting revenues (CFFO 2002, 3-4).

The pressures and constraints on farmers, as described by these organizations, indicate that there is a policy gap, which the present research attempts to address. There is a need to address the increasing economic insecurity faced by farmers in Ontario and the fragmentation of rural

[3] It is important to note, however, that the trends discussed here are general trends and what is true of farmers in general is not true of all farmers or all Greenbelt landowners. Equity considerations thus play an important role in evaluating the potential livelihood benefits of the ALUS program.

economies. There is a need for a mechanism to distribute the costs of environmental protection between rural and urban communities more equitably.

The Alternative Land Use Services program (ALUS), which began to be field tested across Canada in 2006, has the potential to help fill this policy gap. ALUS has been defined as:

> a delivery program that promotes the provision of EG&S by creating an incentive-based, non-trade distorting vehicle for encouraging resource stewardship by landowners and integrating the environmental demands of Canadians into the mainstream of Canadian agriculture. ALUS offers payments for the maintenance of existing natural assets, particularly where a viable alternative exists for converting natural assets into other (agricultural) uses and provides incentives for landscape improvement (CFA 2007).

ALUS provides a way of broadening the base from which farmers can generate income, which in turn will help in ensuring and sustaining the rural economy. A major goal of an environmental services approach to farming is to provide for a broader source of income for rural communities. Income would be provided to rural landowners for the delivery of ecological services to the rest of society. This income "would be in addition to the existing farm safety net and would contribute to economic and environmental stability in rural regions" (KAP 2000, 6).

ALUS thus serves multiple goals. It helps to demonstrate the economic value of farmlands, it broadens the base from which farmers can generate income and supports rural economies, and it contributes to environmental protection through the provision of ecological goods and services and the protection of natural capital.

1.6 Purpose and Research Question

The purpose of the present study is to examine the potential of the Alternative Land Use Services program (ALUS) as a tool for promoting environmental land stewardship and sustainable livelihoods in Ontario's Greenbelt. The research will answer the question: "What contribution can the Alternative Land Use Services (ALUS) program make to the building of a sustainable agricultural economy in Ontario's Greenbelt?" The research will also answer the following sub-questions: what are the key design considerations for such a program (in light of sustainability-based criteria)? what are the advantages and disadvantages of ALUS over current programs with similar agendas? and how could the ALUS program be made to work with, or complement, existing programs in a package?

The study will use a qualitative methodological approach based on a literature review and interviews with key stakeholders in order to develop and test a sustainable agricultural land use

plan (or modified ALUS) for Ontario's Greenbelt and to make policy recommendations. The research will also provide an analytical framework and a comprehensive set of criteria for sustainable agriculture in the Greenbelt. Government and non-government agencies working to promote the long-term protection and sustainability of the Greenbelt will benefit from this research as will agencies working to develop and test ALUS in Canada and ALUS-type programs in other environmentally sensitive areas.

1.7 Academic Justification and Contribution of the Study to the Academic Literature

The present research will contribute to the literature that examines the creation of markets for the provision and protection of ecological goods and services (EG&S) generally, and specifically as this concept has been applied to agriculture. As Daily notes, there has been very little research on ecological goods and services with no direct market value – much less than that on the production of major commodities, such as beef. "In many important areas concerning the supply of ecosystem services," she observes, "there is virtually no research at all. What is known about ecosystem services so far has been learned largely incidentally through their unintended disruption." Daily concedes that how ecosystems confer benefits on humanity represents too applied a topic to qualify as an area of pure research; at the same time, ecosystem services have neither been sufficiently recognized nor valued to attract funds that support "applied" research. This lack of interest and lack of funding is sustained in a detrimental positive feedback (Daily 1997, 371). In addition, very little academic study has been devoted to the application of the EG&S concept to agriculture. The research that has been conducted has primarily been done by NGOs. The present research will contribute to the discussion regarding whether remuneration should be provided to farmers for the production of EG&S, and if so, how. The research will also contribute to the literature which discusses ALUS as a particular case.

The present research will contribute to discussions regarding the *multifunctionality* of agriculture. Multifunctionality refers to the fact that an economic activity may have multiple outputs and, by virtue of this, may contribute to several societal objectives at once. That is, a given industry may provide other services besides the primary products to which value is usually ascribed. Multifunctionality "is thus an activity-oriented concept that refers to specific properties of the production process and its multiple outputs" (OECD 2001, 11; PQ 2005, 9). Agriculture, for example, has (conventional) economic, ecological and social functions, even though, in general, only a certain set of economic functions is given value by the market. Debate at the international level has focused on whether and how the multifunctional nature of agriculture should be supported (PQ 2005, 9).

The present research will contribute to the literature which addresses farmland preservation strategies. Bunce argues that the expanding discourse on farmland preservation in North America that began in the late 1960s has been influenced by two ideological streams: environmentalism and agrarianism. Within environmentalism, "agricultural land inevitably became part of the broader environmentalist discourse; of the language, that is, of resource management, ecological conservation and amenity protection" (Bunce 1998, 235). Progressive agrarianism, on the other hand, "argues for the maintenance of a strong and productive agricultural economy" (Bunce1998, 241). Bunce notes that while environmentalism and agrarianism are "complex ideologies which have their own internal contradictions and their conflicts with each other, they also reveal points of conference which help to explain the interrelationships between what has been previously treated as a disparate list of rationales for farmland preservation" "[U]nder the broad banner of farmland preservation," he notes, "we can discern a common theme between resourcist environmentalism and progressive agrarianism on the one hand and between romantic agrarianism and ecological environmentalism on the other." Bunce concludes that "[i]t is within the notions of sustainability of land use and community that we can recognize some of the overlap between the two sets of philosophies. Indeed, as the farmland preservation movement has matured in North America it has increasingly brought together issues of resource management, environmental protection, farm and community survival under the sustainability umbrella" (Bunce 1998, 243). The present research contributes to the literature on farmland preservation by developing a framework and criteria that integrates conservation and land stewardship with concerns about how to build a strong agricultural economy.

1.8 Applied Contribution and Significance

This present research will be valuable to government and non-government agencies concerned with strengthening the viability of Ontario's Greenbelt. The research addresses the practical question of "how to make the Greenbelt work." It will make recommendations about how the Greenbelt's role in stopping urban sprawl, preserving agricultural land and maintaining ecological goods and services can be strengthened.

These arguments will help to provide on-going justification for the existence of the Greenbelt, and will support public policy decisions. The research will also be valuable for other areas with similar planning designations and/ or similar needs (i.e., the potential for combined stewardship and livelihoods benefits).

Specifically, the research will be of benefit to the Friends of the Greenbelt Foundation (FGBF), whose mission is "to promote and sustain our Greenbelt as a beneficial, valuable and

permanent feature, enhancing the quality of life for all residents of Ontario." As of January, 2007, the FGBF had awarded over $4.4 million in grants to assist farmers in the Greenbelt. This research will benefit the FGBF in making strategic assessments and funding decisions in the future, and will provide guidelines for program evaluation. This research will be valuable to other private foundations, such as the Metcalf Foundation, whose mandate includes conservation and the protection of "working landscapes," in southern Ontario.

The research will be valuable to groups and agencies involved with developing and promoting the ALUS program in Canada, specifically Keystone Agricultural Producers, and Delta Walterfowl. It will also be of value to organizations involved with the Ontario pilot project including the Norfolk Federation of Agriculture. This research project will evaluate the strengths and weaknesses of ALUS as a tool for promoting sustainability. Through the interview process, the ideas generated by key stakeholders who are involved with testing and promoting ALUS will be incorporated into the research, and will therefore help to promote their goals and interests.

The research may also be of interest to Agriculture and Agri-Food Canada as it undertakes its *Next Generation of Agriculture and Agri-Food Policy* initiative as part of the development of the Agricultural Policy Framework. A federal-provincial working group has been created to develop a framework for assessing how EG&S can be considered within the broader agricultural and environmental policy context. Provincial ministers will be conducting cost-benefit assessments of initiatives that may encourage the provision of EG&S. The Federal-Provincial Working Group will develop an approach to carry out this work (Agriculture and Agri-Food Canada, 2006b, 11).[4]

The list of potential beneficiaries provided above is illustrative rather than complete. Other possible beneficiaries include farmers, farm organizations, provincial agricultural authorities, ecological stewardship advocacy organizations, and Conservation Authorities.

1.9 Methodology

The methods used to develop and test the central arguments of the thesis included a literature review, the establishment of an evaluation framework and criteria, and a series of case studies. The method employed to analyze and interpret the data follows loosely from a process developed by Gibson to assist the Joint Review Panel for the Mackenzie Gas Project in its review of the Mackenzie Gas Project and its Environmental Impact Statement (Gibson 2006a). This process

[4] The present research is not a cost-benefit analysis. This study will evaluate ALUS within the context of developing an analytical sustainability assessment framework and criteria. It will therefore be more valuable than a cost-benefit analysis for some purposes.

included the development of a case-specific sustainability assessment framework to aid in evaluations and decision making.

The first task in this research project was to define the meaning of a *sustainable agricultural economy* in Ontario's Greenbelt through the development of an evaluation framework and criteria. A review of the literature which examines the basic requirements for progress towards sustainability undertaken. As Gibson notes, the generic criteria "provide a basic framework that covers the key sustainability issues and their interconnections. Use of these criteria as the basic framework should ensure that no big common issues are neglected" (Gibson 2006a, 25). A review of the literature which examines food systems, with a specific focus on sustainable agriculture was also conducted in order to aid in the development of the framework and criteria.

The second major step was to add in the key considerations that are specific to the cases and their particular contexts. I examined the issues and concerns that are most important in the three areas I have chosen. This was done through a review of the literature which addresses the challenges associated with agriculture in Ontario's Greenbelt or the GTA more generally. Themes identified in the literature were confirmed through a comparison with data obtained through a series of semi-structured interviews with key stakeholders. Stakeholders were asked to describe what they thought were the main challenges associated with farming in the Greenbelt. They were also asked to comment on whether they agreed with the themes identified in the literature. The objective of this stage was to identify the key sustainability-related questions raised by the ALUS program and the context in which it was being applied (Gibson 2006a, 25).

The next step was the integration of the generic sustainability criteria with the identified set of case- and context-specific issues. I chose to use a method which starts with the important issues in each case. This approach seemed the most appropriate, considering that many of the issues associated with agricultural land stewardship and livelihoods in Southern Ontario have been identified and discussed, providing a good framework for considering the ALUS program. The method chosen involved constructing a hybrid framework beginning with the big issues of the case and context, but integrating the major related sustainability criteria. In this method "the generic sustainability criteria clarify and, where necessary, supplement the recognized case and context specific issues to ensure that all of the major sustainability considerations are included" (Gibson 2006a, 26). The merging of the generic sustainability criteria and case- and context-specific issues provided a framework for analysis with a comprehensive set of criteria.

In order to test the central propositions put forward in the thesis, the hybrid framework of generic sustainability and case- and context-specific criteria was translated into a set of

sustainability questions. The set of questions was designed for application to each of the reasonable alternatives under consideration (Gibson 2006b, 1).

Using this set of criteria, I assessed the viability of ALUS as compared to the reasonable alternatives available for addressing the problems identified in the research. The comparative evaluation addressed issues such as the cost difference between various options; the range of benefits protected under each option; and which alternative is easier to administer.

Three case studies were used to evaluate ALUS as a potential policy tool for building a sustainable agriculture economy in the Greenbelt. Case study sites were selected based on the following considerations: the support of decision makers within a particular municipality for an ALUS-type program; potential barriers and other limiting factors; community support for the concept; and demonstrated need for this type of program. Case study sites are the Niagara Region, Caledon and the Holland Marsh.

For each question in the evaluation framework, an assessment was made for each alternative, based on what the literature, government documents and stakeholders revealed about the potential contribution of each option under consideration. Stakeholder opinions were solicited through the interview process. Interviewees were asked whether there were alternatives to ALUS that could be used to reach the same goals and the advantages and disadvantages of these alternatives compared to ALUS. The comparison of the different options under consideration assisted in drawing conclusions about the central propositions and thesis question. The issue of potential compatibilities and mutual strengthening if ALUS were designed and adopted as part of a carefully crafted package including use of some of the other tools available was addressed as part of the analysis.

1.10 Thesis Outline

Chapter Two of this thesis will outline the methodology employed in the case study research. Chapter Three will review the literature which discusses sustainability, ecological goods and services, and programs to provide remuneration for ecological goods and services in agriculture. It will also include a review the literature which examines food systems, with a focus on sustainable agriculture and sustainable agriculture in peri-urban areas. Chapter Four will provide a description of the ALUS program. Chapter Five will provide an overview of the means, other than ALUS of supporting farm economies and stewardship, including farmland protection, agri-environmental and farm support programs. Chapter Six will provide the case study site descriptions. Chapter Seven will bring together the information from the literature review and case specific issues to develop an evaluation framework and criteria for a sustainable agricultural

economy in Ontario's Greenbelt. Chapter Eight will describe the results from applying the methodology to three case study sites on the Greenbelt. The ALUS program with be compared with other reasonable alternatives for achieving the goals that have been outlined. Chapter Nine will include an analysis of the data and will provide policy recommendations for an enhanced ALUS. Chapter Ten will discuss the implications of the findings, put forward final recommendations, and provide directions for further research.

Chapter 2 **Methodology**

2.1 Introduction to Methodology

Several qualitative research methods were used to test the central arguments of the thesis. Data were collected through four methods: 1) a literature review, 2) a review of government and non-government organization (NGO) documents, 3) face-to-face interviews with key stakeholders, 4) and three case studies focused on sites within the Greenbelt where the ALUS program could be applied. The literature review aided in the development of a comprehensive set of sustainability criteria and a framework for analysis. Government and NGO documents helped to fill in the case and context-specific issues. The interviews brought in expert knowledge to the case studies and provided an additional data source and the case studies permitted more specific examination of the potential of the ALUS program in different contexts. A review of currently available tools and programs that could potentially provide an alternative to ALUS was also conducted.

The analysis of data from the four sources included a presentation of the key design considerations for an ALUS program generally, and for Ontario's Greenbelt specifically. The analysis also included identification of unresolved issues, and the presentation of potential response options to address those issues. The evaluation framework was used to assess the ALUS options and alternatives.

2.2 Development of Evaluation Framework and Criteria

The method employed to develop the evaluation framework and analyze and interpret the data in this thesis follows closely from a process developed by Gibson to assist the Joint Review Panel for the Mackenzie Gas Project in its review of the Mackenzie Gas Project and its Environmental Impact Statement (Gibson 2006a). This process included the development of a case-specific sustainability assessment framework to aid in evaluations and decision making.

The first important task in this research project was to define the meaning of a sustainable agricultural economy in Ontario's Greenbelt. A review the literature that examines the basic requirements for progress towards sustainability was undertaken. As Gibson notes, the generic criteria "provide a basic framework that covers the key sustainability issues and their interconnections. Use of these criteria as the basic framework should ensure that no big common issues are neglected" (Gibson 2006a, 25).

The next step was to add in the key considerations that are specific to the cases and their particular contexts. I examined the issues and concerns that are most important in the three areas I

have chosen. I drew from a variety of sources to identify the major case- and context-specific considerations. These sources fell into the following categories:

- existing policy and planning documents that set out key concerns and priorities at the local and regional levels,
- insights from informed experts, and
- other sources of local and/or larger scale information that shed light on how the various generic sustainability concerns are reflected in the circumstances and issues of the particular case and context.

The objective of this stage "is to identify the key sustainability-related questions raised by the project and its context" (Gibson 2006a, 25). The list of concerns that was developed was tested with the interviewees, as part of the interview process, to see if the list was complete and accurate.

Gibson outlines four basic approaches to integration of the generic sustainability criteria with an identified set of case- and context-specific issues. From these options, I chose to use a method which starts with the important issues in each case. This approach seems the most appropriate, considering that many of the issues associated with agriculture in Ontario's Greenbelt have been identified and discussed, providing a good framework for considering the ALUS program. The method chosen involved constructing a hybrid framework beginning with the big issues of the case and context, but integrating the major related sustainability criteria. In this method "the generic sustainability criteria clarify and, where necessary, supplement the recognized case and context issues to ensure that all of the major sustainability considerations are included" (Gibson 2006a, 26).

This approach takes the following steps:

- to begin with the recognized major case- and context-specific sustainability issues for the three cases on the Greenbelt,
- to consider them in the light of the broader generic sustainability requirements/ criteria, and
- to adjust the issues list by adding items or elaborations, as necessary, to ensure that all of the key generic as well as case-specific concerns are covered.

. The merging of the generic sustainability criteria and case- and context-specific issues provided a framework for analysis with a comprehensive set of criteria.

2.3 Interviews

A total of seventeen interviews were conducted. Interviewees were selected based on their knowledge and expertise in the areas relevant to the thesis question. An attempt was made to bring a broad range of backgrounds, perspectives, and values to the research questions. Participants included academics and government policy experts as well as non-government organization leaders and farmers. Several interviewees were selected because of their specific knowledge of the Greenbelt and the issues and concerns of the case study areas. Interviews were arranged by telephone and in almost every case involved face-to-face sessions of approximately one hour at the interviewee's office or home. The interviews were audio recorded, and notes were taken.

All of the interviews followed a set of questions derived from the case study protocol, but remained open-ended and assumed a conversational manner. The interviews started with a series of general questions. Interviewees were asked whether they thought society has a responsibility for compensating farmers for providing ecological services. They were also asked about the types of land use activities ALUS would best be able to support, and who should be able to participate in the ALUS program.

The questions then moved on to the address specific issues associated with farming in Ontario's Greenbelt. A list of challenges associated with farming in the Greenbelt was presented to the interviewees, who were then asked to comment on whether the list included all of the relevant concerns. Interviewees were then asked to comment on the ability of ALUS to promote stewardship and livelihood benefits in the Greenbelt. One question addressed whether lost income from agricultural land taken out of production was a significant barrier to some farmers undertaking stewardship projects of their land.

Another set of questions addressed some of the potential limitations of the ALUS program, including long-term sustainability and funding and how to achieve fairness in rewarding both early and late adopters. Interviewees were asked whether there were means, other than ALUS, for achieving the same goals, and what, if any, advantages these other methods had over ALUS. Finally, there were a series of questions that addressed some of the specific concerns in each case study area.

The interviews were conducted in accord with an approach approved by the Office of Research Ethics and all of the interviewees consented to be identified and cited in this dissertation.

2.4 Data Analysis and Interpretation

In order to test the central propositions put forward in the thesis, I translated the hybrid framework of generic sustainability and case- and context-specific criteria into a set of sustainability questions. The set of questions was designed for application to each of the reasonable alternatives under consideration (Gibson 2006b, 1). The alternatives were identified through a review of current agri-environmental programs, farmland protection tools, and farm support programs available in Ontario. Programs which could possibly provide an alternative to ALUS were described.

The matrix was set up with a series of columns which represent a continuum of anticipated gains and losses. The four identified points along the continuum addressed whether the ALUS program, as applied to selected areas within the Greenbelt, is anticipated to be fully beneficial; whether net benefits are expected but with some negative effects and risks; whether net benefits are not assumed; or whether net losses expected.[5] Using this framework, I assessed the viability of ALUS as compared to the reasonable alternatives available for addressing the problems identified in the research. The comparative evaluation addressed issues such as the cost difference between various options, the range of benefits protected under each option, and which alternative would be easier to administer.

For each question in the evaluation framework an assessment was made for each alternative, based on what the literature, government and NGO documents and stakeholders revealed about the potential contribution of each option under consideration as it applies to each question in the evaluation framework.

2.5 Case Studies

Three case studies were used to illuminate the potential of ALUS as a policy tool for building a sustainable agriculture economy in the Greenbelt. Case study sites were selected based on the following considerations: the support of decision makers within a particular municipality for an ALUS-type program; potential barriers and other limiting factors; community support for the concept; and demonstrated need for this type of program. The case study sites selected were: the Niagara Region, Caledon, and the Holland Marsh. These sites were selected because they also represent the diversity of farming activities and socio-economic conditions on the Greenbelt.

The case study method was chosen because the research problem is related to a specific program, as applied to a specific geographic area. Yin observes that a case study is “an empirical study that investigates a contemporary problem within its real-life context, especially when the

boundaries between phenomenon and context are not clearly evident." He points out that a case study approach is used when a researcher deliberately wants to cover contextual conditions – believing that they might be highly pertinent to his/ her phenomenon of study. This is, in part, what distinguishes case studies from other research strategies (Yin 2003, 13). This is important for two reasons. Gibson has pointed out that while the concept of sustainability is universal, it is also context dependent. All of the generic sustainability criteria (i.e., the "core requirements") are dependent on elaboration and specification in context. There is no common solution. Sustainability requires specification in and for particular places (Gibson 2005, 61). In addition, ALUS is not one specific method that can be applied to all locations, but rather a template or structure for developing local solutions. It will be implemented differently in each location.

2.6 Limitations

The unit of analysis for this research project is the ALUS program as defined by its developers and central proponents, Keystone Agricultural Producers (KAP) and Delta Waterfowl, and as defined by those organizations responsible for field testing the ALUS concept through pilot projects (the Norfolk Federation of Agriculture in the case of Ontario).

The use of the ALUS program as the unit of analysis in this project has some limitations. Yin notes that events or entities such as a program are not easily defined in terms of the beginning or end points of the "case." He notes, for example, that a case study of a specific program may reveal (a) variations in program definition, depending on the perspective of different actors, and (b) program components that preexisted the formal designation of the program. Any case study of such a program, Yin points out, would therefore have to confront these conditions in delineating the units of analysis (Yin 2003, 23). This limitation is particularly true for ALUS which is still being developed as a program. Although the broad goals and values of ALUS have been clearly defined, many of the details about how the program would be implemented and evaluated are still being worked out. The issue of "variations in program definition" is relevant, as there are a variety of ways that ALUS can be implemented. The second issue which Yin raises is also relevant. ALUS is designed to work with existing programs that began before the ALUS concept was developed. These limitations were taken into consideration when defining the ALUS program for evaluation and comparison purposes.

[5] The evaluation matrix was initially designed by Erin Windibank.

2.7 Reliability, Validity and Generalizability

Yin (2003) notes that case study design should include tactics to ensure construct validity, external validity and reliability. Construct validity – establishing correct operational measures for the concepts being studied – can be ensured through the use of multiple sources of evidence, establishing a chain of evidence, and having key informants review a draft of the case study report. All three of these tactics were used in this study to ensure construct validity. Multiple data sources included academic literature, government and non-government organization documents, and interviews with key stakeholders.

External validity, establishing the domain to which a study's findings can be generalized, can be ensured through the use of theory in single-case studies. Yin points out that case study designs rely on analytical generalization (as opposed to statistical generalization) where the goal is to generalize a particular set of results to some broader theory.

Reliability, demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results, can be ensured through the use of case study protocol and the development of a case study database. Both of these tactics were used in this study to increase the reliability of the findings (Yin 2003).

Auerbach and Silverstein argue that in qualitative research, subjectivity, interpretation and context are inevitably woven into every research project. They recommend standards of evaluating research that are consistent with the qualitative research paradigm. In place of the quantitative concepts of reliability and validity, they suggest the qualitative concept of *justifiability of interpretations*. In place of the qualitative concept of generalizability (or external validity) they suggest the qualitative concept of *transferability of theoretical constructs* (Auerbach and Silverstein 2003, 78).

Auerbach and Silverstein suggest *transparency*, *communicability* and *coherence* as criteria for distinguishing between justifiable and unjustifiable ways of using subjectivity to interpret data. For a researcher's data analysis to be justifiable, it must be *transparent*. This means that other researchers can know the steps by which you arrived at your interpretation. For data analysis to be justifiable it must also be *communicable.* This means that the researcher's themes and constructs can be understood by, and make sense to, other researchers, and to the research participants themselves. For an analysis to be justifiable, it must be *coherent*. This means that the researcher's theoretical constructs must fit together and tell a coherent story. The story they tell should help to organize the data. The data analysis procedures they use should help them produce coherent ideas by developing constructs that fit into an organized theoretical narrative.

Auerbach and Silverstein also argue that quantitative methodology should be used to build theories applicable to cases other than the particular sample on which they were developed. The question is how to balance the two requirements of simultaneously extending beyond your sample and respecting diversity. These two requirements are not incompatible, the authors argue, because two levels of grounded theory analysis do different things. The more abstract level of theoretical constructs extends beyond the sample, whereas themes and repeating ideas are context specific. It is possible for theory developed within a qualitative design to extend beyond a specific sample and also be context specific. They use the term *transferable* to describe theoretical constructs that can be extended beyond a particular sample and yet respect diversity. The theoretical constructs that researchers develop in grounded theory are transferable in that they can expect the more abstract patterns that they describe to be found in different cases. The specific content of those patterns, in contrast, will depend on the specific case being studied (Auerbach and Silverstein 2003, 87).

It is anticipated that the incorporation of Yin's case study tactics into the research design, data collection and composition stages of the thesis will help to address the issues of transparency, communicability, coherence and transferability of the study results. These issues will also be discussed as part of my conclusions (Chapter Ten).

2.8 Summary

The present study uses a literature review, a review of government and non-government organization documents, interviews with key stakeholders and three case studies to collect data. An evaluation framework was created in order to assess the viability of ALUS, as well as alternative programs and tools, for Ontario's Greenbelt. The evaluation framework was created by merging generic sustainability criteria and case-and context-specific sustainability issues. The hybrid framework was translated into a set of sustainability questions and these questions were presented in a simple evaluation matrix. The matrix was used to asses each alternative under consideration. Although some limitations in the study methodology were acknowledged, the use of case study tactics (such as the use of multiple data sources) helped to ensure construct validity, external validity and reliability.

Chapter 3 **Literature Review**

3.1 Introduction to Literature Review

In order to assess the potential value of ALUS as a tool for promoting a sustainable agricultural economy in Ontario's Greenbelt, it is important to have a general understanding of the concept of sustainability. How sustainability has been defined in the literature and the issues that have been important with respect to its application will be discussed. While it is hoped that ALUS will help to fulfill a number of the requirements for progress towards sustainability, it holds particular promise with respect to two of these requirements: enhancement of socio-ecological integrity and livelihood sufficiency and opportunity.

Providing remuneration for the provision and protection of ecological goods and services (EG&S) is one example of an initiative that links livelihoods and land stewardship. A review of the general literature which explores the valuation of, and payment for, EG&S will be followed by a review of how the concept has been discussed and applied in agriculture.

A related body of literature that informs the present research is that which explores food systems. The literature which discusses the limitations of the current industrial food system will be reviewed in order to establish the extent to which the current system is or is not contributing to sustainability. A review of the literature which discusses sustainable agriculture as an alternative to the conventional model will assist in defining the goals to be pursued in Ontario's Greenbelt. Finally, the literature which discusses the challenges and opportunities associated with sustainable agriculture in peri-urban areas will be reviewed.

Literature Review Part I – Sustainability and Ecological Goods and Services

3.2. Sustainability

The need for humanity to live equitably within the means of nature is the underlying message of most definitions of sustainable development. In its 1987 report *Our Common Future,* the Brundtland Commission defined sustainable development as "development that meets the needs of the future, without compromising the ability of future generations to meet their own needs (WCED 1987, 43). The Commission recognized that the conventional economic imperative to maximize economic production must be constrained, or augmented, by both the ecological imperative to protect the ecosphere and a social imperative to minimize human suffering today and in the future. For the first time, environment and equity became explicit factors in the development equation. As Wackernagel and Rees observe, "sustainable development therefore

depends both on reducing ecological destruction (mainly by limiting material and energy throughput of the human economy) and on improving the material quality of the world's poor (by freeing up the ecological space needed for further growth in developing countries and ensuring that the benefits flow where they are most needed" (Wackernagel and Rees 1996, 32).

3.3 Requirements for Progress Towards Sustainability

Gibson notes that the essential requirements for progress towards sustainability can and have been set out in countless different ways. Any such list, he argues, is debatable and there will always be openings for learning and revision. Nevertheless, he observes, it is not difficult to discern a limited number of common themes and broadly accepted general propositions (Gibson 2005, 95).

Gibson has proposed a set of eight sustainability criteria. These eight criteria "constitute a minimal set of core requirements, all of which would have to be elaborated on and specified for particular places and applications." These requirements are: 1) socio-ecological system integrity; 2) livelihood sufficiency and opportunity; 3) intragenerational equity; 4) intergenerational equity; 5) resource maintenance and efficiency; 6) socio-ecological civility and democratic governance; 7) precaution and adaptation; 8) intermediate and long-term integration (Gibson 2005, 95). These criteria are described in detail in chapter six of this thesis.

Although it is hoped that the ALUS program would help to meet a number of the requirements for progress towards sustainability, the initiative holds particular promise in helping to fulfill two of these requirements; socio-ecological system integrity, and livelihood sufficiency and opportunity. An understanding of these two requirements is therefore essential in evaluating the effectiveness of ALUS for the Greenbelt.

3.4 Socio-Ecological System Integrity

Socio-ecological system integrity requires that we "[b]uild human-ecological relations that establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which humans as well as ecological well-being depends" (Gibson 2005, 95).

This requirement recognizes that human well-being is utterly dependent on the integrity of biophysical systems. We rely on the key life support functions of these ecosystems and on the resources and conditions that these systems maintain. At the same time, we are active participants in the world's biophysical systems. One consequence is that we must establish and maintain

socio-ecological systems that can provide a viable context for human life over the long term (Gibson 2005, 95).

The focus on maintaining *systems* reflects the growing understanding emerging from many fields, that we live in a world of enormous complexity, of conditions and components and of relationships. Complex systems are characterized by feedback loops, self-organization and unpredictability. Their behaviour cannot be predicted simply by studying each of the entities that make them up; the whole is something more than the sum of its parts. They are *open* systems in the sense that they overlap with neighbouring systems, and there is no straightforward, objective way to demarcate the boundaries of any particular socio-ecological system. They exist within nested hierarchies of different scales and different types, and events at one scale influence systems at other scales (Robinson et al. 2006, 14).

A systems perspective has important implications for how we manage both social and ecological systems. For sustainability, the objective is not to prevent system change but to organize and manage our activities so that the changes we influence still preserve the system conditions and services upon which we rely. That means preserving the "integrity" of systems (Gibson 2005, 96). For an ecosystem, integrity entails ecosystem health, the ability to maintain normal operations under normal environmental conditions. It also means being able to cope with changes (which can be catastrophic) in environmental conditions; that is, it must be able to cope with stress. As well, an ecosystem which has integrity must be able to continue to evolve, develop and proceed with the birth growth, death, and renewal cycle (Kay and Schneider 1994, 37).

In this context, the role of practitioners and policy makers becomes one of fostering resilience and adaptive capacity so that ecosystems and people are prepared for change.
This includes reducing stresses that threaten to force catastrophic shifts, and by fostering systems' capacity to adjust, reorganize and renew in ways that retain key life support functions. It can also entail working to preserve diversity and redundancy as part of systems' requirements for self-organization (Gibson 2005, 97; Robinson et al. 2006, 17).

3.5 Livelihood Sufficiency and Opportunity

A second criterion that is particularly important for the evaluation of ALUS is the criterion of livelihood sufficiency and opportunity. This requirement is to "[e]nsure that everyone and every community has enough for a decent life and opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity." It remains clear, Gibson writes, that socio-ecological systems cannot be built and maintained when many people lack access to basic resources and essential services, have few if any satisfactory

employment opportunities, are especially vulnerable to disease, and face physical environmental or economic insecurity (Gibson 2005, 98).

The primary means for ensuring material improvement have been through the enhancement of livelihoods. Singh and Wanmali note that livelihoods connote the means, activities, entitlements and assets by which people make a living. Assets, in this context, are defined as not only natural/biological (i.e., land, water, common-property resources, flora, fauna), but also social and political (i.e., community, family, social networks, participation, empowerment, human (i.e., knowledge, creation by skills), and physical (i.e., roads, markets, clinics, schools, bridges) (Singh and Wanmali 1998, 1). Chambers and Conway note that a livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access (Chambers and Conway 1991, 1).

Chambers and Conway argue that issues of capability, equity and sustainability are key to understanding livelihoods. Capability refers to being able to perform basic functions, to what a person is capable of doing and being. It includes, for example, to be adequately nourished, to be comfortably clothed, to avoid escapable morbidity and preventable mortality. There is a subset of livelihood capabilities that includes being able to cope with stresses and shocks, and being able to find and make use of livelihoods opportunities (Chambers and Conway 1991, 4).[6]

By equity Chambers and Conway refer to "a less unequal distribution of assets, capabilities and opportunities and especially enhancement of those most deprived" (Chambers and Conway 1991, 4). Sustainability requires social equity at least to the extent that promotion of livelihood opportunities for one group should not foreclose options for other groups, either now or in the future. Gibson, for example, points out that in wealthy contexts, the sufficiency and opportunity requirement demands a decoupling of well-being from material growth (Gibson 2005, 100).

The sustainability of livelihoods has two dimensions: biophysical and social. The sustainability requirement for ecological integrity means ensuring that livelihood activities must not irreversibly degrade natural resources within a given ecosystem. Most conventional thinking equates sustainability with preservation or enhancement of the productive resource base, particularly for future generations. This can be separated into two levels. The first level is local.

[6] An example of an initiative that has addressed this issue of capability and opportunity is the movement for Basic Income (BI), or Guaranteed Annual Income (GAI). Lerner notes that "implemented in a society that supports access for all to adequate food, shelter, medical care and education, a BI is an income sufficient to live on and participate in society, unconditionally granted to all citizens on an individual basis" (Lerner and Clark 2000, 32). The BI concept has been elaborated by Walter (1989) and Lerner et al. (1999).

The question here is whether livelihood activities maintain and enhance, or deplete or degrade, the local natural resource base. On the positive side, livelihood activities can improve productivity of renewable resources like air and river water, soil, organic soil fertility, and trees. The second level is global. The question here is whether, environmentally, livelihood activities can make a net positive or negative contribution to the long-term environmental sustainability of other livelihoods. This is the focus on pollution, greenhouse gases and global warming, the ozone layer (Chambers and Conway 1991, 1).

For equity, the biophysical sustainability of livelihoods has to be complemented by the social sustainability of livelihoods. Social sustainability refers to whether all human units (individual, household or family) can gain and maintain adequate and decent livelihoods. This has two dimensions, one negative and one positive. The negative dimension is reactive, coping with stress and shocks; and the positive dimension is proactive, enhancing and exercising capabilities in adapting to, exploiting and creating change, and in assuring continuity (Chambers and Conway 1991, 10).

In summary, it can be argued that the sustainability of livelihoods is a function of how assets and capabilities are utilized, maintained and enhanced as to preserve livelihoods (Chambers and Conway 1991, 9). Sustainable livelihoods is the capability of people to make a living and improve their quality of life without jeopardizing the livelihood options of others, either now or in the future (Singh and Wanmali 1998, 2).

Although initially elaborated with developing countries in mind, the concept of sustainable livelihoods has also been applied in countries such as Canada. A good example of how the concept is being applied to a Canadian context is the Livelihoods and Ecosystems Project at the University of Guelph. Researchers at the University of Guelph, with the support of the Canadian International Development Agency and assistance from other partners, is in the process of carrying out a project entitled *Building Institutional Capacity for Sustainable Rural Development: Tools from Best Practice and Analytical Thinking*. The project has included a series of workshops on Sustainable Livelihoods and Ecosystem Health approaches and a number of policy discussions on current and future development issues. Some of these policy discussions analyzed how to deal with complexity in rural development and agriculture (Robinson et al. 2006; Connell 2006; Venema 2006; Robinson and Venema 2006)

The Livelihoods and Ecosystem Project is particularly significant in the context of this thesis, in that it seeks to explore the linkages between these two issues and to find solutions that enhance both aspects in mutually beneficial ways. Other attempts to link sustainability and livelihoods

include ecotourism (Tsaur et. al. 2005; Ceballos-Lascurian 1996), fair trade (Goodwin 2004), and the movement for work-time reduction (Hayden 1999).

3.6 Ecological Goods and Services

A fairly recent set of initiatives that have the potential to provide mutually reinforcing benefits in the areas of environmental stewardship and livelihoods are those which offer payments for the provision and maintenance of environmental goods and services (EG&S). I will provide a brief review of literature which discusses valuation and payment for EG&S before looking at the application of this concept agriculture, and ALUS as a specific example.

While explicit recognition of ecosystem services is a relatively new phenomenon, the notion that natural ecosystems help to support society can be traced to ancient times. Although the term "ecosystem services" was first used in the late 1960s, it in is only within the last decade that the concept has gained hold in the broader research, policy and natural resource management community (Whitten et. al 2003, 2). A brief history of the ecological and goods and services concept is provided by Mooney and Ehrlich (1997).[7]

Daily notes that ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. Biophysical systems with ecological integrity maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. In addition to the production of goods, ecosystem services are the actual life-support functions, such as cleansing, recycling, and renewal, and they confer many intangible aesthetic and cultural benefits as well (Daily 1997b, 3).

Costanza et al. note that ecosystem functions refer variously to the habitat, biological or system properties or processes of ecosystems. Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions (Costanza et al. 1999, 253).[8]

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[7] Although "goods," "services," and "cultural services" are often treated separately for ease of understanding, some research and authors consider all of these benefits together as "ecosystem services" because it is sometimes difficult to determine whether a benefit provided is an ecosystem "good" or "service." Also, when people refer to "ecosystem goods and services," cultural values and other intangible benefits are sometimes forgotten (MEA, 2003, p.56). Ecological goods and services are also sometimes referred to as "public services of the global ecosystem" and "nature's services" (Mooney and Ehrlich, 1997, p.15).

[8] The definition of EG&S provided by Costanza et al. raises the question of whether only human benefits can be counted in EG&S. One the one hand, Whitten et al. note that while the anthropocentric nature of ecosystem services may seem arrogant, it is this explicit emphasis on benefits to humans that helps to

Some examples of ecosystem services that come from nature can be found in Appendix A.[9]

3.7 The Value and State of Ecosystem Services

There is a growing recognition that EG&S are vital to our economic development and social well-being. Costanza et al. estimate that ecosystems provide at least US$33 trillion worth of services annually, which they note is 1.8 times the current global GNP (Costanza et al. 1997).[10] Moreover, as The Millennium Ecosystem Assessment (MEA) indicates, consumption of EG&S will continue to grow as a consequence of a likely three to six-fold increase in global GDP by 2050, even while global population is expected to grow more slowly and level off in mid-century (MEA 2005a).

Ecosystem services operate in intricate and little-explored ways that would be very difficult to substitute for using technology (Daily 1997, 369). Costanza et al. suggest that one way to look at this comparison is that if one were to try to replace the services of ecosystems at the current margin, one would need to increase global GNP by at least $33 trillion, party to cover services already captured in existing GNP and party to cover services that are not currently captured in GNP. "This impossible task," the authors note, "would not lead to an increase in human welfare because we would only be replacing existing services, and it ignores the fact that many ecosystem services are literally irreplaceable" (Costanza et al. 1997, 259). Given the fact that technological substitutes for ecological services will be difficult to find, the marginal value of these services will almost certainly only go up as their supply dwindles (Daily 1997, 369).

Despite their obvious importance to our economic and social well-being, ecosystem services have largely been ignored in both domestic and international law and policy. Environmental laws such as pollution laws and conservation laws do not protect EG&S, even if some parts of these

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identify their importance in a policy context (Whitten et al. 2003, 3). On the other hand, a systems-based definition of ecosystem services might more accurately reflect current scientific understanding.

[9] To aid in the identification and management of an optimal ecosystem, ecosystem services have been classified in a number of ways, including by: (1) Functional groupings, such as regulation, carrier, habitat, production, and information services, (2) Organizational groupings such as services that are associated with certain species, that regulate some exogenous input, or that are related to the organization of biotic entities and (3) Descriptive groupings, such as renewable resource goods, nonrenewable resource goods, physical structure services, biotic services, biogeochemical services, information services, and social and cultural services. The Millennium Ecosystem Assessment classifies ecosystem services along functional lines, using categories of provisioning, regulating, cultural, and supporting services (MEA 2003, 56).

[10] It is important to recognize that the valuation of nature remains controversial. Some researchers have questioned whether meaningful benefit estimates can be made for environmental services and, if made, whether the estimates are acceptable guides to making environmental policy (see, for example, Shabman and Stephenson 2000; Knetsch 1994; Grove-White 1997). Ackerman and Heinzerling (2004) have more generally criticized the role of economic analysis and theory as it has been applied to environmental policy, noting that human life, health, the natural world, and the well-being of future generations are "priceless" – not infinite in value, but fundamentally incommensurable with money.

laws do conserve ecosystem services.[11] Whitten et al. note that these laws were not primarily intended to provide legal standards for conservation of natural capital and the services that flow from it and, in practice, they usually do not (Whitten et al. 2003, 4).[12]

The main reason why so little political attention has been paid to conservation and protection of ecosystem services is that the value of natural capital is unrecognized by most people. Many of the services provided by natural systems are taken for granted. Even when recognized, ecosystem services tend to be ignored by policy makers because historically they could be. They have been "free." Markets explicitly value and place dollar figures on ecosystem goods (such as timber) that are perceived as important and limited in supply. Yet the services underpinning the production of these goods (such as soil maintenance and nutrient recycling) almost without exception have no market value – because there is no market to capture and express their value directly. Until fairly recently, they were so abundant relative to human demands that such markets were not needed. As a result, no effective price mechanisms exist to signal scarcity or deterioration of most ecosystem services. In economic terms, they are classic public goods. Their use cannot be exclusively controlled (Whitten et al. 2003, 4-5).

Because they are not recognized adequately in economic markets, government policies or land management practices, ecosystems and the services they provide are in decline. The Millennium Ecosystem Assessment (MEA) has recently reported worldwide declines in nearly two-thirds of the services provided to humankind (MEA 2005b, 5). Constanza et al. argue that "[w]e must begin to give the natural capital stock that produces these services adequate weight in the decision-making process, otherwise current and continued future human welfare may drastically suffer" (Costanza et al. 1977, 259). Daily argues that "safeguarding ecosystem services represents one of the wisest economic investments society could make" (Daily 1997, 369).

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[11] For example, pollution laws generally rely on human health-based standards (focusing on pollutant levels in air or water). Conservation laws are either species-specific or must accommodate multiple and conflicting resource uses. Part of these laws, such as restrictions on clearing native vegetation, can conserve ecosystem services (Whitten et al. 2003, 4).

[12] While some governments do pay attention to many services provided by ecosystems, it is usually through built structures rather than managed landscapes. For example, local officials have historically built dikes and levees to minimize flood damage rather than provide the same service through protecting or restoring wetlands. Water suppliers have generally built purification plants rather than conserve and restore forested watersheds. In some cases, built provision of services will provide a preferable delivery strategy, providing greater social benefits at a lower cost than investing in natural capital. In other instances, the net value of the joint products yielded by ecosystems will exceed that of built structures. Local state and national governments rarely consider ecosystems as valuable providers of services. Without explicit comparisons between natural and built provision of services, Whitten et al. note, we will continue to miss opportunities where reliance on natural capital provides the lowest cost services for human welfare (Whitten et al. 2003, 4-5).

3.8 Protecting Ecosystem Services: Economic Versus Regulatory Tools

How can ecosystem services be protected and their outputs maximized, given that markets typically do not protect them? Murtough et al. note that, in theory, problems arising from the absence of markets can be remedied by government intervention. This intervention can take the form of regulation, and/or market-based approaches. Regulation typically involves command-and-control measures, prescribing actions that must or must not be undertaken (i.e., restrictions, regulations). Market-based approaches change financial incentives in favour of the supply of ecosystem services. This involves the use of taxes, subsidies, or market-creation (Murtough et al. 2002, 4).

Various authors have argued for the use of market-based approaches over regulation in agricultural applications. McCallum argues that incentive-based approaches have more chance of success than those using command-and-control measures. With respect to their use in agriculture, she points out that the imposition of mandatory measures by statute or coercion though disincentives or mandatory cross-compliance has not been popular among farmers and are not a strong feature of Ontario programs. In addition, if we are looking at payment for environmental services from a livelihood point of view, laws would hinder this aspect of it (McCallum 2002, 39). In discussing an ecological goods and services model for agriculture, Gerowitt et al. have argued that methods influencing actions indirectly, such as information, appeals or financial incentives, have more advantages than the methods controlling actions directly. They are not based on constraints, and therefore they guarantee the power of decision to the individuals. The possibility for making individual decisions can be utilized to make nature conservation measures as inexpensive as possible and to search for new resource-preserving uses of nature. The direct control does not offer any incentive for reducing costs. Restrictions and regulations usually affect the actions only at a specific threshold level. In contrast, the indirect methods can influence resource use from the beginning. Therefore, the authors argue, opportunities for influencing behaviour through economic measures should be preferred for guiding farmers' decisions on environmental effects (Gerowitt et. al. 2003a, 543).

Heal argues that while natural systems have non-economic value and economic value, economic values are probably easier to communicate and agree on than the other aspects of value. He notes that it is notoriously difficult to reconcile differences in the sphere of non-economic value. In contrast, there is a good chance of reaching agreement on maters of economic importance or value. Through incentive programs people choose environmentally conservative strategies because these options are in their economic self-interest. "The prices they face fully reflect the social costs of their actions, and they are naturally lead by the invisible hand to make

conservation choices" (Heal 2000, 129). Heal believes that economic incentives are more appealing and most likely to be applied on a large scale. A widespread use of the regulatory approach, he notes, would almost certainly generate a strong political backlash. Relying on people to do the right thing has not worked in the past, and there are no reasons to expect this to change in the future. In contrast, economic incentives have worked in the great majority of areas where they have been applied (Heal 2000, 130).

It is important to note that these points about economic versus regulatory tools are put forward in the context of their application to farming. Farmers generally are already under considerable economic stress, and often cannot afford to comply with regulatory requirements that entail new expenditures. Because of these economic constraints, governments are not in the position to regulate the farming sector as they would other sectors. The need for a more proactive and collaborate approach to regulation is one of the rationales for providing payments to farmers for delivery of ecosystem services.

3.9 Creating Markets for Ecosystem Services

Murtough et al. note that ecosystem services affect the wellbeing of individuals and the performance of firms. Yet this is rarely reflected in the financial incentives that parties face. The benefits of ecosystem goods and services from farmlands are roughly divisible into a portion enjoyed by the farmland owner/occupier, and a portion enjoyed by the larger public. Typically, those who supply ecosystem services are not rewarded for all the benefits they provide to others, and those who reduce ecosystem services do not bear all of the costs they impose on others. This is because markets rarely exist for ecosystem services (in broad terms, a market is any context in which the sale and purchase of an item takes place). As a result, allowing parties to act in their own private interest can result in fewer ecosystem services than is optimal for society as a whole (Murtough et al. 2002, 3).

The tools that make use of market-based approaches are varied and range from simple coercion (taxes) to ongoing remuneration for EG&S by their sale on a market such as the one for offset credits[13] (PQ 2005, 15). These mechanisms could be used to promote the production, sale and purchase of EG&S, or minimize environmentally damaging effects, with minimum government intervention. Murtough et al. note that market creation schemes can be divided into four categories based on whether the relevant property right is *tradeable* and if it involves an *offset arrangement* (Murtough et al. 2002, 7).

[13] As with carbon offsets, some EG&S are bought and sold through international brokers, online retailers, and trading platforms.

Murtough et al. define market creation as "government intervention to form markets for ecosystem services that are nonexcludable in consumption."[14] Such intervention involves the definition of a new *property right* that is both linked to an ecosystem service and can be exchanged for reward. A property right is an entitlement to use a particular good or service in a certain way. For example, a property right could be established over the carbon sequestered in forest plantations. Use of this right is not an ecosystem service in itself. However, it could be a proxy for climate stabilization services, since the process of sequestering carbon may mitigate the greenhouse effect (Murtough et al. 2002, 6).

Murtough et al. and Whitten et al. (2003) have examined some of the issues associated with creating markets for ecosystem services. These issues include definition and measurement of ecosystem services and development of institutions and mechanisms to facilitate trade and integration of these instruments into the broader natural resource management agenda and toolbox. Murtough et al. have explored how well environmental problems related to salinity, biodiversity and climate change in Australia can be addressed by creating markets for ecosystem services. Whitten et al. examine these issues with respect to pilot markets for ecosystem services in three case study catchments in Australia. Their research is conducted as part of the Ecosystem Services Project.[15]

3.10 Payments for Environmental Services

Robinson and Venema note that while there is a substantial and growing body of literature around valuing ecosystem services, much of it does not focus on direct payments to landowners or other stakeholders, but rather on economic valuation as a means of incorporating environmental values into national accounts and into decision-making mechanisms, such as cost-benefit analysis, used by various levels of government. Nevertheless, the authors report, in recent years there has been a growing body of practical experience not simply with valuing ecosystem services for incorporation into cost-benefit analysis, but with making direct payments to communities and landowners in exchange for particular land management practices and the ecosystem services that these practices provide (Robinson and Venema 2006, 1-2).

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[14] This means that it is hard to prevent parties who do not pay for an ecosystem service from benefiting from it. For example, it is hard to exclude people from enjoying a stable climate (Murtough et al. 2002, 4).

[15] The Ecosystem Services Project was instigated in 1999 by the Commonwealth Scientific and Industrial Research Organization (CSIRO). The project aims to increase awareness and understanding of ecosystem services amongst decision makers and society in general; explore the economic and other values of ecosystem services in natural resource management; and investigate possible mechanisms and new institutional arrangements that better recognize, use and protect ecosystem services.

Examples of systematic ongoing Payment for Environmental Services (PES) policies and programs include the following:

- in the United States, the Conservation Reserve Program, Water Quality Incentive Projects and the Wetlands Reserve Program.
- in Costa Rica, the National Forestry Financing Fund
- in Guyana, Conservation International's program of purchasing conservation concessions; and
- in Kenya, the Kitengla Lease Program, which pays landowners to allow wildlife to use their land as corridors (Robinson and Venema 2006, 3).

Mayrand and Paquin (2004) have conducted a survey of PES schemes with an analysis of the main differences and similarities among PES models as well as their strengths and limitations. They have also identified conditions for the success of PES schemes and highlight some of the initial lessons and emerging best practices.

Wunder (2005) has provided an overview of the general issues associated with payment for environmental services schemes. He looks at the advantages of PES schemes over other types of programs, such as Integrated Conservation and Development Projects,[16] as a way of promoting sustainable development in developing countries. He also examines challenges associated with PES schemes, such as the high ongoing costs, the need to build social capital or trust, and high transaction costs. He addresses issues such as how to evaluate PES efficiency, which land-use scenarios to use PES for, whom to pay, how to pay, and the tradeoff between efficiency and fairness. He also discusses where PES programs would be most effective and where other schemes would be more appropriate.

3.11 Valuation vs. Incentives

As noted previously, assigning economic values to natural systems remains controversial. One of the debates within EG&S research is whether to assign economic value to environmental goods and services or merely provide incentives to ensure their protection. Heal has argued that rather than valuation (i.e., assigning an economic value or benefit to natural areas), providing incentives is key to conservation. He notes that "[v]aluation is neither necessary nor sufficient for conservation. We conserve much of which we do not place economic value, and we do not conserve much that we value economically." What, then, he asks, is the economic prerequisite for

[16] Integrated Conservation and Development Projects are projects that link biodiversity conservation in protected areas with local socio-economic development. This means that local people living in or near

conservation? He suggests that it lies in incentives. "To conserve systems," he writes, "we must give their owners incentives to conserve them. We must make conservation more attractive than any other use. To achieve this, we must translate some of the social importance of ecosystem services into income and ensure that this income accrues to the owners of the ecosystems as a reward for their conservation" (Heal 2000, 125).

Many of the programs which provide payments to farmers for environmental services, use incentives to protect those services rather than creating markets based on their true economic value. The payments in the ALUS program, for example, are currently based on lost opportunity costs which are calculated on a per acre basis for land taken out of production. There is a debate among the proponents of ALUS-type programs about whether it is necessary to merely provide incentives, such as this, or whether the payments provided should be based on the true economic value of the services protected. This issue will be discussed in Chapter Nine of this thesis.

3.12 Rewards for Ecological Goods and Services in Agriculture

Any farming activity is based on the use of abiotic and biotic resources, and thereby, affects the environment. Intensive farming has been shown to exploit and disturb natural resources and has had adverse effects on the environment, e.g. through the pollution of ground and surface water, or of the atmosphere, by nitrogenous compounds or pesticides. However, apart from being dependent on natural resources, agriculture also creates resources. Gerowitt et al., for example, have pointed out that agricultural land use has produced and sustained a major part of the biodiversity found in Central European landscapes. In addition, agricultural land use can facilitate the regeneration of clean ground water resources that are used for society's drinking water supply (Gerowitt et al. 2003a, 542).

As is the case with EG&S in general, the production of EG&S is not valued by the agri-food market. Producers have more incentives to increase their production of agricultural commodities, while EG&S outputs are quite often lower than desired (PQ 2005, 13).

Agriculture Québec (PQ 2005) and Gerowitt et al. (2003a) have discussed the various approaches used to maximize the EG&S outputs in agriculture including regulatory measures, cross-compliance, education-based voluntary approaches, environmental marketing, one-time direct payments, and marked-based approaches. Both have argued that the best approach to aid in the provision of EG&S is through programs that provide ongoing direct payments. Agriculture Québec examines the provision of ecosystem services in agriculture from the perspective of

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protected areas are given alternative sources of livelihood that reduce the pressures on protected areas resources (Wells and Brandon 1992).

multifunctionality. According to Agriculture Québec, ongoing direct payments are the main vehicle for promoting multifunctionality and enhancing the value of the various products of agriculture, whether economic, social or environmental: "Ongoing direct payments associated with multifunctionality result in the production of goods and services other than agricultural commodities becoming a source of ongoing income to farmers" (PQ 2005, 15).

For agri-environmental programs specifically, Agriculture Québec uses the following definition: "agri-environmental programs using ongoing direct payments integrate the environmental function as a source of ongoing income for farmers." Programs using the multifunctional approach usually are voluntary The provide ongoing support for functions other than agricultural production, target the medium or long term, involve a contract between the farmer and agency, and are offered on a geographic basis rather than by specific production chain (PQ 2005, 15-16). An important part of this definition is that EG&S payments are distinguished from the regulatory, cross-compliance, voluntary and one-time direct payment approaches in that they provide ongoing income (PQ 2005, 19).

Gerowitt et al. (2003a) have explored how a reward system for EG&S in agriculture can be developed. They propose a model or framework for a market for EG&S in agriculture which covers issues such as catalogue of ecological goods, demand for ecological goods, supply of ecological goods and adjusting and administrating supply and demand. Gerowitt et al (2003b) examine the possible contribution of agricultural land use to the conservation of biodiversity, and more specifically to plant biodiversity, as a factor in EG&S reward systems.

Agriculture Québec and Gerowitt et al. outline a number of important issues to be considered in developing a remuneration for EG&S system, including the purpose of remuneration – that is, whether the program rewards actions or results, remuneration methods, EG&S pricing, and funding remuneration systems (PQ 2005, 20-22; Gerowitt et al. 2003a).

3.13 Direct Payments in Canada

In Canada, few programs or mechanisms exist for providing compensation for the provision of EG&S. Efforts are focused instead on providing direct payments to encourage farmers to implement agri-environmental management plans, adopt environmentally beneficial practices and acquire the appropriate facilities and infrastructures. Agriculture Québec (2005) provides an overview of Canadian programs that are roughly similar to remuneration for EG&S. These include the federal Greencover Canada program, Manitoba's Riparian Tax Credit Program and Ducks Unlimited Canada's conservation programs.

One of the main objectives of the Greencover Canada program is to remove environmentally sensitive land from production and it is implemented mainly on the Prairies. Remuneration is divided into two payments. The first covers the costs of converting to permanent cover, while the second serves as an incentive for the participant to comply with the ten-year conservation contract. The Greencover program can be considered a rudimentary attempt at remuneration for EG&S since it is implanted in the form of a long-term contract; it compensates the farmer for land use other than crop production and the payments may sometimes exceed the initial costs incurred. The program also has components for managing agricultural land near water (riparian strips) shelterbelts and the evaluation of beneficial management practices in specified watersheds (PQ 2005, 41).

The Ontario Conservation Authorities also have a number of support programs**.** The Grand River Conservation Authority's Rural Water Quality Program implements ongoing direct payment mechanisms at a local scale. In a measure to provide remuneration for EG&S, the program compensates farmers for land set aside for stream buffer strips, cover crops, shelterbelts, shelterbelts, environmentally friendly cropping practices or simply the retirement of fragile agricultural land**.** The Clean Water Program in the South Nation River watershed between Ottawa and Cornwall manages a similar program also on a watershed scale. What makes this program special is that it experiments with tradable-rights and offset credits for nutrients. New polluting firms or municipalities that must comply with a maximum daily load can buy discharge credits from the South Nation Conservation Authority, which will provide an increase in the allowable phosphorus load certified by the Ministry of the Environment. Revenue from the discharge credit purchases is used to support farm stewardship activities. The organization is mandated to fund good farming practices in order to reduce the phosphorus load elsewhere in the watershed. The City of Ottawa, through its Rural Clean Water Program, is also engaged in providing remuneration for ecological services (PQ 2005, 43).

Literature Review Part II - Food Systems

3.14 Introduction

It has been argued by sustainable agriculture advocates, including farmers, activists, and food system critics, that modern industrial agriculture is unsustainable by the definition of sustainability put forward in chapter three of this thesis. In this chapter I will examine the degree to which industrial agriculture is unsustainable as it is currently practiced, examine systems of sustainable agriculture that have been put forward as alternatives to the current system, and

explore the unique challenges and opportunities associated with sustainable agriculture in peri-urban areas. The purpose of this review is to assist in the development of a set of criteria and a framework for a sustainable agricultural economy in Ontario's Greenbelt

3.15 The Internationalized Ago-Industrial Food Economy

The decline of traditional farming and the rise of agro-industrial activities to an economically dominant role is a phenomenon that has occurred largely since the Second World War (Winson,1992). Around this time, the transition from animals to tractors as a source of power was completed and hybrid seeds, fertilizer, and chemicals were introduced to making farming more efficient. These changes demanded larger capital investments, and, in turn, pressure to apply these new technologies to larger farms to use them as efficiently as possible. Grey observes that productivity did rise as a result of these changes, but the upward pressure on the size of farms and the amount of capital required to run a complete operation led to a decline in the number of family farms. (Grey 2000, 144).

The new emphasis on capital-intensive farming and efficient production that emerged during World War II laid the groundwork for the global, industrialized food economy we experience today. As this structural transformation continued and became deeply rooted in agricultural production, Grey argues, the very nature of how a farm was defined changed. The traditional diversified, family-centred operation was replaced by a model where agriculture took on characteristics of other industries, with a shift from “farming” to “food manufacturing”(Grey 2000, 144-145).

The push for economic efficiency and development of agriculture along capitalist lines deemphasized diverse productivity and emphasized specialization. Control of the food system shifted from independent farm owners to nonfarm firms. As a result, decisions about what to produce and how to produce it became centralized among agribusinesses. At the same time, agribusiness became global enterprise. As control of food production shifted from farmers to corporations, transnational or multinational food corporations expanded and sought control of production in the United States and abroad (Grey 2000, 145).

Winson (1992) has described how this transformation occurred in Canada, using a historic and holistic approach to the study of food systems. He describes the efforts of primary producers to establish social solidarity and their struggles to take back control of their economic affairs. He also examines the forces that have accounted for the food system’s substantial shift in power away from the producers towards capitalist agribusiness corporations. He uses the term *internationalized agro-industrial food economy* to describe the current food system. This term

was introduced by agricultural historian Louis Malassis who identified four phases in the historical food economy.[17] Winson notes that "[i]t is only in the fourth state that we see the maturation of what is a thoroughly capitalist food system in all respects except that of agricultural production. The sphere of production remains predominantly in the hands of increasingly capitalized, but not capitalist family units of production (Winson 1992, 109). This phase of the historical food economy is characterized by the concentration and centralization of capital and the multinationalization of food enterprises.

Lyson has outlined the dimensions of the dominant commodity-focused and market-based approach to agricultural development. Conventional agriculture, he argues, is based on neoclassic economics as its social theory. Its operational model is a productionist model, concerned with economic efficiency and productivity, an emphasis on business growth and profits, and global mass production and mass consumption. Its organizational model is a corporate model with large vertically or horizontally integrated multinational corporations competing in a global market (Lyson 2004, p.70).

3.16 The Costs of Improvement

Pretty acknowledges that the pursuit of increased productivity and conserved natural resources[18] in the cause of rural modernization has produced benefits in the form of improved food production and some improvements in resource conservation. However, he notes, "it is increasingly being recognized that the social and environmental costs of agricultural modernization cut deep into the fabric of society…Jobs have been lost, environments polluted, communities broken up and people's health damaged" (Pretty 1995, 58). Tegtmeier and Duffy similarly observe that industrial agriculture is increasingly being recognized for its negative consequences on the environment, public health and rural communities (Tegtmeier and Duffy 2005, 65).

Schaller notes that problems associated with conventional farming are now widely recognized as hidden costs of modern industrialized farming, costs that until recently have been all but

[17] The first stage identified by Malassis is the "pre-agricultural food economy," in which the primary methods of obtaining food were gathering and hunting and fishing. The second stage – "the agricultural and domestic food economy," is associated with the successful domestication of plants. The third stage he identifies is the "commercialized and diversified agricultural food economy," which covers the decline in the 19th century of the subsistence economy of small holders as peasants produced for the market more and more. This period also corresponds with the internationalization of commerce that came about through advances in transportation technology (Winson 1992, p.96).

[18] Pretty discusses the establishment of parks and protected areas, and advances in both soil conservation and rangeland management in drylands as examples of resource conservation successes in rural development in the twentieth century (Pretty 1995, 33).

justified by the impressive gains in food production during this century. The problems include the following: 1) contamination of ground and surface water from agricultural chemicals and sediment; 2) hazards to human and animal health from pesticides and feed activities; 3) adverse effects of agricultural chemicals on food safety and quality; 4) loss of genetic diversity in plants and animals, a key to the sustainability of agriculture; 5) destruction of wildlife, bees, and beneficial insects by pesticides; 6) growing pest resistance to pesticides (exacerbating the effects noted above); 7) reduced soil productivity due to soil erosion, compaction, and loss of soil organic matter ; 8) over-reliance on non-renewable resources; 9) health and safety risks incurred by farm workers who apply potentially harmful chemicals (Schaller 1993, 90).

In addition to creating environmental problems, conventional agriculture has had undesirable economic and social impacts. Pretty notes that agricultural modernization has helped to transform many rural communities in both industrialized and developing countries. Pretty observes that the drive for agricultural efficiency has drastically cut the numbers of people engaged in agriculture in industrialized countries. External inputs of machines, fossil fuels, pesticides and fertilizers have displaced workers in Green Revolution lands. Rural cultures have been put under pressure, as more and more people have been forced to migrate in search of work. Local institutions, once strong, have become coopted by the state or have simply withered away (Pretty, 1995, 59). Other features of the transformation to industrial agriculture include the further shift of economic opportunity away from women to men, the increasing specialization of livelihoods, the increasing concentration of land in the hands of wealthy villagers and urban investors, the growing gap between the well-off and the poor, and the cooption of village institutions for the purpose of the sate (Pretty 1995, 81).

The transition to modern agriculture has also left communities more economically vulnerable. The financial crisis of the 1980s in the U.S., Schaller notes, illustrated what can go wrong when farmers rely on a few crops produced mainly for export, borrow too much to pay for the chemicals and other inputs used to produce those crops, and depend on the federal government to protect them when things go wrong (Schaller 1993, 91).

Related psychological and social consequences of industrial agriculture include personal stress on farm families due to declining and uncertain farm incomes, the persistent loss of family farms, and a steady deterioration of rural communities (Schaller 1993, 91).

In discussing the economic impacts of industrial agriculture on rural agricultural communities, Heffernan points out that capital that comes from outside the local community has major economic consequences for the local community. Giant corporations headquartered in distant places see labour as just another input cost to be purchased as cheaply as possible. Their profits

are usually immediately taken out of the local rural community. The profits are very likely invested in the food system somewhere else in the world. "Today," Heffernan argues, "the economic impacts of agricultural production on rural agricultural communities are perceived to be so small that few economic development specialists see any hope in expanding the economic base of a rural economy by focusing on the production stage of the food sector." These economic outcomes have major social consequences for communities. Heffernan cites a well-known study by Goldschmidt (1978) which "showed a strong relationship between the structure of the food system and the social condition of the community, revealing that the well-being of communities dominated by large-scale absentee-owned, corporate farms was greatly inferior to that of communities in which family farms predominated (Heffernan 2000, 73-74).

All of the environmental and social costs of the impacts described above are external to agricultural systems and markets for products. They are borne by society at large. In many circumstances, costs are borne by those who are not decision makers. Tegtmeier and Duffy note that "[i]mpacts of agriculture involve costs to individuals and communities who are not making decisions about production methods. These consequences indicate when property rights are not well defined and they represent future market failures, which lead to economic inefficiencies." Because these effects occur outside the marketplace they are called "externalities." Negative externalities occur when costs are imposed; positive externalities occur when others gain benefits without charge (Tegtmeier and Duffy 2005, 64-65).[19]

Tegtmeier and Duffy have estimated that agricultural production in the U.S. negatively impacts water, soil, air, wildlife and human health at an estimated cost of $5.7 to $16.9 billion per year. Total external cost per cropland hectare is calculated at $29.44 to $95.68. The authors note that while these figures offer a broad, preliminary view of how the externalities of agriculture encumber society, they are also conservative estimates. They point out that the U.S. also supports at least $3.7 billion annually in efforts to regulate the present system and mitigate damages. Additional public costs of agricultural production in the U.S. include direct subsidies and other support mechanisms for farmers (Tegtmeier and Duffy 2005, 82-83).[20]

[19] Tegtmeier and Duffy note that while negative externalities are generally not accounted for, neither are positive externalities. The positive, or beneficial, externalities provided by agriculture include things such as carbon sequestration, wildlife habitat and aesthetics. Pricing these services may open the door to policy decisions that compensate producers for such "products" (Tegtmeier and Duffy, 2005, p.83).

3.17 Defining Sustainable Agriculture

According to Schaller, sustainable agriculture, like the concept of sustainability itself, suggests not only the core characteristics of a destination for agriculture but also particular farming practices that could move agriculture towards that destination (with both ends and means). He points out, however, that neither characteristic lends itself to precise definition. "As a destination," he writes, "sustainability is not easily captured in concise definitions. On the other hand, specific farming practices need to be tailored to the particular location and circumstance, continual modification and adaptation." Because of these difficulties, he notes, many people prefer to focus on the technical side of sustainable agriculture, about the different kinds of practices that may conserve soil and water, protect the environment, and provide the farmer with a decent profit. Scientists in particular, Schaller argues, tend to think of the ends of sustainability as "givens" and the role of science to determine how best to achieve them. For that reason and because it is difficult and unwise to issue a top-down definition of sustainable farming practices, Schaller suggests that people's beliefs and values play a role in determining what sustainability is and how it can and should be achieved (Schaller 1993, 92).

Schaller notes that current beliefs and values differ markedly. At one extreme there are those who believe that conventional agriculture is basically sound and that fine-tuning or modification will suffice. According to Schaller, this view is still widely held by many people and organizations within the traditional agricultural community, such as the U.S. Department of Agriculture, the land grant colleges of agriculture, farm and commodity organizations, and business firms. In contrast are those who feel that a fundamentally different way of thinking about agriculture is required in order to make it sustainable (Schaller 1993, 93).

Another useful framework for understanding the different conceptualizations of sustainable agriculture is provided by Douglass (1984). He notes that "agricultural sustainability" can be defined in different ways and sought through different means. He defines three main approaches. The first group defines agricultural sustainability in economic or production terms, focusing on food sufficiency. A second group defines it in biophysical terms and stewardship. A third group, the "alternative" agriculturalists, are concerned with sustaining the permanent carrying capacity of renewal agricultural resources, but also focus special attention on the effects of different agricultural systems on the social organization and culture of rural life. There is a concern for the values of stewardship, self-reliance, humility and holism. They also believe that the agricultural

[20] As noted previously, assigning economic value to natural systems remains controversial and readers should therefore be cautious with interpreting the costs of externalities.

information encoded in the cultural practices of traditional rural societies is as important to the creation of sustainable agricultural systems as the products of science (Douglass 1984, 6).[21]

The rise of this "alternative" group can be traced back to Rachel Carson's 1962 work *Silent Spring*, a criticism of pesticides, which served as a catalyst for the emergence and growth during the 1970s and 1980s of an agricultural sustainability movement that focused on the social and environmental externalities associated with modern agricultural technologies. Kloppenberg et al. note that the success that farm and agrarian activists enjoyed in deconstructing the legitimacy of industrial agriculture was reflected in the National Research Council (1989) report, *Alternative Agriculture*, which called for making alternative practices more widespread (Kloppenberg et. al. 2000, 178).

Kloppenberg et al. note that although the "alternative" agricultural sustainability movement found its origins in farm environmental issues, globalization in the 1990s has prompted a broader approach to the social analysis of food extending far beyond the farm gate. The failure of many proponents of sustainable agriculture to adequately treat social injustice (class, gender, and especially hunger), Kloppenberg et al. point out, has engendered considerable criticism. Allen, for example, has argued that, historically, sustainable agriculture has focused on the environmental and there is a need to include human needs and social relations. Working to fulfill basic human needs, she argues, "requires reframing our concept of sustainability to include a social dimension and a concomitant expansion of our approach to sustainable agricultural research." (Allen, 1993, p.8). Allen calls for the development of "new epistemological and research approaches that integrate the natural processes of ecology combined with the social relations compatible with sustainability. This will involve, for instance, examining not only techniques for reducing soil erosion and water depletion, but also new forms of social organization that alternative agricultural practices presuppose" (Allen, 1993, p.10). Study and activism around food issues have generally come now to encompass the larger concerns of social justice and environmental interests in additional to traditional agricultural problematics. Those working for the transformation of the food sector now commonly frame their ambitions not in terms of sustainable agriculture per se,

[21] Douglass later defines a fourth approach or understanding of agricultural sustainability. This is the anti-corporate stance as expressed in the writings of Frances Moore Lappe, Joseph Collins and Susan George whose frames of reference are the "contradictions" of world hunger and modern agri-business. They look at inequalities generated by industrial food system and advocate for the need for food self-reliance. "Agricultural sustainability thus becomes a radically different way of organizing the production and distribution of food, ostensibly a way which accords with a particular standard of social justice" (Douglass, 1984, pp.21-22).

but as the realization of a sustainable food system (Kloppenberg et al. 2000, 179). The notion of sustainable food systems will be discussed at the end of this section.

3.18 Sustainable Agriculture as Alternative Agriculture

The understanding of sustainable agriculture used in this thesis follows from Douglass' third group, the "alternative" agriculturalists. It is a holistic approach to sustainable agriculture which encompasses the goals of food sufficiency and environmental protection, but which also addresses human needs and social relations. The definition of sustainable agriculture used in this thesis, therefore, extends beyond production to take into consideration the entire food system.

Sustainable agriculture integrates three main goals – environmental health, economic profitability, and social and economic equity. Sustainability, as previously noted, rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. It recognizes that natural resources are finite, acknowledges limits on economic growth, and encourages equity in resource allocation. Therefore, stewardship of both natural and human responsibilities is of prime importance. Stewardship of human resources includes consideration of social responsibilities such as working and living conditions of labourers, the needs of rural communities, and consumer health and safety both in the present and the future. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term (UC Davis 1997).

Taking into consideration the notions of justice and equity, Douglass defines as unsustainable any structure of agricultural production that directly or indirectly worsens the distribution of opportunities or incomes within producing communities, and judges as unsustainable all structures that fail to improve the distribution of opportunities or incomes by a specific degree within a given period of time. Agriculture will be found to be sustainable, he suggests, "when ways are discovered to meet future demands for foodstuffs without imposing on society real increases in the social costs of production and without causing the distribution of opportunities or incomes to worsen" (Douglass 1984, 25).

According to Pretty, sustainable agriculture is any system of food or fibre production that systematically pursues the following goals: a more thorough incorporation of natural processes; a reduction in the use of off-farm, external and non-renewable inputs; a more equitable access to productive resources and opportunities, and progress towards more socially-just forms of agriculture; a greater productive use of local knowledge and practices, an increase in self-reliance among farmers and rural people (Pretty 1995, 9).

Ikerd has argued that sustainable agriculture must use farming systems that conserve resources, protect the environment, produce efficiently, compete commercially, and enhance the quality of life for farmers and society overall (Ikerd 1993, 151).

The sustainable agriculture model relies more on management of the internal resources of the farm (i.e. management skills, knowledge and labour) and maximizes reliance on natural, renewable and on-farm inputs, and less on purchased commercial inputs in attempting to reduce negative ecological impacts while maintaining economically viable farms. The goal is to develop efficient, biological systems that do not need high levels of material inputs (UC Davis 2007). The sustainability model implies greater reliance on human resources in terms of the quality and quantity of labour and management, and relatively less reliance on land and capital. Thus, sustainable farming systems may require more farm operators, more farm labourers, and more farm families than do conventional farming systems (Ikerd 1993, 152).

3.19 A Systems Approach to Farm Management

Sustainable agriculture is holistic in that it takes a system-wide approach to solving farm management problems, and also because it places farming within a social context and within the context of the entire food system. The system is envisioned in its broadest sense, from the individual farm, to the local ecosystem, and to communities affected by this farming system both locally and globally. An emphasis on the system, the University of California's Sustainable Agriculture Research and Education Program points out, allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. A system approaches gives researchers and practitioners the tools to explore the interconnections between farming and other aspects of the environment. A systems approach also implies interdisciplinary efforts in research and education. This requires not only the input of researchers from various disciplines, but also contributions from farmers, farm workers, consumers, policymakers and others (UC Davis 1997).

At the farm management level, Ikerd notes that the new sustainability paradigm "treats the farm like an organism consisting of many complex, interrelated organisms, all of which have distinct biological limits. Economic performance is dependent on the achievement of the total organism and, thus, requires a holistic systems approach to farm resource management" (Ikerd 1993, 151-152). Ikerd points out that a given set of farming practices or methods is not inherently more or less sustainable than any other set of practices or methods. Sustainability depends on the nature of whole farming systems. "The goals and values of long-term sustainability must be reflected in combinations of practices and methods that are consistent with

an individual farmer's unique set of resources, including his or her knowledge base, technical know-how, and farming opportunities" (Ikerd 1993, 154).

Ikerd argues that agroecology provides a philosophical foundation for the sustainable agriculture concept. Agroecology is a synthesis of agriculture and ecology. Agroecology implies a systems approach to farming, integrating technology, and natural processes to develop productive systems. It recognizes that systems are in fact components of still larger systems and all components of systems are in fact systems made up of still smaller components. Whole systems have qualities and characteristics not present in any of their constituent parts; therefore, one must seek to understand the greater whole in order to understand its parts, not just vice versa (Iked 1993, 154-155; Savory 1988).

3.20 From Sustainable Agriculture to Sustainable Food Systems

There is another level at which a systems perspective is important in developing a sustainable agriculture. Dahlberg agues that we must go beyond the typical narrow focus on production (agriculture) to a broad analysis of complete food systems – which include not only production, but processing, distribution, use, recycling, and waste disposal. These food systems operate at a number of different levels from the household to the international. A broadening of the time horizon is also required, one that includes the ecological and evolutionary dynamics of regenerating both natural and human systems. Broadening the spatial and temporal scope of analysis also requires a broadening of the evaluation criteria. Dahlberg argues that this broadening should help to give better understanding and make such systems more regenerative (Dahlberg 1993, 75).

Winson has suggested the "agro-food complex" as a framework for analysis and has applied this framework to a study of agricultural economics in Canada (Winson 1992). At one point in time, he argues, it made sense to focus attention on the primary producers themselves, on the characteristics of farming and the organizations producers forged in their attempts to protect and shape the world around them. But as we approach the conditions of the present, he observes, we need a new framework for analysis, because social and economic transformations in recent decades have substantially reduced the importance of the farm population in the wider society, and of farming as an economic activity. Together with the declining importance of farming in terms of employment and the value-added factor, we now have to account for the massive dependence of farm operators on all manner of agricultural inputs together with the growing integration of "independent" farming operations and food-processing firms through formal contractual or informal arrangements (Winson 1992, 8-9).

This new reality, Winson observes, has stimulated a broader, systemic approach to this sector of the economy. He uses the concept of the *agro-food complex* "to denote the large number of activities associated with the production, processing and distribution of food, and with the educational, technical and ideological apparatuses that provide support and guidance for the more production-oriented activities of the food economy. Within this wider complex, it is possible to distinguish various components, or agro-food chains, which taken together make up the whole complex" (Winson 1992, 9).

Many authors have described the elements of a sustainable food system. For example, Kloppenberg et al. (2000) have explored the attributes of food system sustainability with members of the farm/food community, and the Region of Waterloo (Xuereb and Desjardins 2005) has produced report outlining the elements of a healthy community food system. At a general level there is agreement that a sustainable food system involves ecological sustainability, economic viability, and social justice. Another important dimension that has been described by many authors is *proximity*. These authors argue that a sustainable food system will be locally based. Local food is, simply, food produced for local consumption. Localization doesn't mean that every community would be entirely self-sufficient; it simply means striking a balance between trade and local production by diversifying economic activity and shortening the distance between producers and consumers wherever possible (Norberg-Hodge 2002, 1). The economic, nutritional and environmental benefits of local food systems have been described by Halweil (2004), Pawlick (2006) and Kneen (1989). Kloppenburg et al. (1996) have argued that the concept of a foodshed can serve as a conceptual and methodological unit of analysis that provides a frame for action as well as thought.

Much of the literature on alternative food systems examine means of taking back power over the production, processing, distribution and consumption of food. These alternatives, which in many cases attempt to create direct links between producers and consumers, include local processing and distribution networks (Lyson 2004), community supported agriculture (Cone and Myhre 2000), and farmers markets (Gurin 2006). Community food councils have also been identified as playing a potentially important part in building a sustainable food system (MacRae 1999).

A food systems perspective recognizes that reaching toward the goal of sustainable agriculture is the responsibility of all participants in the system, including farmers, laborers, policymakers, researchers, retailers and consumers. Each group has its own part to play, its own unique contribution to make to strengthen the sustainable agricultural community (UC Davis 1997).

3.21 Sustainable Agriculture in Peri-Urban Areas

Farming in the peri-urban countryside has been described "as a land of uncertainty […] a dynamic space where change is the norm and agricultural activities compete everyday with urbanization pressures, turning once intact rural communities into areas of transition and instability" (Brunet et. al. 2007, 253). Agriculture in peri-urban areas is characterized by particular challenges but also by access to certain opportunities. This section will review the literature that addresses both of these aspects in relation to peri-urban agriculture as they have been experienced in industrialized developed countries.

Areas surrounding urban centres have been defined and named in various ways including peri-urban, urban shadow, urban field, urban fringe etc. Caldwell et. al. note that many authors, however, make no attempt to define this ambiguous term and use it as though its definition was implicit. They report on a study which looked at the commonalities between the various interpretations of this notion. There is agreement that peri-urban is different from urban; peri-urban is, in some fashion, connected to being urban; and peri-urban has geographic (near the city), demographic (increasing population) and temporal (constantly expanding, changing) components. In general, the authors conclude, it is clear that there is no single definition of this concept. They report that the urban fringe has been defined as a zone up to sixteen kilometres wide surrounding the suburbs where rural land is being turned into housing and industrial subdivisions. The urban shadow is an area extending at least 30 to 50 kilometres beyond the urban fringe (Caldwell et al. 2007, 255). Peri-urban areas have elsewhere been described as "characterized by strong urban influences and demand, easy access to markets, services and other inputs, but relative shortage of land and risks from pollution and urban growth" (NRI, 1997; modified) and as the "interface zone between concentrated and dispersed population, and between urban and resource production systems." (Russwurm 1977, 16).

Brunet et al. note that the dynamic forces of urbanization create an interface where a variety of farm types coexist. In general, however, metropolitan area farms have been found to be smaller, produce more per acre, have more diverse enterprises and are more focused on high value production than non-metro farms. Metropolitan farms also tend to decrease capital and purchased input per dollar of output, shift from field and livestock crops to specialty or niche crops, increase the amount of contact and direct marketing and are generally younger farmers who work more hours off the farm. In a Canadian study, Bryant et al. showed that near-urban areas contained high proportions of the most intensive agricultural activities, especially specialized crops, nurseries and horticulture (Brunet et al. 2007, 269).

Over time, Burnet et al. observe, farmers have identified both limitations and opportunities in farming at the city's edge. Challenges, they report, are numerous and often lead to farmers deciding to move elsewhere where the pressures are less. However, despite these threats, there does continue to be a substantial amount of diversity of farming activity in near-urban areas. It has been found that fringe farm types are quite different from rural farming operations and also show a substantial variation in farm enterprises. Bryant found that farm restructuring at the urban fringe came either from macro changes to which individual react and adjust, or were initiated by individuals through adaptive behaviours that were more entrepreneurial and innovative in nature (Bryant 1989, cited Brunet et al. 2007, 265).

Challenges

Warnings about the fragility of Canada's urban fringe productive resources and the value of preserving high-quality agricultural land have often been voiced.[22] Some major concerns are the country's food production ability, its environmental and resource base protection and management, the diminishment of the social and economic life of the countryside, and deteriorating natural and scenic values (Russwurm 1977). However, the concern for farmland preservation has been suppressed by a large degree by the common thought that land in Canada was limitless and that if needed, technology would make it possible to grow large amounts of food on relatively small area of land.[23] It is only recently that governments have shown an interest in the maintenance of agricultural land uses under the threat of urban expansion. This movement has been influenced by the recognition that some of the best agricultural lands in areas of urban expansion are also the most attractive for non-agricultural uses. This attraction, combined with growing suburban populations, has even further increased the demand for development on the city's edge, leading to speculation and the purchase of large tracts of farmland by mainly absentee, non-farmers who rent out the land until development ensues. This

[22] These concerns go back to the 1950s and Ralph Krueger's seminal work on the changing land use patterns of the Niagara Fruit Belt. Beesley has described Krueger's work as forming the foundation for later urban fringe research in Canada (Russwurm 1997).

[23] Russwurm reports that in contrast to popular perception, only 11% (105 m ha) of Canada's agricultural land is suitable for production, and only 43% of this 105 m ha (45.9 ha) can grow crops. Almost one third of Canada's farmland is located in the country's peri-urban zones. Approximately 55% of the country's high quality farmland (Canada Land Inventory Classes 1-3) is located within a 161 km radius of Canada's 23 largest urban centres. Ironically, much of Canada's rapid urban expansion, particularly since 1950, has taken place on this high-quality agricultural land. (Russwurm 1997). Johnston and Bryant reported that in Ontario, an estimated 70 percent of census farms are located in the urban field, accounting for nearly 80% of the provinces improved farmland (Johnston and Bryant 1987, 9).

has detrimental impacts on agriculture in the area. As land prices rise in expectation of urban development, it is known that investment in agriculture will decline. Furthermore, lowering the percentage of farmer owned land because of high prices and lack of availability causes fragmentation and insecurity. Consequently, the stability of the agricultural industry becomes uncertain (Brunet et al. 2007, 256).

The impact of expanding urban areas brings other threats; more people, traffic, crop theft, dumping of garbage, and trespassing make it difficult to want to maintain a farming operation in these areas. The constant proposal of new municipal by-laws aimed at pleasing the suburban residents has also been identified as an issue affecting farmers. The loss of agricultural community and rural character in the peri-urban space further limits the future of farming. According to Bunce and Mauer (2005), most farmers believe that they are not adequately represented at the municipal level and many feel that the local farming community no longer exists or is in serious decline. Over regulation is also perceived by many as a major threat to their continuing farming. Most farmers are also concerned about having to adjust to operating next to non-farm neighbours. Sharp and Smith have observed that while the loss of farmland is an obvious threat to the long-term viability of agriculture at the urban edge, a less obvious threat is the emergence of conflict among farm and non-farm, rural residents concerning what is acceptable or desirable activity in the community. Farmers in growing and densely populated areas may be constrained by the local social environment due to expectations of neighbouring nonfarmers (Sharp and Smith, 2003, p.914). The effects of rural non-farm development on Ontario's agricultural industry have been described in detail by Caldwell and Claire Dodds-Weir (2007; 2003a; 2003b).

Opportunities

Johnston and Bryant note that in areas close to many cities, agriculture is seen as the penultimate use of the land before it is finally devoted to urban development. Consequently, the dominant opinion is that agriculture at the fringe is doomed. It has been commonly assumed, they observe, that urban-based forces hold negative consequences for agricultural structure, agricultural productivity, and, ultimately, farming's long-term viability. This can be seen in the many North American public policy initiatives formed to maintain agriculture in target regions by proscribing nonfarm development. Without any doubt, Johnston and Bryant note, nonfarm development pressures can sometimes be unyielding and completely detrimental to agriculture. This point, however, has been extended to more complex situations where it may not apply (Johnston and Bryant 1987, 10).

Blobaum argues that American agriculture is simultaneously in crisis and faced with new opportunity. Both arise out of market forces. While conventional agriculture is unlikely to be saved by current market solutions, he observes, sustainable systems near cities can create new, local farm economies based on entrepreneurial spirit. Bobaum argues that farmers, by relying on sustainable technology to produce high-value crops for targeted and faithfully serviced urban markets, can form an alliance with urban consumers who are becoming increasingly conscious of diet and health and are willing to pay for quality. Blobaum notes that much of the earlier literature on farmland preservation focused on ways to minimize the disadvantages of farming near cities. Urban farming, he argues, should be viewed instead as an opportunity to be realized (Blobaum 1987, 3).[24] Blobaum argues that for urban farming to be successful, rather than deficiency payments, set-asides and export subsidies the focus must be on systems that are sustainable, emphasize high-value crops, respond to local market demand, feature private enterprise and innovation, and develop independently of federal government involvement (Blobaum 1987, 3).

Brunet et al. note that the opportunities of the peri-urban space have been explored extensively in recent years. For example, it has been found that a certain degree of stress may have a beneficial impact in stimulating creative adaptation. Urban pressures have been found to promote innovation throughout North America. Other positive impacts of urbanization on near-urban agriculture include better access to urban markets, proximity to specialized services and the potential for direct sales to the consumer. The proximity to an abundant labour pool is also seen as a benefit of proximity to large urban centres (Brunet et al. 2007, 270).

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3.22. Preserving Agriculture in Peri-Urban Areas

Brunet et al. explore the potential of preserving agricultural activities in the rural-urban interface through comprehensive strategies involving the state and most importantly, the farmer. They note that a review of the empirical studies in Canada and abroad reveals the potential of better adapted farming models in preserving and promoting agriculture around our major urban centres. The authors discuss the key characteristics of these models, and the strategies that may lead to a thriving peri-urban agricultural industry (Brunet et al. 2007, 254).

Brunet et al. divide the strategies to save peri-urban agriculture into two main categories: regulatory/ incentive based approaches and farm level approaches. Regulator and incentive based

[24] Blobaum suggests that an orientation toward local or regional urban consumers is not limited to farmers on the urban fringe. Issues such as agricultural diversification and production of alternative crops are important topics in hard-hit grain and livestock areas. Many farms far removed from cities have become disillusioned with their export-dependent market system and are looking at ways to gain access to urban markets (Blobaum, 1987, p.3).

approaches include agricultural protection zoning, differential tax assessment laws, right to farm laws, purchase of agricultural conservation easements, agricultural districts, and payments for environmental benefits models. These approaches will be discussed in more detail in chapter seven of this thesis. The focus of Brunet et al.'s study, and the focus here, is on role of operators and how they respond to forces – threats and opportunities that have been found to promote innovation and therefore create distinct farm models in the peri-urban space (Brunet et al. 2007, 258).

A study by Lynch and Carpenter (2003) found that very few if none of the farmland preservation programs have decreased the rate of farmland loss on the fringe of metropolitan areas. In order for the near-urban agricultural industry to survive, Brunet et al. argue, other approaches will therefore be needed. Some have suggested integration of regulatory and incentive based approaches. Conversely, some studies have shown that "the viability of near-urban agriculture will be ensured with the adaptation of production and marketing methods to meet the requirement of the urban populations. This calls for the birth of a new and innovative near-urban agricultural industry" (Brunet et. al. 2007, 264).

Brunet et al. discuss some of these farm level adaptation approaches. In response to the many challenges of farming at the rural-urban interface, some farmers have decided to adapt their production and marketing methods to ensure the viability of their operation. "The evolution of near-urban agriculture has been characterized by diverging thoughts and practices, which have led to the maintenance of traditional practices and on the other hand, to alternative agricultural models, which are often perceived as better adapted to this environment" (Brunet et al. 2007, 264).

Three types of metropolitan farms types are identified by Brunet et al.: recreational, adaptive, and traditional. Adaptive agricultural operations have the highest chance of survival in near-urban areas. Specifically, this group includes "[f]arms that produced relatively high value products, with sales of $10,000 [US] or more and having sales of more than $500 [US] per acre of land. Specializing in high value products allows these farms to adjust to increasing land prices, population density, and continuing conversion of local agricultural land to non-farm uses." Adaptive farmers have also been found to engage more readily in proactive behaviour having taken advantage of expanding urban populations within close proximity (Brunet et al. 2007, 269).

Johnston and Bryant also explore the idea "that some farm operators change certain aspects of their business to suit prevailing conditions in the fringe and that these changes result in a more viable farm. Such positive adaptation can be viewed as an adjustment to allow the exploitation of production and marketing opportunities characteristic of rural-urban fringe environments."

Johnston and Bryant propose positive adaptation as a partial model of agricultural evolution in areas near cities. It presents a form of agricultural change that is often overlooked because of the lack of attention commonly given to the role of the farm entreprenueur (Johnston and Bryant 1987, 10).

In their study of southern Ontario, Johnston and Bryant identified six types of adaptive strategies in the responses: pick your own operations, establishment of retail outlets, land-extensive cash cropping, direct livestock sales, off-farm employment, and single-lot severance (Johnston and Bryant 1987, 14).

Johnston and Bryant report that the results of their study indicate the existence of positive adaptation. The adaptability of some farm entrepreneurs underscores their resiliency. Some farmers have demonstrated an uncanny ability to identify and exploit new opportunities. The range of positive adaptations observed can be classified into two broad categories; (1) adjustments made to systems of production that result in greater output or lower costs of production and (2) adjustments made to marketing systems, either in types of products offered or the manner in which certain commodities are sold. The authors conclude that the positive adaptive mechanisms they describe appear to be very capable of sustaining agriculture near cities (Johnston and Bryant 1987, 18).

Another set of adaptations are farmer adaptations focused on altering the constraints and limitations created by the local social setting. For example, a farmer might actively develop a relationship with non-farm neighbours to build trust and understanding about potentially offensive farm practices to avoid misunderstanding or conflicts that might arise otherwise. These types of farm-neighbouring activities are increasingly being promoted by industry and agricultural support organizations as a way of reducing conflict between farmers and non-farmers. In terms of adaptation, the goal of neighbouring is fundamentally an attempt to reduce negative social constraints on agriculture at the rural-urban interface. Sharp and Smith conclude that farmer neighbouring and the development of social relationships with non-farmers is an effective adaptive strategy for farm operators at the rural-urban interface (Sharp and Smith 2003, 915).

It is important to note that not all adaptation is positive. In their model describing farmer adaptation in the rural-urban interface Johnston and Bryant identify three types of farm-level change: normal change, positive adaptation and negative adaptation. Normal change on individual farms resemble those in the farm sector as a whole, for example, the substitution of capital for labour, or the adoption of a standard agricultural technology (i.e., hybrid seeds). In contrast to normal change, adaptive changes are adjustments that are specific to a single farm or a

relatively small group of farms. They are linked more closely with local forces, the unique circumstances of an individual farm decision-maker, or the particular ways in which the farm decision-maker assesses those circumstances. Positive adaptations are adjustments intended to improve the farm's economic prospects and its likelihood of continuing. This can include things such as adding nontraditional enterprises or intensifying production on the existing land base. Negative adaptations, in contrast, have the ultimate aim of dissolving the farm business (Johnston and Bryant 1987, 12). Negative adaptations can include an exit from farming or a reduction in production intensity in anticipation of future sale of farmland to developers. The impermanence syndrome, or a gradual disinvestment in the farm operation due to recognition that long-term prospects for farming are limited in light of local growth and development, is a commonly noted negative adaptation (Sharp and Smith 2003, 915).

3.23 Chapter Summary

This chapter has demonstrated that programs which provide payments for ecological goods and services fit well with the requirements for sustainability. The concept of sustainability, as articulated in by the Brundtland Commission, is an integrative concept that emphasizes the interdependence of biophysical and social development goals. Payments for EG&S programs can make a strong contribution to sustainability, but holds particular promise with respect to two of its requirements; socio-ecological system integrity and livelihood sufficiency and opportunity.

EG&S programs will help to preserve the integrity of socio-ecological systems. They will ensure that the changes we influence on agricultural lands preserve the system conditions and services upon which we rely. EG&S programs will promote ecosystem health, and the ability to maintain normal operations under normal environmental conditions. They will foster resilience and adaptive capacity so that ecosystems are prepared for change. This would including reducing stresses that threaten to force catastrophic shifts, as well as fostering the ability of farmlands to survive and adapt to changes in climate, drought, pest infestations, loss of soil productivity, and other environmental stresses. Finally, EG&S programs will help to preserve diversity and redundancy as part of systems' requirements for self organization.

Payments for EG&S also contributes to the enhancement of livelihood capabilities and opportunities. EG&S programs recognize both the biophysical and social dimensions of sustainable livelihoods. On the local level, EG&S programs help to ensure that livelihood activities enhance and do not degrade, the local natural resource base. They also help to ensure that livelihood activities improve the productivity of renewable resources. At the global level EG&S programs ensure that livelihood activities make a net positive contribution to the long-

term sustainability of other livelihoods by addressing pollution and greenhouse gases and global warming. EG&S programs promote social sustainability by enhancing the ability to cope with stress and shocks. They also aid in enhancing and exercising capabilities in adapting to, exploiting and creating change, and in assuring continuity.

Perhaps most importantly, payments for EG&S programs link improvements in the biophysical environment with sustainable livelihoods in a strong way. This linking is particularly important in agriculture. Farmers, who are under increasing financial constraints, are often forced to choose between making a living and promoting environmental stewardship. Payments for EG&S address this conflict by combining the two goals.

The EG&S approach fits well with the definition of sustainable agriculture articulated in this chapter. Sustainable agriculture emerged in the 1970s as a reaction to the social and environmental costs associated with modern agriculture. While early versions of sustainable agriculture focused on environmental considerations, since the 1990s a more holistic approach has emerged. This approach encompasses the goals of food sufficiency and environmental protection, but also addresses human needs and social relations. That is, it extends beyond production to take into consideration the entire food system, including participant engagement and social equity components. The definition of sustainable agriculture put forward in this chapter corresponds with the definition of sustainability described previously; it is an integrative concept that emphasizes the interconnection between biophysical and social development goals.

Sustainable agriculture in peri-urban areas presents both challenges and opportunities. In developing an ALUS program for Ontario's Greenbelt, these challenges and opportunities will need to be considered. The challenges include the effects of urban sprawl, the influence of non-farm development, and the loss of farm community and culture. Opportunities for preserving agriculture in peri-urban areas include positive adaptation and entrepreneurialism. In Chapter Seven, I will address these challenges and opportunities more directly as I examine the specific issues associated with farming in the Greenbelt as a basis for creating a framework to assess the contribution of the ALUS program. In the next chapter, I will describe the basic elements of the ALUS program, and in Chapter Five I will establish means, other than ALUS, of farmland protection, agricultural viability and farm stewardship**.** Chapter Six will describe the case study areas in the Greenbelt

Chapter 4 **Description of the Alternative Land Use Services Concept**

4.1 The Alternative Land Use Services (ALUS) Concept

ALUS is a Canadian farm policy concept developed by Keystone Agricultural Producers (KAP), Manitoba's largest farm group, in partnership with the Delta Waterfowl Foundation (DW), a not-for-profit conservation organization. ALUS has the support of farmers, as well as a wide range of agricultural, non-government, conservation, and government organizations, including the Canadian Federation of Agriculture.

The ALUS approach is distinct from other farm support programs in that it aims to provide financial compensation to farmers for their EG&S outputs, and thus promote greater production of such goods and services. The extensive range of EG&S targeted in the program includes water filtration, biodiversity and carbon sequestration. Through the ALUS program, producers are encouraged to enroll any ecologically sensitive, natural, wetland or riparian areas. They are given a choice whether these lands are left in their natural state with no agricultural use, or maintained with some level of haying or grazing, for which the producer receives a variable per acre payment (McLaren 2006).

According to the ALUS approach, since ecological goods and services are often purely public goods or at least goods held in common, it is unfair that farmers alone should bear the costing of producing, restoring or conserving them. ALUS aims to introduce the concept of ongoing payments for these public goods, thus distinguishing itself from other approaches based on the one-time funding of specific projects (PQ, 2005, 37).

The objectives of ALUS fall into three broad categories:

- Conservation and environmental enhancement (soil, water, carbon sequestration, fauna and flora);
- Promotion of sustainable rural communities;
- Agricultural income enhancement and adaptation

Aside from the third item, these objectives are very common in the agri-environmental field and what makes the project special is its aim of changing remuneration methods for farmers. This latter is based on the following fundamental principles:

1. Voluntary program
2. Cap on land eligible for program to 20% of each participating landowner's holdings
3. Integrated with existing delivery systems, such as crop insurance programs
4. Targeted to environmentally sensitive sites

5. Flexible, based on a nine-year contract, modifiable every three years
6. Does not cause market distortion

According to Dr. Robert Bailey, vice president of Delta Waterfowl and cofounder of the approach, the basic difference between ALUS and traditional conservation programs is that traditional approaches do not involve the farmer in the process. Bailey believe that existing land acquisition and retirement programs, which are common in the Prairies, have neither achieved tangible environmental results nor recognized the active role that farm producers can play in environmental protection. Proponents of this approach believe that it is more likely to encourage farmers to produce a wider range of positive externalities. In addition, Bailey believes that the local program administration advocated by ALUS differentiates it from programs administered centrally or by major NGOs (PQ 2005, 28).

One of the main characteristics of the implementation of the project is that program delivery will be entrusted to agencies managing crop-insurance programs. The ALUS proposal defines qualifying practices as follows:

1. Annual practices
    - Grazing management using rotation
    - Green manure crops to improve the soil
    - Crop residue management

2. Multi-year practices
    - Conversion of land to conservation cover (forage, pasture, wooded cover, etc.) for longer than one year
    - Creation of forage reserves
    - Deferred harvesting of forage areas to accommodate nesting

3. Permanent practices
    - Riparian area management
    - Wildlife management zones
    - Carbon sinks
    - Conservation or creation of water storage areas or wetlands (PQ 2005, 38).

A recent review commissioned by Delta Waterfowl found that the costs of a national ALUS program are significantly outweighed by the benefits to Canadians. The review focused on the anticipated national costs and benefits of implanting ALUS as a conservation program on privately-owned farmland across Canada. The report estimates annual cost reductions within government of over $61 million and a total benefit to society of over $820 million/yr through the program's positive results in greenhouse gas sequestration, increased value of outdoor recreation activities, and other services. The annual cost of the ALUS program is assumed to be $738 million (Tyrchniewicz 2007).

4.2 ALUS Pilot Projects in Canada

Local partners have been recruited to implement ALUS pilot projects.[25] The first ALUS pilot project in Canada was launched by the federal and provincial governments along with Keystone Agricultural Producers, Delta Waterfowl and the Rural Municipality (RM) of Blanchard, Manitoba, in November, 2005. The program's aims include testing the method's feasibility and costs, determining the most efficient administrative structure for program delivery, establishing a fair-market-based method of pricing ecological service delivery and quantifying the effects of the approach on farm incomes (KAP et al., 2004, PQ, 2005, p.39). As of November, 2006, over 20,000 eligible acres have been enrolled by the RM by 160 landowners, totaling over $300,000 in annual payments for ecological goods and services (KAP, 2006).

The second pilot project is has been initiated in Norfolk County, in southwestern Ontario. A detailed proposal was published in January 2004, and exploratory work has been done with farmers to identify potential participants. The Norfolk Federation of Agriculture (NFA) and the Norfolk Land Stewardship Council (NLSC) have taken the lead developing and promoting the Norfolk ALUS Project. The proposal describes the activities to be funded, with the total cost of the pilot project estimated at $7.65 million over nine years (Bailey and Reid, 2004).

A partnership is also planned with the University of Guelph to ensure environmental monitoring and assessment since the project objectives also include determining its environmental effectiveness and the ideal structure for program delivery (PQ 2005, 40).

A benchmark survey of public opinion on the environment in relation to farming and the quality of life in Norfolk County was completed in 2005. A significant finding of the survey was that a majority of non-farm residents in Norfolk County "believed that farmers should be, or possibly could be paid to deliver environmental services." Four ALUS demonstration farms are

[25] In addition to the two pilot projects described here, Prince Edward Island, Saskatchewan and Alberta are also putting together ALUS project proposals (KAP 2006).

now established and hosting tours by the public and potential farmers of the county wide pilot proposal (KAP 2006; Bailey and Greenslade 2006).[26]

[26] In November 2007, it was reported that the project has commitments of $90,000 towards a three-year $1.9 million pilot and is waiting for funding approval from several other funding sources. However, since failing to secure any funding from the Advancing Canadian Agriculture and Agri-Food program administered by AAFC, the Partnership Advisory Committee (which directs the project) has decided to refocus the pilot project proposal from a County wide pilot to one including additional ALUS demonstration farms to better reflect the County's diversity of agriculture as well as targeting additional priority watersheds for riparian buffer restoration and forest corridor creation (Reid, 2007).

Chapter 5 **Established Means of Farmland Protection and Farm Stewardship Promotion**

5.1 Introduction

Before developing a framework and criteria for evaluating ways of building a more sustainable agricultural economy in Ontario's Greenbelt, it is necessary to look at the various options for achieving farmland protection, agricultural viability and farm stewardship. Three categories of tools will be discussed: farmland protection tools, agro-environmental programs, and farm assistance tools. This review will assist in evaluating ALUS against other reasonable alternatives available for promoting agricultural land stewardship and livelihood benefits in Ontario's Greenbelt.

5.2 Farmland Protection Tools

Farmland preservation has been a serious public issue in Canada and the United States since the late 1960s. Over that period a variety of techniques have used by state and local governments to protect farmland and to ensure the economic viability of agriculture (Bunce 1998, 233).

Atash notes that farmland protection programs generally fall into three categories: incentive programs, land use control programs, and integrated programs. While early farmland protection programs were composed mostly of incentive mechanisms, current programs rely more on land use control mechanisms or a combination of incentive and control mechanisms. The two major incentive programs are differential tax assessment and agricultural districting (Atash 1987, 199-200). The review of existing programs is divided into those that are generally enacted at the state or provincial level, and those that are enacted at the local level.

5.2.1 Farmland Protection Tools Generally Used at the State or Provincial Level

5.2.1.1 Agricultural District Programs

Agricultural district programs allow farmers to form special areas where commercial agriculture is encouraged and protected. These programs stabilize the land base and support the business of farming by providing farmers with an attractive package of incentives. Typically in the U.S., programs are authorized by state law and implemented at the local level. Enrollment in agricultural district programs is voluntary. In exchange for enrollment, farmers receive a package of benefits, which varies from state to state. Agricultural districts should not be confused with zoning districts that delineate areas governed by particular local land use regulations.

There are a total of 19 state agricultural district laws in 16 states in the U.S. Provisions vary widely, but most agricultural district laws are intended to be comprehensive responses to the challenges facing farmers in developing communities.

To maintain a land base for agriculture, some agricultural district laws protect farmland from annexation and expropriation (called "eminent domain" in the U.S.). Many laws also require that state agencies limit construction of infrastructure, such as roads and sewers, in agricultural districts. Some states offer participants eligibility for purchase of agricultural conservation easement programs, and two states include a right of first refusal in district agreements to ensure that land will continue to be available for agriculture.

Agricultural district laws help create a more secure climate for agriculture by preventing local governments from passing laws that restrict farm practices, and by providing enhanced protection from private nuisance lawsuits.

To reduce farm operating expenses, some jurisdictions offer either automatic eligibility for differential tax assessment (also known as use value assessment) or property tax credits to farmers who enroll in agricultural districts (AFT 2002, 1).

5.2.1.2 Greenbelts

While greenbelts have been used since biblical times as methods of urban containment, they are more commonly known as a key planning tool of the "garden city" movement and, more recently, as a major element in regional planning. Greenbelts essentially divide the regional landscape into distinctly urban, greenbelt, and exurban components (Nelson 1985, 43)

In order to create greenbelts within the confines of American law, a few American jurisdictions have acquired development rights of greenbelt land proximate to urban areas. Other communities have purchased greenbelt land in fee. More common, however, is the creation of conservation zoning on open spaces without compensating the affected landowners. In its pure form, conservancy zoning does not allow land to be further divided or built upon. It is intended to maintain open land for open space purposes such as agriculture, forestry, and pasture (Nelson 1985, 44).

Examples of established Greenbelts include the London, UK Green Belt, the German Iron Curtain Green Belt, the Netherlands Green Heart, Portland Oregon's Urban Growth Boundary, and British Columbia's Agricultural Land Reserve (Carter-Whitney 2008).

5.2.1.3 Conservation Easements

Agricultural conservation easements are designed specifically to protect farmland. Grantors retain the right to use their land for farming, ranching and other purposes that do not interfere with or reduce agricultural viability. They continue to hold title to their properties and may restrict public access, sell, give or transfer their property as they desire. Producers also remain eligible for any sate or federal farm program for which they qualified before entering into the conservation agreement.

Conservation easements place restrictions on the acceptable uses that are permitted on a property and thus protect it from development. These voluntary legal agreements are created between private landowners (grantors) and qualified land trusts, conservation organizations or government agencies (grantees). Grantors can receive federal tax benefits as a result of donating easements. Grantees are responsible for monitoring the land and enforcing the terms of the easements.

Easements may apply to entire parcels of land or to specific parts of a property. Most easements are permanent; term easements impose restrictions for a limited number of years. All conservation easements legally bind future landowners. Land protected by conservation easements remains on the tax rolls and is privately owned and managed. While conservation easements limit development they do not affect other private property rights (AFT 2002, 2, Watkins et al. 2003, 11). Part of the attraction of easements for landowners is the collective aspect. Landowners in a defined area can mutually agree to retain the scenic and other qualities that they all value (against the risk that one owner will sell out to development interests that would blight the area generally).

With respect to the Ontario context, Watkins et al. note that agricultural easements are a tool that could be used by land trusts and governments to protect foodland in the long-term. The use of conservation easements is currently enabled under the Conservation Land Act, RSO 1990, c.28; however, this legislation was designed to protect natural and ecologically significant areas and is not entirely applicable to farmland. There was a very short-lived easement program, the Niagara Tender Fruits Program, for protecting specialty cropland in the Niagara region in the early 1990s; however it was dropped with the election of a new provincial government in 1996 (Watkins et al. 2003, 11).

Watkins et al. report that the use of easements to protect foodland has extremely high potential to be effective to ensure a long-term supply of farmland in Ontario. The Southern Alberta Land Trust and the American Farmland Trust in the United States have established extremely successful easement programs. In Ontario, an easement program would be relatively inexpensive

to establish and could be highly effective in the long-term because the easements are not subject to review through the planning process. It would require the commitment of groups such as land trusts to hold and monitor the easements in the long-term. Lower-tier governments may oppose the use of easements in some instances because they override existing zoning designations and efficiently revoke the municipality's power to determine the permitted use on that property. Currently, Watkins et al. argue, easements are the only tools available that have high potential to keep foodland protected in the long-term, however, in order for easements to be used effectively province-wide, there needs to be some legislative reform to enable their use to protect foodland (Watkins et al. 2003, 12). The use of easements does have some limitations. A key problem is that the motivations for engaging in land trusts are not universally shared, perhaps not even widely shared, among owners of farmlands.

5.2.1.4 Purchase of Agricultural Conservation Easement Programs

Purchase of agricultural conservation easement (PACE) programs have been used, chiefly in the U.S., to pay property owners to protect their land from development. PACE is known by a variety of other terms, the most common being purchase of "development rights". Landowners sell agricultural conservation easements to a government agency or private conservation organization. The agency or organization usually pays them the difference between the value of the land for agriculture and the value of the land for what American legal tradition calls the land's "highest and best use," which is generally residential or commercial development.

PACE programs allow farmers to cash in a fair percentage of the equity of their land, thus creating a financially competitive alternative to selling land for non-agricultural uses. Permanent easements prevent development that would effectively foreclose the possibility of farming. Removing the development potential from farmland generally reduces its future market value. This may help facilitate farm transfer to the children of farmers and make the land more affordable to beginning farmers and others who want to buy it for agricultural purposes. PACE provides landowners with liquid capital that can enhance the economic viability of individual farming operations and help perpetuate family tenure on the land. Finally, PACE gives communities a way to share the costs of protecting agricultural land with farmers (AFT 2002, 3).

Walton notes that Ontario has little experience with programs that involve the purchase of "development rights". This is in part because of the underlying principles upon which Canadian property laws are based. In the U.S., where the principle of private property rights is firmly established, many such programs have been implemented. The Canadian constitution and legal practice do not recognize development rights. However, there are Canadian examples of easement

purchase programs to protect agricultural land in Quebec, British Columbia and Alberta (Walton 2003b, 22).

5.2.1.5 Right-to-Farm Laws

State and provincial right-to-farm laws are intended to protect farmers and ranchers from nuisance lawsuits. Some statutes protect farms and ranches from lawsuits filed by neighbours who moved in after the agricultural operation was established. Others protect farmers who use generally accepted agricultural and management practices and comply with federal and state/provincial laws. Some right-to-farm laws also prohibit local governments from enacting ordinances that would improve unreasonable restrictions on agriculture.

Right-to-farm laws are a state policy assertion that commercial agriculture is an important activity. The statutes also help support the economic viability of farming by discouraging neighbours from filing lawsuits against agricultural operations. The American Farmland Trust argues that "[b]eyond these protections, it is unclear whether right-to-farm laws help maintain the land base" (AFT 2002, 4).

In Ontario, there are locally-based mechanisms that have been effective in resolving conflicts between farmers or between farmers and their non-farm neighbours. However, there may also be a need to strengthen the *Farm and Food Production Protection Act* (FFPPA) to enable farmers to engage in normal and approved agricultural practices. The Agricultural Advisory Team, which advised government on the potential Greenbelt legislation, urged greater reliance on the FFPPA to clearly identify normal and approved farm practices. The Advisory Team recommended improving the application and awareness of the Act by emphasizing early-mediation and conflict resolution to address contentious issues before they escalate, and by increasing public education and communication to raise awareness and understanding in both the farm and non-farm community about normal and approved farm practices (AAT 2004, 8).

5.2.1.6 Tax Relief through Differential Assessment Laws

Differential assessment laws direct local governments to assess agricultural land at its value for agriculture, instead of its full fair market value, which is generally higher where the potential for non-farm uses for the land affects the land market. In the U.S. differential assessment laws are enacted by states and implemented at the local level. With a few exceptions, the cost of the programs is borne at the local level.

Differential assessment programs help ensure the economic viability of agriculture. Since high taxes reduce profits, and lack of profitability is a major motivation for farmers to sell land for

development, differential assessment laws also protect the land base. Finally, these laws help correct inequalities in the property tax system. Owners of farmland demand fewer local public services than residential landowners, but they pay a disproportionately high share of local property taxes. Differential assessment helps bring farmers' property taxes in line with what it actually costs local governments to provide services to the land (AFT 2002, 4).

5.2.1.7 Income Tax and Property Tax Incentives

Currently in Ontario, qualifying farmland is eligible to benefit from favourable assessment values and property taxation that is at 25% of the residential tax rate established by the local municipality.

Donations of land or easements to government or qualified conservation organizations can qualify for a charitable tax receipt or for a corresponding reduction in the income tax otherwise payable by the landowner. Unfortunately, the donors may also be subject to capital gains taxation on the accrued increase in the value of the land that is donated. Currently, the tax benefits of donating land are only applicable to ecologically sensitive lands and there are some questions about how these rules could be applied to the donation of agricultural land or easements (Watkins et al. 2003, 12-13).

5.2.1.8 Provincial Planning Laws and associated Regulations, Policies and Guidelines

Although there is no provincial legislation in Ontario specifically designated for the protection of agricultural land, certain elements of the *Planning Act* may be used to protect farmland. First, the Act gives municipalities the authority to make planning decisions about farmland protection through their official plans and zoning by-laws. The Act also states that municipal councils, provincial ministries, commissions and the Ontario Municipal Board are required to "be consistent with" matters of provincial interest identified in the Provincial Policy Statement (PPS). These matters include the protection of the agricultural resources of the province. A municipality is legally bound to be consistent with all matters of interest in the PPS, which in many cases have the potential to conflict with one another. The PPS promotes an approach to planning that emphasizes the importance and priority of agriculture within rural areas. The PPS guides the development of local official planning policy and the review of individual development proposals.

Recent amendments to the *Planning Act* and the PPS aimed to (among other things) strengthen the policies governing farmland protection. These changes, adopted by the Ontario Government in 2005, provide stronger protection to prime (Class 1-3) farmland as well as specialty croplands,

and also virtually eliminate rural severances for residential purposes in agricultural areas. Such severances, creating non-farm homes in the middle of a working agricultural landscape, have often caused significant challenges for farming, particularly when non-farm residents complain about manure spreading and other normal farming practices (Watkins et al. 2007, 298).

While the revisions to the PPS have strengthened policy regarding the protection of agricultural land, there are still several issues that it has not addressed. Over the years provincial policy statements have evolved into a concise, short document with little mention of how the polices are to be implemented. Implementation guidelines that were once used to direct the planning process in a detailed way are no longer in use and the PPS is left primarily to interpretation. On the one hand, the PPS does have legal authority. As noted above, the law now requires municipal decisions to be "consistent with" the PPS. However, because of the necessarily limited precision of the PPS and of the "consistent with" requirement, there is considerable room for interpretation. Other identified weaknesses of the PPS include the following: successful farmland preservation has been dependent upon the cooperation of local municipalities; policy has often been implemented without sufficient consideration of other issues within the rural community; the overall commitment of the province to farmland preservation has been questioned. Where the PPS has been most successful, Caldwell et al. argue, it has been accompanied by locally developed and supported municipal policy that was often more holistic, comprehensive and restrictive than provincial policy (Caldwell et al. 2007, 96). Watkins et al. note that "as a legislative tool the PPS is not highly effective in achieving long-term farmland protection due to its lack of implementation guidelines and room for interpretation (Watkins et al. 2003, 15).

5.2.1.9 Special Provincial Planning Initiatives – the Greenbelt and Growth Management

Over the past three years, in addition the amendments to the *Planning Act* and the PPS, discussed above, the Ontario provincial government introduced two other very important measures intended in part to preserve farmland: the Greenbelt and the Growth Management plan for the Greater Golden Horseshoe area. Watkins et al. point out that these initiatives were not primarily directed at farmland preservation. The authors also argue that although the political rhetoric associated with these initiatives explicitly included farmland preservation, it remains to be seen whether this goal will be effectively achieved in the long run (Hilts et al. 2007, 296).

Watkins et al. note that farmland viability became a major issue in the Greenbelt decision, and farm organizations opposed its creation, specifically demanding compensation for lost development opportunities. The government rejected this argument, but did appoint an

Agricultural Advisory Team, which held meetings and documented issues of concern to farmers. Organizations such as the Ontario Farmland Trust (OFT) provided input to this team as well, and the list of 14 issues they produced provides a working list of priorities for improvement from an agricultural perspective including the recommendation that land trusts be used to help protect agricultural land in Ontario (Watkins, et al. 2007, 297).

Opinions regarding the potential of the Greenbelt legislation to promote farmland protection have been mixed. Davidson has argued that the Greenbelt Plan "has the effect of placing farmers in a park which makes future farm business planning problematic" (Davidson, 2007, p.202). In contrast, Caldwell et al. have argued that Greenbelt Act may be an example of a radical departure for Ontario in terms of farmland protection policy. There are models from all across North America, the authors argue, where provinces and states have taken a bold step to establish new tools and methods of farmland preservation. Many of these tools may require a new legislative framework, which may include enhanced regulation (Caldwell et al. 2007, 100)

The second important Ontario planning initiative is the development of a growth management plan for the Greater Golden Horseshoe. This plan focuses on the urban side of future development, but in emphasizing greater density of urban development (actually setting density targets to be reached), as well as transit, the plan in turn serves to reduce development pressures on farmland and rural areas. Whether this plan will receive political support from municipalities and developers, Watkins et al. note, is a major question (Watkins, et al. 2007, 298).

5.2.2 Programs Enacted at the Local Level

5.2.2.1 Agricultural Protection Zoning

Zoning is a form of local government land use control. Agricultural protection zoning (APZ) ordinances designate areas where farming is the primary land use and discourage other land uses in those areas. APZ limits the activities that are permitted in agricultural zones. The agricultural zoning ordinance is either nonexclusive or exclusive. Under a nonexclusive agricultural zoning ordinance, nonfarm uses are allowed, but agricultural uses are preferred. In contrast, exclusive agricultural zoning prohibits all nonfarm uses in an area zoned for agricultural use (AFT 2002, 4; Atash 1987, 201).

APZ stabilizes the agricultural land base by keeping large tracts of land relatively free of non-farm development. This can reduce the likelihood of conflicts between farmers and their non-farming neighbours. Communities can use APZ to conserve a "critical mass" of agricultural land, enough to keep individual farmers from becoming isolated islands in a sea of residential

neighbourhoods. Maintaining a critical mass of agricultural land can ensure that there will be enough farms to support local agricultural service businesses. By restricting the development potential of large properties, APZ limits land speculation and helps keep land affordable to farmers and ranchers. Finally, APZ helps promote orderly growth by preventing sprawl into rural areas, and benefits farmers and non-farmers alike by protecting scenic landscapes and maintaining open space (AFT 2002, 4).

In Ontario, Municipal Official Plans and Zoning By-laws perform the same role at APZ. Watkins et al. note that where there is political will and community support official plans and zoning by-laws have the potential to protect foodland. For example, "permanent agricultural reserves" could be designated to protect high quality farmlands and viable farm communities that should be considered the last lands considered for urban expansion. The *Planning Act* gives the official plans and zoning by-laws of municipal governments the force and effect of statute.

In addition to the fact that landowners and municipal staff are familiar with agricultural zoning and it can provide a degree of foodland protection at a relatively low administrative cost, agricultural zoning is flexible and can be adapted to accommodate local circumstances.

Watkins et al. note that "the unfortunate reality, however, is that market demand is usually stronger than political will and community support and foodland is rarely adequately protected using these planning tools." "It is unlikely," the authors observe, "that improving the uses of these existing tools will be adequate to protect foodland in the long-term because local development pressures will always prevail over the problem of the loss of farmland" (Watkins et al. 2003, 10).

5.2.2.2 Transfer of Development Rights

Transfer of development rights (TDR) programs allow landowners to transfer the right to develop one parcel of land to a different parcel of land. Because development rights are legally recognized in the U.S., this mechanism is more commonly used there.[27] Generally, TDR programs are established by local zoning ordinances. In the context of farmland protection, TDR is used to shift development from agricultural areas to designated growth zones closer to municipal services. When the rights are transferred, the land is restricted by a permanent conservation easement.

[27] Although this mechanism is common in the U.S., Canadian municipalities have only recently considered them. Because the Charter of Rights does not mention property rights, transfer of development credits (TDC) may be amore appropriate term in a Canadian context. Municipalities in Canada may not be able to establish all aspects of TDC programs in the absence of specific legislative authority (Kwasniak 2004, CWF 2006). The Canada West Foundation has presented TDC programs as an option for farmers in Western Canada (Beale and Fay 2006).

TDR programs are distinct from Purchase of Agricultural Conservation Easement programs because they involve the private market. Most TDR transactions are between private landowners and developers. Local governments approve transactions and monitor easements.

The attraction for builders and developers in TDR is that buying these rights generally allows the new owner to build at a higher density on other lands than ordinarily permitted by the base zoning. For example, a farmer in a rural area may sell one unit of rights to a developer who then uses that right to build two houses on a lot concentrated to an urban centre where only one house was allowed before. Builders can thus build more units without purchasing additional land. From a governments' perspective builders pay for the development rights; no federal, state or local funding is needed. The attraction for the farmer is that they receive payment for their development rights and their land stays in production for agriculture (Dodds-Weir and Dykstra, 2003, 13).

TDR programs prevent non-agricultural development of farmland, reduce the market value of protected farms and provide farmland owners with liquid capital that can be used to enhance farm viability.

TDR programs also offer a potential solution to the political and legal problems that many communities face when they try to restrict development of farmland. Landowners often oppose agricultural protection zoning (APZ) and other land use regulations because they can reduce the market value of the property. APZ can benefit farmers by preventing urbanization, but it may also reduce the market value of their land. However, local authorities can compensate landowners for downsizing by purchasing the development rights (AFT 2002, 6).

5.2.2.3 Land Stewardship Programs

Because farmland is held in private ownership in Ontario, stewardship is important to maintaining the quality of existing farmland, which can have an important influence on whether the land will be protected for farming in the future. Farmland that is poorly managed may lose productivity and therefore be transferred to other land uses.

Land stewardship programs can be an effective way to raise awareness and support for the protection of agricultural land throughout Ontario. The conservation authorities, the Ministry of Natural Resources stewardship coordinators, and the agricultural organizations, such as the Federation of Agriculture, are the principal agencies currently delivering these types of programs in southern Ontario. Other non-government organizations such as Ducks Unlimited and the Centre for Land and Water Stewardship at the University of Guelph are also involved in promoting and delivering stewardship programs that help to protect farmland. These programs

encourage practices to protect water quality (including manure management practices) efficient use of nitrogen (through modeling on-farm nitrogen use), and wetland protection.

Improved stewardship programs are one option that may be used to protect foodland in Ontario. However, these programs usually rely on the voluntary cooperation of the landowner. This approach has historically been supported by the farm community, but risks being ineffective if widespread cooperation cannot be achieved. Implementation is relatively easy, although it is fairly reliant on staff time to deliver the program to landowners. Watkins et al. argue that although this approach has the potential to build relationships between landowners and the government and may contribute to achieving improved understanding and attitudes towards foodland protection, it has low potential to achieve widespread results that would permanently protect farmland (Watkins et al. 2003, 10).

5.2.2.4 Land Trusts

Land Trusts are non-government organizations that protect land through ownership or other formal legal agreements. The general goal of a land trust is to protect private land for public benefit. This is often achieved through the acquisition and long-term management of the land, or by placing easements on the land that permanently restrict the land use of the property. Land trusts have been used to protected farmland throughout the U.S. and western Canada for many years. In Ontario, the Ontario Farmland Trust, established in 2003, is exclusively dedicated to protecting agricultural land.

Watkins et al. argue that the Ontario Farmland Trust could perform many functions to protect foodland, from education to government lobbying in support of foodland preservation to acquiring farmland and leasing it back to farmers at affordable rates. The latter function may be one way to make farmland more affordable to farmers (Watkins et al. 2003, 12).

5.3 Agro-Environmental Programs

Many jurisdictions around the world have implemented voluntary agri-environmental programs to encourage farmers to undertake best management practices or other environmentally-friendly activities on their land. McCallum (2002) has provided a detailed review of current agro-environmental programs in Ontario as well as a study of barriers to participation in these types of programs (McCallum 2003).

Ontario's programs have traditionally been voluntary and cost-sharing. The programs generally pay a certain percentage of eligible costs as a grant, generally with an upper limit, from a finite fund budgeted by government. Some programs require matching funds to be obtained

from collaborators. Programs are also, typically, limited in duration. This reflects the timeframe of the political mandates of the governments which originate them.

Most of the current programs in Ontario are voluntary and publicly funded. They originate from all three levels of government; federal, provincial and municipal. Some programs are local or regional in scope, often targeting specific watersheds or other areas.

McCallum notes that until recently, agi-environmental incentive programs in Ontario have concentrated on conservation of soil and water resources. Therefore, programs have dealt heavily with what might be called best management practices. New orientations, she observes, will seek to include air quality, biodiversity, health issues and related environmental concerns. This is in keeping with wider national and international trends. These new areas of interest are stated in the current Agriculture Environmental Stewardship Initiative (AESI) programs and also in the Healthy Futures for Ontario Agriculture programs (McCallum 2002, 43, 105).

A summary of current agri-environmental incentive programs, based on research by McCallum (2002), can be found in Table 7.1. Since individual farms in Ontario often contain both actively farmed and natural environments (such as woodlots), McCallum has grouped these programs under two general types:

- Agri-environmental programs whose on-farm projects are directed towards farming practices and management of productive farmland;
- Those where on-farm projects are directed towards conservation or management of forest, natural or semi-natural areas on private land.

Table 5.1: Current Agri-Environmental Incentive Programs in Ontario (based on McCallum 2002)

Current Agri-Environmental Programs		
Federal Programs		
Great Lakes Sustainability Fund (GLSF)	2001	Part of Great Lakes Basis 2020 Action Plan (Environment Canada) Initiatives to restore streams into the Great Lakes in 16 Canadian Areas of Concern (AOC) Five-year timeframe
Greencover Canada		A five-year $110-million Government of Canada initiative to help producers improve their grassland-management practices, protect water quality, reduce greenhouse-gas emissions, and enhance biodiversity and wildlife habitat. Greencover Canada focuses on four components: - land conversion – converting environmentally

		sensitive land to perennial cover; - critical areas – managing agricultural land near water; - technical assistance and regional technical assistance – helping producers adopt beneficial management practices; Watershed Evaluation of BMPs (WEBs); and - shelterbelts – planting trees on agricultural land.
Federal Provincial Programs		
Agricultural Environmental Stewardship Initiative (AESI)	2001	Administered in Ontario by the Agricultural Adaptation Council (AAC) Funded by federal National Soil and Water Conservation Program (NSWCP) For environmental improvements on farms, watersheds and food-processing; includes: Agriculture in Harmony with Nature Funded by AAFC's Canada Adaptation and Rural Development Fund Delivered by Ontario's Agricultural Adaptation Council and Ontario Farm Environmental Coalition
CanAdapt Program	2001	Administered by the Agricultural Adaptaton Council (AAC) Funded by Canadian Adaptation and Rural Development (CARD) program of Agriculture and Agri-Food Canada (AAFC) Includes CanAdapt Small Projects Initiative For small-scale agricultural projects in marketing and human resources development
Best Management Practices: Fish and Wildlife Habitat Management		Through AAFC and OMAFRA
Environmental Farm Plan (EFP)	2001	Contributions from AESI Delivered by Ontario Soil and Crop Improvement Association Self-assessment and action plan
EcoAction	2000	An Environment Canada program In Ontario: funding that helps groups to implement projects that protect or enhance the environment
Ontario Programs		
Ontario Stewardship	2001	An Ontario Ministry of Natural Resources program to link stakeholders to promote stewardship on private land
Municipal Outlet Drainage Program	2000	Grants landowners for a portion of costs of municipal drains
Nature Conservation Programs		
Selected Current Ontario/ Local/ Regional Programs		
American Chestnut Project		Led by Ontario Soil and Crop Improvement

		Association (OSCIA) and Grand River Conservation Authority (GRCA)
Rural Water Quality Program		Water: Ours to Protect (Waterloo Region) Funded by the regional municipality with support from a number of other partners
Clean Water Program		Led by South Nation Conservation, funded by Parmalat, and local municipalities
Rural Clean Water Program		Administered by Conservation Authorities of Ottawa (Rideau Valley Conservation Authority, Land Owner Resource Centre, South Nation Conservation Authority) in partnership with the City of Ottawa Cost-share grants available
South Nation Conservation Clean Water Program	2001	Cost-share funding
Middlesex, Perth, Oxford Counties, Cities of London, Stratford and Town of St. Mary's Clean Water Project		Technical and financial assistance in the Thames watershed Grants from three levels of government.
Related Conservation/ Environmental Programs		Programs relating to conservation and/or heritage conservation, for rural landholders. Funding sources are variable:
Baseline Water Well Testing Program		Managed by the Ontario Federation of Agriculture (OFA) for the Ontario Farm Environmental Coalition (OFEC) Test kits available for all private well owners in Ontario
Carolinian Canada "The Big Picture"		Includes list of landowner incentive programs
Ducks Unlimited Canada rural Wetlands in Ontario: A Guide for Landowners		With information on funding/ information from Ducks Unlimited and other agencies
Essex Region Conservation Authority Biodiversity Conservation Strategy		Funding from Environment Canada
Ontario Land CARE		Delivered by Ducks Unlimited Canada
Wetland Habitat Fund		Funded by Wildlife Habitat Canada, Province of Ontario, North American Waterfowl Management Plan Partners Through OFA, OMAFRA, MNR, Conservation Authorities
Community Fisheries/ Wildlife Involvement Program (CFWIP)		Annual financial assistance program administered by the Ontario MNR CFWIP provides grants to community groups and organizations for projects that contribute the rehabilitation or enhancement of fish and wildlife habitat. Eligible projects may include streambank fencing and stabilization, stream crossings, alternative

		watering systems, spawning bed construction, building bird nesting structures, creating wildlife viewing areas, planting food plots, monitoring and assessment of populations and environmental education.
Tax Benefit Programs		
The Conservation Land Tax Incentive Program (CLTIP)	2000	Property tax exemption for eligible lands Supports the long-term private stewardship of Ontario's provincially significant conservation lands through tax relief to eligible land
Managed Forest Tax Incentive Program (MFTIP)		A voluntary Ontario tax reduction initiative Property tax incentives Delivered through Ontario Forestry Association and the Ontario Woodlot Association Conservation easements for tax relief
Tax Benefits		From restricting land uses or donating lands as conservation easements
The Farm Property Class Taxation Program		Farm properties satisfying the eligibility requirements will be taxed at 25% of the municipal residential tax rate.
The Ecological Gifts Program		A program of the Canadian Wildlife Service, Environment Canada

5.4 Farm Assistance Tools

Ontario provides a number of federal and provincial income support programs issuing payments to Ontario farmers. A few of these programs are described below. A complete list of programs can be found on the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) website at www.omafra.gov.on.ca/english/busdev/analysis.

Canadian Agricultural Income Stabilization (CAIS) Program

The CAIS program integrates stabilization and disaster protection into a single program, helping producers protect their farming operations from both small and large drops in income. The CAIS program is a whole-farm program available to eligible farmers regardless of commodities they produce.

CAIS is a joint federal/ provincial/ territorial Business Risk Management program. Producers receive a payment from CAIS when their current year farm income is less than their average farm income from previous years. The amount of support they receive is based on the level of protection they choose.

The Canadian Farm Families Options Program

Announced in August 2006, this program provides income support for farm families with total family income below $25,000 or individuals with total income below $15,000, on the condition that they participate either in business planning or in skills training for off-farm employment. The program will apply to roughly half of Ontario's low income farm families, so it is just one piece of a rural income strategy (Sparling 2006). It is designed to provide short-term income assistance to lower-income farmers and their families while they pursue training and advice to improve their business prospects and income for the long term.

Canadian Agricultural Skills Service (CASS)

This program provides complete coverage of the cost of a consultant's time for the development of a farmer/ spouse Needs and Skills Assessment and Learning Plan. Funding supports both agricultural and non agricultural skills training. This includes formal training such as college programs and informal learning activities such as workshops and short courses. The funding covers tuition and fees, course materials, and, if needed, certain other costs associated with the training. The program provides farmers and their spouses with opportunities to access skills assessment and training with the goal of improving their farm profitability and net family income. Learning Plans can be directed towards individual goals such as improving farm production and management practices building new agricultural enterprises, creating new business ventures, and obtaining employment income.

Planning and Assessment for Value-Added Enterprises (PAVE)

PAVE is delivered through the Canadian Farm Business Advisory Services as part of the Agricultural Policy Framework's Industry Renewal element – a five-year initiative ending March 2008. PAVE provides producers with financial support to establish or expand a value-added enterprise with the hiring of a consultant to develop a feasibility assessment or business plan for specific value-added enterprises.

Nutrient Management Financial Assistance Program (NMAP)

This program applies to existing farms generating more than 300 Nutrient Units and agricultural operations with a high-trajectory manure irrigation gun (used for low wind conditions to obtain maximum distance of throw). The program offers up to 40 to 60% cost-share on eligible beneficial management practices. NMFAP grants can be combined with Canada-Ontario Farm Stewardship Program COFSP grants.

Canada-Ontario Farm Stewardship Program (COFSP)

This program is for Ontario Registered Farm Businesses that have a completed peer reviewed Environmental Farm Plan (EFP). The program offers either 30% or 50% of funding up to $30,000 total grants on eligible projects that were identified in the EFP.

Farm Property Tax Class Tax Rate Program

Farm properties satisfying the eligibility requirements will be taxed at the Farm Property Class tax rate of 25% of the municipal residential tax rate. The farm residence, and one acre of land surrounding it, will continue to be taxed as part of the Residential Class.

Can Advance

The Advancing Canadian Agriculture and Agri-Food (ACAAF) program is a national five-year, $255-million program aimed at positioning Canada's agricultural and agri-food sector at the leading edge to seize new opportunities in the international agri-food market. In Ontario, the Agricultural Adaptation Council delivers the program under the name "Can Advance."

The ACAAF program will focus on three pillars:

Pillar 1 - Industry-Led Solutions to Emerging Issues will support projects that test or pilot approaches and solutions that can serve as an incubator for initiatives holding future promise.

Pillar 2 – Capturing Marketing Opportunities by Advancing Research Results will support projects that transfer research results into market opportunities.

Pillar 3 – Sharing Information to Advance the Sector will support projects aimed at gathering, analyzing and sharing information to contribute to future agriculture and agri-food policy directions.

5.5 Conclusion

This chapter has provided an overview of the tools currently available to support farmland protection and farm stewardship. Almost all of the programs described in this chapter are available to farmers in Ontario. One exception is Transfer and Purchase of Development Rights Programs. As noted in this chapter, Canadian municipalities have only recently considered Transfer of Development Rights programs. Municipalities may not be able to establish all aspects of Transfer of Development Rights programs in the absence of specific legislative authority. The programs described in this chapter, considered together as a package, present the main alternative to the ALUS program.

One approach described in this chapter focuses on farmland protection, primarily through the state or provincial planning process. This includes the creation of agricultural districts, greenbelts, purchase of agricultural easements, and transfer of development rights. Some programs use tax incentives to promote farmland protection. Other programs focus on supporting the culture of farming through reducing competition and conflict with non-farm development. The advantage of these programs is that they do address the loss of farmland by limiting urban sprawl and other forms of development. The limitation of many of these programs is that they do not address the viability of agriculture in the areas where farmland is protected. The programs, for the most part, do not promote economic development in farming and rural communities.

Another set of programs discussed in this chapter focus on promoting environmental stewardship. This includes land set aside programs such as Greencover, and the promotion of general environmental stewardship through the Environmental Farm Plan. The advantages of these types of programs is that they help farmers to start thinking about environmental stewardship and they do lead to improvements in the biophysical environment. The limitation of these programs is that they do not take a long-term or whole farm approach to stewardship, nor do they help in creating a stewardship mindset among farmers who participate. Funding is provided on an ad hoc basis for discrete projects. In addition, because many of these programs employ a cost-share approach, they entail some expense for the farmer.

Another approach described in this chapter is to focus on providing farm support. This support can be through income stabilization, through programs which support skills training for on-farm and off-farm employment, or through programs which focus on developing marketing opportunities such as value-added enterprises. The strength of these programs is that they support the viability farming through the long-term transformation of the farm enterprise. The weakness of these programs is that some focus on short-term solutions (i.e. income stabilization), and they do not link economic development with protection of the biophysical environment.

This review suggests that there is room for looking at ALUS as an alternative or supplement to the kinds of initiatives reviewed in this chapter. Because ALUS does not address farmland protection directly, an ALUS program would work best in areas where farmland protection policies were in place. ALUS would also be a good complement to farmland protection policies which, for the most part, do not address the viability of the agricultural economy. ALUS could be complemented by existing farm support programs which address skills development and business planning as a long-term approach to transforming the farm enterprise. Unlike existing programs, however, ALUS has the ability to link economic development with environmental stewardship.

An ALUS program could also complement existing stewardship programs by promoting a level of environment stewardship not supported by these programs.

The programs reviewed in this chapter, considered together as a package, will be evaluated and compared with ALUS in order to draw conclusions about the potential of ALUS to support a sustainable agricultural economy in Ontario's Greenbelt. Whether ALUS presents a more attractive option than the programs currently available to farmers will be discussed. This analysis is presented in Chapter Nine.

Chapter 6 **Case Example Site Descriptions**

6.1 Introduction

Three case study areas within the Greenbelt were chosen in order to highlight the diversity of the food and agriculture sector in this region and to test the potential of ALUS in a variety of settings. Two sites (Caledon and Niagara) were chosen because municipal governments in these areas have expressed an interest in exploring agricultural ecological goods and services programs in their jurisdictions.

6.2 Case Study #1: Caledon

Almost half of Caledon is currently classified as an Agriculture Area in the Town of Caledon's Official Plan. This area includes prime agricultural lands and takes in the Peel Plain which is particularly important for agriculture because it has Classes 1, 2 & 3 agricultural soils and relatively warm climate. This combination makes it more productive than other areas of the province that may have good soil but fewer heat units.[28] This area, which is close to the edge of suburban Brampton, remains one of the most productive farming areas of the Toronto region, with almost $47 million in gross farm receipts in 1996 (RON 1998). While Brampton has built subdivisions on its prime agricultural land, Caledon has managed to keep the majority of this land in agricultural production. Virtually all of the active farms in Peel Region are located in the Town of Caledon. Although, like the rest of Peel, Caledon is experiencing considerable growth pressures, with a 45% increase in population in the last decade, most of this growth will occur in rural service centres, as the municipality tightens policies to protect rural areas (Bunce and Maurer 2005, 10).[29]

There are indications that Caledon's efforts to protect agricultural land are working. The total agricultural acreage of Caledon has declined by 16% over the past 25 years - half the rate of the Toronto region as a whole. Although the number of farms has declined at almost the same rate as the rest of the GTA,[30] average farm size has increased to 214 acres, and Caledon contains some very large operations; 20 are more than 760 acres. More than half (55%) of agricultural land in the area is rented. The dominant types of farming in 2001 were dairy, cattle, cash crops, and horse

[28] Crop heat units is an energy term calculated for each day and accumulated from planting to the harvest date.

[29] While it agreed to double its population between 1996 and 2021, Caledon has already focused that growth in three urban centres in order to protect its agricultural and environmentally-sensitive lands.

[30] In absolute numbers, Caledon experienced the loss of the largest number of farms at 75 (between 1996 and 2001) or 287 (between 1976 and 2001) (Walton, 2003a, p.2.7).

operations. Most horse farms were in the rural area of the Oak Ridges Moraine and on the Niagara Escarpment (Bunce and Maurer 2005, 10).

6.3 Caledon's Agricultural and Rural Policy (OPA 179)

Caledon introduced a new Agricultural and Rural Policy in 2003 (Official Plan Amendment 179). Caledon's vision for its Prime Agricultural Area is as follows:

> Flowing from its rich farming traditions the business of agriculture in Caledon will continue to make important economic contributions through the production of healthy food and value-added products for local, regional, national and international markets. By encouraging the business of agriculture and other compatible activities the Town will protect high quality agricultural land and will recognize the contributions agriculture and other compatible activities make to Caledon's culture and countryside (Caledon 2003).

As outlined in the OPA, the municipality seems determined to pursue policies to retain its overall rural character and ensure the continuation of agriculture on its prime lands. The OPA establishes policies for agriculture within the Prime Agricultural Area. The OPA states that Caledon's agricultural industry is undergoing fundamental changes challenging the business of agriculture with issues such as declining farm populations and commodity prices, increasing competition and consumer preferences and increasing environmental requirements. The response to these issues by the agricultural industry, the OPA notes, has generally been to increase farm size and the intensity of agricultural land use and to seek off-farm income. To assist the agri-food industry and agricultural community, the Town states that it is committed to providing the most support possible through the land use planning process. The Town seeks to promote a viable and sustainable agricultural industry though giving first priority to agriculture and its needs within the Prime Agricultural Area, promoting value-added agriculture, farm intensification and diversification, preventing the creation of new land uses from hampering productive agriculture and educating the consumer on the importance of agriculture (Caledon 2003, 8). The new policy expresses a willingness to incorporate other innovative solutions such as conservation easements, restricting urban boundaries, and tightly controlling severances on farmland.

Considered comprehensively, the policies stated in the OPA should assist the agricultural industry and agricultural community through changing market conditions, technological advancement, economic fluctuations and a shifting Provincial regulatory environment. Bunce and Maurer report that Caledon - both the municipality and its residents - represents one of the

strongest supporters of region-wide initiatives to protect agricultural land (Bunce and Maurer 2005, 9).

6.4 Effects of the Greenbelt Plan and Places to Grow Legislation on Farmland Protection

Several non-government organizations have expressed concerns that the Greenbelt Plan fails to protect the significant agricultural lands in Caledon that form a ring around the perimeter of the existing urban area. These lands were left undesignated in the draft Greenbelt Draft Plan. Located in areas known as the "white belt," where urban/suburban developments are anticipated, these pockets represent about 70% of Caledon's prime agricultural land. These lands are currently protected under Caledon's Official Plan, but because Caledon's Official Plan must be brought into compliance with the Greenbelt Plan, these protected agricultural lands are open to urban development. At the time that the draft Greenbelt Plan was being circulated for comment, the Caledon Countryside Alliance was concerned that these lands may appear as areas for future urban growth in the Places to Grow document. The recent Places to Grow growth strategy produced by the Provincial Government puts 27,000 acres of south Caledon into the unprotected "White Belt" and available for future growth.

6.5 Environmental Issues in Caledon Agriculture

A Region of Peel report describes a number of areas of concern regarding the impact of farming practices on the natural environment have been identified. This includes soil erosion by wind and water, which undermines the productivity of the soil. Certain soil tillage methods reduce the organic matter content of the soil, though the use of conservation tillage techniques and crop rotation by many farmers have helped to improve the soil's organic content.

Pesticides are used to control crop and livestock pests. The health effects of pesticides may be the greatest for the farmers who work with them. However, there remains a more general risk through the contamination of food and water. In the Region of Peel, the land area for which pesticides have been used has not decreased to match the decline in total farm area. The area for which the use of herbicides was reported declined from 1886-1991, then increased from 1991-1995. The area for which the use of insecticides and fungicides was reported increased 28% during the 1986-1995 period, as total farm area declined by 7.3 percent.

Fertilizer use can degrade water quality, and nitrogen fertilizer can contribute to atmospheric greenhouse gases, through the release of nitrogen oxides. The reported area of fertilizer use in the Region declined between 1986 and 1991, then increased again in 1995.

The Region of Peel report notes that despite this situation, farmers are more educated about the proper use of these products and are making efforts to decrease the frequency of application and the amount used. This makes economic sense due to the fact that these products are costly inputs to the food production process.

Historically, the clearing of land for agriculture has been one of the principal causes of the loss of natural areas. More recently, the abandonment of marginal cropland has permitted some natural regeneration of these areas, as agriculture concentrates in core areas such as southwestern Ontario. Many farmers manage woodlots for the sale of timber and maple syrup. Surviving wetland and woodlands provide essential habitat for wildlife (ROP 1998).

6.6 Support of ALUS

The Town of Caledon Town Council has expressed some interest in an ALUS-type program and has passed a motion to that effect. On March 20, 2007 it was noted that:

> Council recognizes the "basket" of services that agriculture provides to the urban residents is vast and varied, and that the cost to maintain and improve environmental projects cannot be solely borne by the agricultural community when the benefit is realized by society as a whole. Council requested that the Caledon Environmental Advisory Committee (CEAC) include in its work plan an investigation of "A Net Value System" that could be used to support the long term plan for environmental payment for conservation protection.

Caedon's interest in ecological goods and services arose, in part, as reaction to provincial initiatives such as the Oak Ridges Moraine and Greenbelt, "which are regarded by many as a threat to agricultural viability by requiring changes in many agricultural practices."

6.7 Case Study #2: Niagara

The Niagara Fruit Belt, in the northern part of the Niagara Region, is relatively small, extending some 25 miles along the southern shore of Lake Ontario between Grimsby and the Niagara River, and extending inland between one and seven miles from the lakeshore to the Niagara Escarpment. However, with its important combination of soil and microclimatic conditions, it is one of only three small areas in Canada that is capable of supporting a large-scale commercial, tender-fruit and grape growing industry (Gayler 2004).

The Niagara region is a symbol of the conflict between agriculture and urbanization in the Golden Horseshoe. Rapid and largely uncontrolled development along the Queen Elizabeth Way highway between the 1950s and 1970s eroded the specialty fruitlands below the Niagara

Escarpment. This threat to the future of the Province's only significant tender fruit-, grape-, and wine-producing lands precipitated the introduction of provincial farmland preservation policies in the late 1970s and, more recently, strongly pro-agricultural policies on the part of the Regional Municipality (Bunce and Maurer 2005, 14).

Although agricultural acreage declined by almost eight percent between 1976 and 2001, there has been a slight increase in the past few years (RAEIS 2003). Despite these problems and despite increasing foreign competition in the fruit sector, agriculture in the Niagara region seems to be holding its own (RON 2004). Agricultural acreage appears to be stabilizing and new types of enterprises are being developed. Although grapes and tender fruits define the region's agricultural identity, with expanding greenhouse flower and vegetable production, nursery gardens, sod farms, livestock production, cash cropping, and a range of niche enterprises, this is the most diverse agricultural area in the Toronto region. And with average gross farm receipts of almost $2,200 per acre annually, it is also the most productive agricultural area in the region (RON 2006; RAEIS 2003).

6.8 Pressures and Challenges

While acknowledging that, on the whole, the agricultural sector in Niagara is healthy, the Regional Agricultural Economic Impact Study, completed in 2003, identified some disturbing trends. While the number of acres under production is relatively steady, the amount of rental land being farmed is growing. This reluctance, or inability of farmers to make capital investment in land, generally points to vulnerability of the land base. Sectors of the industry are experiencing pressure from foreign competition and are vulnerable to increases in the value of the Canadian dollar, discrepancies in service levels, costs of inputs, access to services and delays at the border. There is the pressure for urban expansions, and urban-type uses and related infrastructure are encroaching into agricultural areas (RMON 2004; RAEIS 2003, 1). There are also pressures on the limited land base from competition within the agricultural sector between traditional and newer types of farming (RAEIS 2003).

The Regional Agricultural Economic Impact Study noted that one of the measures of a successful planning program is often the number of severances that are approved in the rural and agricultural areas. In 2002, a study conducted by the University of Guelph reviewed the incidences across Ontario. The conclusion of this study was that during the period between 1990 and 2000 an average of four lots were created in Niagara for each concession block (RAEIS 2006). The 2002 Agricultural Action Plan also noted that this large protected area in close proximity to the GTA is desirable as the location for rural residences. The nature of agriculture in

Niagara is such that the farm parcels are small enough to be viable as large estate lots. Competition for land between agricultural and estate residential use could drive prices up making it difficult for farmers to afford to acquire or rent land, introduce conflicting uses, take land out of production, and result in a fragmented agricultural area (RON 2006).

6.9 The Agricultural Action Plan

In 2002, in response to the findings of the economic impact study and in response to a provincial initiative to establish an "agricultural preserve" in Niagara, the Agricultural Task Force comprised of representatives of all of the major agricultural groups in Niagara was established. The Task Force was assigned to develop a strategy to support agriculture in Niagara. The strategy was refined and endorsed by Regional Council in May of 2004. It articulates a vision for agriculture in Niagara:

> Agriculture in Niagara is a diverse, multi-faceted industry based on a very special, limited, non-renewable resource created by a unique combination of physiography, soil, location and climate. The strength, stability and diversity of this industry is recognized and will be promoted and protected so it can continue to grow and evolve for the benefit of present and future generations.

The Agricultural Action Plan is looking at how to grow the industry and create economic viability for the long-term. The report looks at actions that are required to support the industry, and identifies steps that can be taken to ensure that agriculture in the region will thrive into the 21st century. The report doesn't describe all of the actions that could be taken, but rather proposes what it considers to be the most effective bundle to realize its goals and to grow the industry at this point in its history. This strategy continues to provide the guiding principles under which actions to support agriculture in Niagara should be taken. It is the basis for the recommendations contained in this action plan.

At the time that the Task Force was completing its work the Province was introducing a number of land use initiatives. Work on three major initiatives – establishment of the Greenbelt, revisions to the Provincial Policy Statement, and development of the "Places to Grow' growth plan for the Greater Golden Horseshoe, were ongoing. The Greenbelt plan incorporated ideas from Task Force and Regional Policy Plan.

While the provincial initiatives addressed a number of issues identified as critical to the ongoing viability of agriculture in the Region, there was also a clear consensus among Task Force members that additional actions and investments would be required to support agriculture in the

area included in the Greenbelt and to realize the vision of ongoing strength, stability and diversity for agriculture in Niagara generally.

In June, 2005 the Province awarded $100,000 to help implement the Task Force action plan. The Task Force responded by establishing a goal to grow agriculture in Niagara from a $3.6 billion industry annually from its current level of $1.8 billion. Preparation of an agricultural viability plan focused on seven specific areas: re-establishing the research capability of the Vineland Research Station; reducing barriers to growing the agricultural industry; specific tax policies; providing raw water for agriculture; developing small and medium processors; re-visiting the use of the Agricultural Easement program; and developing a Niagara brand for agricultural products (RMON 2006).

6.10 Grape Growers Replanting Proposal and National Tree Fruit Replant Strategy

Two recent initiatives highlight some of the issues and trends in agriculture in the Niagara region. The Grape Growers of Ontario have proposed a replanting plan to convert up to 25% of suitable juice grape acreage to more valuable wine grapes. The strategy is needed because juice grape production has become unsustainable,[31] in contrast to wine grapes where there is high and growing demand. The strategy is also needed because Ontario's Greenbelt legislation requires continued agricultural use. The Grape Growers has argued that because the Ontario Greenbelt legislation has restricted the use of Niagara's grape and tender fruit lands to agricultural uses, a strategy is needed that will help to ensure that agriculture remains a viable option for landowners. The organization also believes that the Ontario government must share the economic impact of the Greenbelt (GGO 2006).

The federal and provincial governments have made a commitment to a national replant strategy for tree fruit. The strategy states that 25% of Canada's tree fruit acres will be replanted with varieties well suited both to anticipated consumer preferences and local soil and climate conditions. The rationale is that growers will have a better likelihood of earning sustainable returns from the market, reducing their reliance on risk management programs like the Canadian Agricultural Income Stabilization (CAIS) program (OTFP 2007).

[31] The recent loss of contracts to supply Cadbury-Schweppes Beverages with juice grapes, affected about 105 growers in the Niagara area and approximately one-fifth of all Greenbelt grape growers (FGBF, 2007, p.10).

6.11 Case Study #3: Holland Marsh

Ontario's Holland Marsh is an area of land running astride the Holland River from Cook's Bay, Lake Simcoe southwest to the shoulder of Kind Township. It has been used for growing vegetables since 1930, when the canal system was constructed to drain the Marsh for agricultural use (Bartram 2007, 1)

Designated as a Specialty Crop Area in the Greenbelt Plan, it holds a place as one of the unique features of Ontario's Greenbelt. At over 7,000 acres, the land is comprised of some of the most fertile soil in Canada, soil that supports the growth of a wide variety of plants. While carrots and onions are the two most common crops, ethnic vegetables, such as Chinese cabbage, are becoming increasingly common. There are currently about 100 farms in the Holland Marsh, down from around 300 to 350 in the late 1970s. Smaller farms have been amalgamated into large operations as farms today tend to require more acerage to be profitable. This decline is also considered as a result of increasingly prohibitive production costs, and farmers retiring without anyone taking over the business (Bartram 2007, 8). Along with the increase in farm areas, the land-use distribution has changed, with less pasture land used for raising livestock and an increase in field crops such as corn and beans. The Holland Marsh generates millions of dollars in annual revenue and creates employment for agricultural growers, packagers, and processors. Economically, the Marsh plays a large role in Canada's food export market.[32] Carrots and onions are exported to the U.S., as well as Venezuela, Caribbean islands and sometimes Britain. Products also and find a substantial local market in the neighbouring Greater Toronto Area's six million residents (Bartram 2007, 1).

The number of irrigation systems within the Marsh has increased recently. In 1985, few growers would irrigate onions and carrots, but due in part to climate change (increases in temperature and reduced rainfall), irrigation is now practiced throughout (Bartram 2007, 8).

Although there are a number of agricultural and environmental challenges facing the Marsh, Bartram notes that "at this time, the farming community does not appear to be cohesive or particularly engaged with any government or non-government organizations to deal with issues facing farming in the Marsh" (Bartram 2007, 1).

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[32] Bertram points out that the percentage of food exported from the Marsh is also unknown, though it has been suggested that the majority of food grown in the Marsh is exported to the United States (Bartram, 2007, p.2).

6.12 The Canals

The canal system, which has been keeping the Marsh drained for agricultural use for over 70 years, has not been properly serviced since the 1950s and requires maintenance. The canals have not been dredged since 1955, allowing a silt build-up of 1 metre over the original grade line of the canal bottom. The silt build-up poses a risk in the event of a torrential rainstorm, since the lack of maintenance over the past years has compromised the entire system. Reports from the Holland Marsh Drainage Commissioner estimates that a large storm could cause up to $84 million in damage to local farmers and businesses alone, increasing to as much as $200 million when associated food processors, transportation companies and a rise in province-wide vegetable costs are taken into account. If the soil was saturated during a severe rainstorm the canals could easily be overwhelmed, inundating the dykes again flooding the 7,000 acres of farmland (Bartram 2007, 10).

6.13 Agricultural Issues

Soil erosion is another major concern, since the organic black soil decomposes naturally. This inevitable decomposition, combined with farming practices, will leave the Marsh stripped of its fertility in 100 to 200 years. Though the soil decomposition cannot be stopped altogether, there are a number of processes that can help slow down the decomposition and extend the Marsh's productivity. Some beneficial practices that reduce environmental impact are the use of cover crops and improved cropping systems, as well as low impact irrigation and riparian planting.

Agricultural challenges for the Marsh include both local and international issues. According to one farmer, the encroaching urban areas have begun to affect the Marsh though an increase in trespassing and crop theft. This farmer claims that challenges also exist with farming practices, and some growers may benefit from additional training in land stewardship and conservation methods.

The strong Canadian dollar has meant profit margins have shrunk for Holland Marsh farmers who export the bulk of their products to the U.S. This challenge is an opportunity for the farmers to become more involved with local food movement, selling their produce at neighbouring farmers' markets and supplying organizations such as Local Flavour Plus, A Toronto-based group dedicated to facilitating the consumption of local, sustainably-produced food by connecting farmers to institutional food markets (Bartram 2007, 12; FGBF 2007a).

6.14 Environmental Issues

Marshes are important ecological features of the landscape, acting as natural water filters and important habitat for biodiversity. As the Holland Marsh is foremost a marshland, its drainage for agricultural use has left it with a number of severe environmental issues.

Specific environmental issues associated with agricultural land-use include: soil erosion, lack of vegetative buffers along watercourses, and the application of herbicides, pesticides and commercial fertilizers resulting in polluted runoff that makes its way into nearby watercourses, and ultimately Lake Simcoe.

Most crops are grown using chemicals to fertilize them and protect them from disease. The absorptive properties of the organic black soil which makes it so effective in supporting high crop yields, result in those chemicals soaking into and polluting the surrounding watershed.

Phosphorus pollution, partially as a result of farm runoff, has showed a marked effect on the health of Lake Simcoe and the surrounding watershed. Phosphorous loading is believed to be from agricultural land use practices, urban runoff and atmospheric sources. Though the Marsh is a visible producer of phosphorus runoff, its contribution currently ranges from two percent to six percent of the total phosphorous load into Lake Simcoe.

There are a number of programs in place to lessen the environmental impact of the agriculture in the Marsh. Nutrient management and planting of buffers to reduce erosion on banks both serve to lessen the strain on the environment. Reducing the amount of fertilizer used on crops would also be beneficial. However, because there is currently a large build-up of phosphorous in the drainage system, phosphorous would continue to leave the canal system even if all of Holland Marsh stopped using chemicals today (Bartram 2007, 13).

6.15 Lake Simcoe Water Quality Improvement Program

The Lake Simcoe Water Quality Improvement Program (LSWQIP) is a partnership between the Lake Simcoe Region Conservation Authority, its member municipalities, and the York, Durham and Simcoe chapters of the Ontario Federation of Agriculture. The programs provides technical and financial support to assist private landowners in competing environmental projects designed to improve local surface and ground water quality, reduce soil erosion, and enhance wildlife habitat. LSWQIP support is available for a variety of activities including:

- Milkhouse waste management systems
- Manure storage and management
- Streambank erosion control
- Tree and shrub planting

- Cover cropping
- Cropland erosion control structures
- Clean water diversion
- Livestock access restriction from watercourses

6.16 Integrated Pest Management in the Holland Marsh

Intensive vegetable production has been ongoing since the early 1940s, which has led to high pest populations in carrots, onions, celery, and lettuce. To combat increasing pest problems, pesticides were often the first line of defence to protect crop yield and quality.

In the late 1970's a program was introduced to the Holland Marsh to better time pesticide applications and reduce producer's reliance on pesticides as the primary means of pest control. This program and many others like it fall under the name of Integrated Pest Management (IPM) and it still functions today, reducing the producer's reliance on pesticides while maintaining quality vegetable production.

The IPM program has led to a dramatic reduction in the volume of pesticides used in this area. Over all, across the 18 years of operation, the IPM program has contributed to a 40% reduction in the amount of pesticides used on muck crops.

Today, IPM is part of a more comprehensive Integrated Crop Management program involving the intensive management of all aspects of production including soil management, plant nutrition, climate modeling, marketing, etc. New marketing opportunities are now at the forefront and produce may soon be labeled under a responsible management banner. This marketing technique will be designed to inform the consumer of the healthy choice they are making purchasing Ontario grown produce (Croplife 2003).

6.17 Summary and Conclusion

The case studies in this chapter demonstrate the very important role that agriculture plays in communities in this region. This is especially true in the Holland Marsh and in Niagara, which are both considered Specialty Crop Lands.

The chapter also demonstrates the vulnerability of agriculture in these regions, both economically and environmentally. The agricultural economies in these areas face a number of challenges. These challenges exist at the international level, including competition with foreign commodities, and at the local level, including restrictions created by the Greenbelt legislation itself. These regions also face environmental challenges including the effects associated with the use of pesticides and fertilizers, as well as soil loss and issues related to maintaining water quality

and quantity. Farmers in these areas also face changing market conditions, technological advancement, economic fluctuations and a shifting provincial regulatory environment.

Local governments in both Niagara and Caledon are concerned about the long-term sustainability of the agricultural industry and are actively working to find solutions to these challenges, and to create new opportunities. Niagara's Agricultural Action Plan is looking at ways to grow the industry and create economic viability for the long-term. The grape replant and national tree fruit replant initiatives in Niagara, are also attempts to adjust to new opportunities in order to preserve the agricultural economy. Caledon's Agricultural and Rural Policy (OPA 179) is also an attempt to ensure the continuation of agriculture on its prime lands. Limiting urban growth, promoting value-added agriculture, and payments for providing ecological goods and services all being discussed as solutions. A concern for preserving the agricultural industry does not seem to be present in the Holland Marsh, where it was noted that the farm community does not seem to be engaged with government or non-government organizations to deal with issues facing farming in the Marsh.[33]

An ALUS program for the Greenbelt must address the realities discussed in this chapter, and must help farmers adapt to an agricultural industry that is undergoing fundamental changes. The program must contribute to the long-term sustainability of the biophysical environment as a foundation for the agricultural economy in the region. It must also help to create and sustain economic opportunities and ensure the viability of the farm economy in these areas. The following Chapter will develop a framework for a sustainable agricultural economy in the Greenbelt, taking into consideration the case and context species issues discussed in this chapter and in the literature. This will be followed by an assessment, in Chapter Eight, of where ALUS can make a contribution, and what that contribution can be.

[33] A recent grant from the Friends of the Greenbelt Foundation may help to shift the mindset towards farmland stewardship in the Holland Marsh area. The Foundation provided over $1 Million in funding to the Lake Simcoe Conservation Authority to assist farmers with environmentally-friendly farm stewardship.

Chapter 7 **A Sustainable Agricultural Economy in Ontario's Greenbelt: Assessment Framework and Criteria**

7.1 Introduction

In Chapter Three, I examined the literature on sustainability with a specific focus on environmental stewardship and livelihood requirements. The elements of a sustainable food system and the principles of sustainable agriculture were also discussed. This chapter will bring the requirements for progress towards sustainability and the principles of sustainable agriculture together with the context specific issues of the Greenbelt in order to develop a framework for a sustainable agricultural economy. I begin by reviewing and summarizing the requirements for progress towards sustainability, and then describe the important issues relevant to farming in Ontario's Greenbelt. Finally, I create a hybrid framework which encompasses all of the relevant case-specific issues within the context of the broader sustainability requirements. The framework will provide a structure for assessing the potential contribution of the ALUS program in comparison with the other reasonable alternatives.

7.2 Requirements for Progress Towards Sustainability

Gibson notes that the essential requirements for progress towards sustainability can and have been set out in countless different ways. Any such list, he notes, "is debatable and there will always be openings for learning and revision. Nevertheless it is not difficult to discern a limited number of common themes and broadly accepted general propositions" (Gibson 2005, 95).

The eight criteria put forward by Gibson "constitute a minimal set of core requirements, all of which would have to be elaborated on and specified for particular places and applications." The list is based on a synthesis of arguments drawn from the sustainability literature and practical experience very broadly categorized as sustainability-centred (Gibson 2005, 95). The eight requirements are summarized in Figure 6.1. It is important to note that these generic criteria must be supplemented by incorporation of case and context specific elaborations (see section 6.10., below).

Figure 7.1 : Requirements for Progress Towards Sustainability (Gibson 2005, 95-114)

Socio-ecological system integrity. Build human-ecological relations that establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological well-being depend.
Livelihood sufficiency and opportunity.

Ensure that everyone and every community has enough for a decent life and opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.
Intragenerational equity. Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.
Intergenerational equity. Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.
Resource maintenance and efficiency. Provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the long-term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.
Socio-ecological civility and democratic governance. Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision making bodies to apply sustainability principles through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary, collective and personal decision making practices.
Precaution and adaptation. Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise and manage for adaptation.
Immediate and long-term integration. Attempt to meet all requirements for sustainability together as a set of interdependent parts, seeking mutually supportive benefits.

7.3 Case Specific Issues

While a number of study reports address agricultural pressures in Ontario generally, very few focus specifically on the challenges encountered by farmers in Ontario's Greenbelt. Much of the information in this section was taken from four reports that focus on agriculture in the Greenbelt and the Greater Toronto Area region (Bunce and Maurer 2005; Walton 2003a; Walton 2003b; FGBF 2007a).

The issues raised in these reports have been organized into five "issue clusters" or sets of related issues. Four issue clusters represent negative aspects of the current system, or challenges to be addressed, and one issue cluster represents opportunities for farming in the Greenbelt.

7.4 Issue Cluster 1: Farm and Farmland Loss

The number of farms in the Greater Toronto Area (GTA) declined by over 2,000 (or 31%) between 1976 and 1996. In reviewing this, it must be remembered that looking at trends with respect to number of farms can be misleading. There has been an ongoing trend to farm amalgamation which means that individual operations are getting larger and the absolute number

of operations declines. However, even considering this trend the percentage of loss of farms in the GTA was greater than that of farms lost in the surrounding counties (20%) or the province as a whole (24%). Between 1996 and 2001, the number of farms in southern Ontario and Ontario declined by 12%; in the GTA it declined by 16% (representing a loss of 751 farms). Not surprisingly, the municipalities closest to Toronto experienced the largest percentage decline in number of farms (Walton 2003a, 2.5-2.7).

There has also been a dramatic decline in the area of farmland in the GTA. In the period between 1976 and 1996 in excess of 150,000 acres of farmland went out of production in the GTA. This represents an overall decline of 17%, which was considerably larger than the percent of decline of 9% in the area surrounding the GTA or 10% in the province as a whole, during the same period. This trend continued between 1996 and 2001. During that period the amount of farmland in the GTA decreased by 50,314 acres (Walton 2003a, 2.8).

The proportion of land under production that is rented rater than owned is often an indicator of the stability of the industry. In 1986, 68.8% of the 4.3 million acres being farmed in the GTA region was owned; 31.2% was rented. In 2001, 61.6% of the 4.1 million acres of farmland was owned and 38.4% was rented. Again there is a correlation between proximity to urban areas and a higher percentage of rented land. The percentage of rented land in the GTA continues to be considerably higher than the provincial average of 31% and for the area surrounding the GTA where the rate is 37% (Walton 2003b,7; Walton 2003a, 2.15).

A higher incidence of rented land often results in a less stable agricultural community. Farmers are less inclined to make the capital improvements required to maintain the land if they do not own it or if the right to use is short term and informal. The type of commodities grown on rented land tends to be limited. A farmer with a year-to-year rental agreement is not going to plant a crop that requires capital investment and a number of years to reach full production. Therefore rental land is often not managed to full efficiency, used to its full potential, or cultivated for the most productive crop. Rental arrangements in the GTA are usually short term and informal (Walton 2003b, 2.15-2.17).

As Walton points out, a number of other uses compete with agriculture for land. Primary among these is urban development. Competition for land in the rapidly urbanizing areas in the GTA and around existing urban areas is intense. “Pressure for residential, industrial, and commercial development,” Walton reports, “is obvious and constant.” Less obvious is competition for land for golf courses, aggregate extraction, transportation corridors, service corridors, wetland complexes, and open space facilities. All of these uses result in the loss to agriculture of much larger areas than just those actually being occupied by new development.

Inherent conflicts between these and uses and agriculture negatively impact the ability to farm efficiently (Walton 2003b, 17). In terms of green space, Walton notes that the polices for the Oak Ridges Moraine and the Niagara Escarpment have imposed restrictions on activities that have traditionally been part of farming. To be successful, she argues, farmers need flexibility to respond to changes. As flexibility is lost through tightened regulations and as the required procedures become more complicated, the ability to farm successfully is reduced (Walton 2003b, 18).

7.5 Issue Cluster 2: Making a Living from Farming

The Cost-Price Squeeze

In a series of interviews with farmers in the GTA region, Bunce and Maurer found that although most farmers said that they felt financially secure, the most frequently repeated concern was the challenge of making an adequate living from farming. Most farmers were pessimistic about the future of their business. While almost 70% of the operators felt secure or relatively stable about their overall financial outlook, the remaining 30% identified themselves as either struggling or unable to make any kind of living from their farming operation. Almost 60% had no plans to expand, diversify, or alter their farm businesses. Only 19% had any intentions of expanding the scale of their operations. Almost 60% stated that they would sell their farm or farmland if offered the "right" price. The economic viability of farming in general was cited by 55% of the operators as a major threat to continuing to work their farms, with urban development a close second (Bunce and Maurer 2005, 19).

Bunce and Maurer found that of the major challenges to making a living from farming, the respondents they spoke to most often identified the cost-price squeeze – that is, the relationship between the costs of production and the prices received from farm produce. This complaint was cited even by those who were operating relatively successful and secure enterprises. While most saw this as endemic to agriculture, some specific factors were involved. For many, it related to the cost of expansion and new investment as operators worked to achieve economies of scale and greater market share. Start-up costs are a problem for young farmers. However, rising input costs in general combined with declining commodity prices are clearly seen as the main barriers to the continuation of farming. The farmers Bunce and Maurer spoke to complained that the returns on investments just aren't there, that the costs of farming just keep escalating and that they have to work harder than ever just to stay where they are (Bunce and Maurer 2005, 26).

Market Competition

Low returns on investment were usually attributed to the general difficulties of competing in continental and global markets. Several farmers Bunce and Maurer spoke to talked about the large supermarket chains that could lock up contracts with foreign shippers and to the problems of selling produce locally when so much is imported. Another saw the problem in terms of the more systematic consequences of global agribusiness, and the inability to compete with developing countries.

Two examples illustrate this problem. Bunce and Maurer report that potato and hog farms feel vulnerable because of corporate food processing monopolies and the tight margins that this forced on them (Bunce and Maurer 2005, 26-27). In the large retail market, southern Ontario farmers growing strawberries face increasing competition from cheap exports, forcing Ontario farmers to either drop their prices or find new markets (FGBF 2007a, 10). California boasts seven times Ontario's strawberry fields – 14,000 hectares compared to 2,000. The state grows them all year round, which is why consumers can find them in January (Toronto Star, June 24, 2007).

Walton attributes part of this problem to what she calls a federal policy vacuum. She argues that there is a lack of a clear statement from the federal government on the importance of agriculture to the Canadian economy, and a commitment to developing a "level playing field" with respect to agriculture in other countries. These issues may be addressed through the forthcoming Agricultural Policy Framework initiative. In the meantime, Walton notes, subsidies for agriculture in other countries skew the marketplace, making foreign products cheaper than Canadian products. Free trade policies were designed to address these inequalities but often seem ineffective. Walton goes on to note that Canadians enjoy some of the cheapest food in the world. The burden of this cheap food policy, she points out, is often disproportionately borne by the producers. While the input costs to farming rise, prices fall. Because of subsidies in other countries, there is limited opportunity to increase the prices of agricultural products (Walton 2003b, 24). This situation is made more difficult by "a culture of cheap food and a mental price barrier of consumers who feel that food should be cheap" (Bunce and Maurer 2005, 26).

Supplementing Farm Income

The Toronto Star reported that around Toronto, most farms make under $25,000 a year (Toronto Star, June 24, 2007).[34] In the GTA region, many farmers have to supplement their farm

[34] It is assumed that this figure represents net income. Figures from the 2001 agricultural census state that average gross farm receipts per acre for farms in the GTA was $946. The average operating cost in the GTA per acre in 2001 was $821. Based on an average farm size of 183 acres for farms in the GTA, the net income would be $22,236 (Walton 2003a).

income with income from non- or off-farm work. Some farmers Bunce and Maurer spoke to did farm work for other operations, such as combining, while others reported income sources such as interest on investments, pay from work as chair or member of a marketing board, or working for a seed dealership or grain elevator. However, the sense of non-farm work as a second choice to full-time farming seemed to be fairly common. While some farmers the authors spoke to sought extra income off the farm, their long-term plans are to concentrate fully on the farm.

The most common source of non-farm income came from a spouse – this usually meant the wife's job. Wives bring in as much as two-thirds of total family income from off the farm and are essential to the survival of some operations (Bunce and Maurer 2005, 28-29).

Based on the 2001 Statistics Canada Agricultural Data, The Friends of the Greenbelt Foundation reported that while about 56% of farmers do not work off the farm, nearly 20% put in more than 40 hours of work at another job, revealing the difficulty in creating a viable farm business. The number of farmers supplementing the family income by working off the farm, the Foundation reports, has likely risen since 2001 (FGBF 2007, 12).

The Land Market

Land, and its value for uses other than agriculture, takes on central significance in the Greenbelt. Bunce and Maurer report that in the GTA, retaining development rights and the freedom to sell land to the highest bidder is important to many farmers. A common theme was that of wanting to "cash in on their property" and farm elsewhere. However, remaining active players in the land market for farmers also means buying other land for agriculture, or taking advantage of the rental land that the development process supplies.

Despite the obvious enthusiasm among many farmers for taking advantage of rapidly rising land prices, some are more interested in holding on to their land. However, farmers Bunce and Maurer interviewed who want to stay on and expand their operations complained about the difficulties of acquiring more land. Competition for rental land is increasing and making it difficult for farmers to expand, while the short-term nature of most leases discourages long-term investments. Some farmers see the availability of rental land as an opportunity for expansion, although this is generally associated with the short-term perspective of cash croppers who assemble large acreages of scattered rental parcels (Bunce and Maurer 2005, 35).

The Toronto Star reports that land near Milton is being bought up by developers at $50,000 an acre. A 100-acre farm will sell for $5 million – and that is not including the tractors, irrigation pipes, seed and other necessities. Renting land from a developer can be less expensive, but it can

also carry risks. Farmers can be asked to leave without notice so that the developer could build something (Toronto Star, June 24, 2007, Porter).

7.6 Issue Cluster 3: Ensuring the Next Generation of Farmers

Many members of the next generation are not entering the industry. The age profile of farmers continues to rise and the number of operators continues to decline. This raises concerns about who will replace farmers as they retire (FGBF 2007a, 12).

The Aging Farm Population.

The average age of farmers in the GTA continues to increase. The average age of operators in the GTA in 2001 was 53.3 years, an increase from the average age of 52 in 1996 (Walton 2003a, 2.57).

Family Commitment

The sustainability of the family farm depends on variables such as the children's interest in farming as an occupation, the level of attachment to the farm as a family institution, and whether farmers intend to sell the farm if the "price is right." There is widespread concern within the community that fewer young people are interested in inheriting the family farm and that the farm population will decline as farmers retire and interest within farm families and broader community wanes (Bunce and Maurer, 2005, 20; FGBF 2007a, 12)

Almost 60% of the farmers Bunce and Maurer interviewed did not describe their farm as a family farm, and almost 70% said they did not expect any of their children to work the farm in the future. Some have already seen their sons and daughters leave for other careers, while those with younger children saw better futures than farming for them and did not want to encourage them to stay on the farm. A few expressed a desire to keep the family farm going, but accepted that this was unlikely (Bunce and Maurer 2005, 32).

This has significant implications. Farming, Walton points out, is a tremendously sophisticated and complicated industry and success is in large part related to knowledge that comes with experience. When a farm is handed on to the next generation, it is not just the land that is handed on. The knowledge gained from working with the previous generation is also handed on. There is no point in protecting the land base is there is no younger generation of skilled operators to continue (Walton 2003b, 25).

Another consequence of this trend is that as the number of farmers decline, it becomes increasingly difficult for those left to manage their operation and spend the time and effort needed

to protect the interests of the industry. Ongoing efforts, Walton argues, will be required to make and keep the voice of agriculture heard (Walton 2003b).

Financial Barriers to New Operations.

The high cost of getting into farming is a major obstacle for new operators. Farm equipment, quota, property, and livestock are all expensive, and once a farm goes out of production, few can afford to get back in (Walton 2003b, 25). Bunce and Maurer report that some farmers they spoke to mentioned the financial barriers to entry for new farmers, including their own children, as a reason why the farm would not pass to the next generation. Especially in the urban fringe areas, farmers said that they could not expand their operations to accommodate farming by their children because of the lack of available farmland to buy or, in some cases, rent (Bunce and Maurer 2005, 20). With respect to the example cited above, of a 100-acre farm in Milton selling for $5 million, few people under 35 have saved $125,000 for a down payment, especially if they've been working and getting experience on a farm (Toronto Star, June 24, 2007). Next to the high cost of land, the costs of inputs and machinery were the next most significant issue.

7.7 Issue Cluster 4: Loss of Farm Community and Culture

Bunce and Maurer report that for 36% of the respondents they spoke to, no farming community exists any longer in their area; another 23% believed that it is in serious decline. Over 50% of the respondents felt that their was no evidence of municipal support for farming and a further 11% were unsure about the degree of local political interest in farming issues, with many farmers commenting that municipalities were very committed to urban development (Bunce and Maurer 2005, 19-20).

Non-Farm Residential Development

A number of problems are associated with farming in areas that are increasingly dominated by non-farm residences and populations. There is a general concern about the intrusion of non-farm values and the decline of the farming community. It is not just that urbanites don't understand farmers and farm practices, one of the farmers Bunce and Maurer spoke to noted, but that non-farm residents have different values and agendas. Several farmers Bunce and Maurer spoke to expressed a growing sense of social isolation as the number of their farm neighbours declines and more urbanites move into the area. They also spoke of the loss of influence of farmers in local politics, although in Caledon they were told that three farmers were on regional or local councils and that the farm community there had a strong local influence. Increased taxes to support new

services for non-farm residents coming on top of the reduction in local farm services was another common complaint (Bunce and Maurer 2005, 37).

As competing and conflicting land uses push into the agricultural community, it is more difficult to farm using standard farm practices. Inherent conflicts between competing land uses such as residential development and golf courses and agriculture negatively impact the ability to farm efficiently. As an area is urbanized, more time is spent dealing with complaints about farm practices and the use of farm machinery. There are also more restrictions on when and how farmers can operate. Spreading of manure and hours of operation become issues. Walton notes that Right to Farm legislation has helped this situation, but not eradicated the problems. Separation of uses, she argues, would be more effective in addressing conflicts (Walton 2003b, 25).

The impact of development on sewage and water systems, especially groundwater levels was also cited as an important issue. Spraying of herbicies and pesticides on golf courses or other areas can lead to conflicts. Demands for water by other land uses can have significant impacts (Walton 2003b, 18). Other problems include the dumping of topsoil, damage from road salt, and vandalism and theft (Bunce and Maurer, 2005, 37-38). Introducing recreational activity into an agricultural area can also create conflicts. Trespassing and crop damage occur when the public has access to areas near farms. Lighting and sports facilities can affect operations such as greenhouses. The increase in traffic is also an important issue. Farmers are experiencing increasing difficulty in moving equipment between fields, getting produce to market, and receiving deliveries. This was particularly problematic for large cash crop operators who were farming scattered parcels (Bunce and Maurer 2005, 38). With all of these pressures, the character of the community gradually changes from agricultural to urban (Walton 2003b, 17).

Decline of agricultural infrastructure is another issue. As the agricultural infrastructure in the urban fringe continues to decline, the availability of services from farm equipment to veterinary services continues to decline making it more difficult and expensive to farm (Walton 2003, 25).

Bunce and Maurer report that some sectors thrive on being located close to residential areas. Sod farmers, pick-your-own operations, market gardens doing direct sales, greenhouse operations, and horse farms generally do well on the urban fringe (Bunce and Maurer 2005, 38).

7.8 Issue Cluster Five: Positive Adaptation: Entrepreneurialism and Innovation

Bunce and Maurer report that on a more positive note, large or highly capitalized operations in the GTA region with resources for investment and expansion seem to be holding their own. Here the common theme is entrepreneurialism, adaptation, and innovation.

Cash-croppers who have been aggressive in assembling a large land base, especially by renting rather than purchasing land, appear to be in fairly good financial shape.
Other operations have improved their financial security by emphasizing value-added activities: on-farm processing, greenhouse operations, farm shops, wineries, pick-your-own arrangements, and other types of direct sales (Bunce and Maurer 2005, 28-29).

Walton notes that although numerous conflicts can arise between agriculture and nonagricultural development, there are also many benefits to co-existence. There is an environmental benefit to having agricultural land use close to urban development. Crops such as corn can sequester carbon dioxide, and fencerows and woodlots maintained as part of farm operations act as wildlife corridors and habitats for many species. Without farmlands, the linkages that species need to survive in urbanizing areas would not exist. Loss of birds and animals would have a significant negative effect on the quality of life in urban areas (Walton 2003b, 20).

Walton reports that the trend in the GTA has been to replace traditional crops with specialty crops that require, and are required by, an urban market. Time-sensitive products such as herbs need to be grown close to their markets. Both producer and consumer benefit from "just-in-time" delivery. Having a productive, viable agricultural industry nearby allows urban residents to enjoy the benefits of a plentiful, nutritional food supply geared to urban tastes. Growth opens markets and stimulates demand for product. The farmers in the Central Ontario Zone have shown great flexibility, Walton reports, in responding to these markets. For example, about 90% of the Asian vegetables produced in Ontario are produced in the Holland Marsh.

Walton observes that pick-your-own business and agriculturally-related tourism can be very successful around urban areas. The role of the agricultural community as part of the rural landscape, she notes, is an important benefit to an urban region. It is part of the broader open space system that provides a more tranquil environment as well as education about agriculture to urban residents (Walton 2003b, 20).

Linkages between agriculture and urban living are growing. There is a growing trend in the restaurant business to feature local produce. Restaurant owners establish relationships between farmers that benefit both parties and allow consumers access to fresh local products. Not only does the urban population benefit from the existence of a strong agricultural community, the agricultural community can also benefit from proximity to urban areas; access to services and research facilities in urban areas enhances farmer's ability to operate; access to large and sophisticated markets helps stabilize production; access to transportation services is critical to reaching markets; and access to services such as gas and hydro support operations such as

greenhouses. What is needed, Walton argues, is a way to balance conflicts to allow both groups to take advantage of the benefits (Walton 2003b, 21).

7.9 Environmental Issues

Although environment was not identified as a major issue in the reports referenced in this section, farmers' comments with respect to environmental concerns are important for discussions about the potential application of the ALUS program.

Bunce and Maurer report that almost 75% of farmers they surveyed followed sustainable land management practices such as low till cultivation, leaving stubble on harvested fields, crop rotation, and/ or green manuring; and 56% had completed the Provincial Environmental Farm Plan. However, and not surprisingly, Bunce and Maurer report, 84% of the farmers surveyed relied to some degree on chemical fertilizers, pesticides, and/ or genetically modified seeds and many argued that they had no alternative but to use chemicals in their production system. Fewer than 25% of the farmers were involved in other forms of land stewardship practice, such as tree planting, and only 13% were active in environmental organizations or environmental policy making initiatives. Bunce and Maurer report that their analysis reveals a prevailing attitude among farmers that they are looking after their land and will continue to do so as long as it is economically viable, and that land preservation policies and untargeted environmental regulations are neither necessary nor welcome (Bunce and Maurer 2005, 21).

Of the respondents, 25% cited over-regulation as a threat to their continuing to farm. Many cited the additional costs incurred by operators as a result of the provincial Nutrient Management Act, which might put some farmers out of business, and weak support for farmland preservation initiatives. Only 34% were in favour of farmland preservation and most of these were already farming on protected land such as the Oak Ridges Moraine, or were farming away from development pressures.

7.10 An Evaluation Framework for a Sustainable Agricultural Economy in Ontario's Greenbelt

The evaluation framework for a sustainable agricultural economy in Ontario's Greenbelt, which combines the generic sustainability criteria with the case-specific issues outlined above, is presented in Figure 7.2.

Figure 7.2. Evaluation Criteria for a Sustainable Agricultural Economy in Ontario's Greenbelt[35]

Major categories of sustainability issues and associated questions
1. Socio-ecological system integrity
1.1. Might ALUS help to alleviate some of the negative environmental aspects of modern industrial agriculture (i.e., contamination to ground and surface water, loss of soil productivity, loss of biodiversity, etc.), contribute to more resilient ecosystems in the Greenbelt, and help to reduce the costs to society associated with these externalities?
1.2. Could ALUS help to encourage long-term investment in land, leading to a higher proportion of land under production that is owned rather than rented, thereby contributing to a more stable agricultural community?
1.3. Might ALUS have any effect on the loss of viable farmland in the Greenbelt to residential, industrial and commercial development? What affect might ALUS have on land speculation and the purchase of large tracts of farmland by mainly absentee non-farmers who rent out the land until development ensues?
1.4. Might ALUS help farmers maintain the flexibility that has been lost through tightened regulations such as those imposed by the Greenbelt legislation, thereby contributing to their ability to farm successfully?
1.5. Could ALUS help to attract a new generation of farmers by making farming more appealing as an occupation?
1.6. Might ALUS contribute to the resilience of farming communities and rural economies by reducing the economic vulnerability that comes from relying on a few crops produced mainly for export, high rates of debt to pay for chemicals and other inputs, and dependence on the federal government to protect farmers when things go wrong?
1.7. Does ALUS encourage links to broader initiatives linking producers and consumers (or farmers and other land beneficiaries) in ways that strengthen communities of interest, helping to enhance resilience?
2. Livelihood sufficiency and opportunity
2.1. What effect might ALUS have in addressing the challenges of making a living from farming associated with the cost-price squeeze?
2.2. What effect will ALUS have on the ability of farmers to compete commercially with big grocery chains and agricultural imports in regional and global markets?
2.3. Will ALUS help to support pluri-activity and diversification of income sources (including off-farm income) for farmers, thereby supporting the resilience of the farm enterprise?
2.4. What effect will ALUS have on the land market, and the high costs of purchasing and renting land in the Greenbelt? Will ALUS help farmers who want to continue farming and expand their operations acquire more land?
2.5. Can ALUS help to compensate for the high costs of getting into farming?
3. Intragenerational equity
3.1. Will ALUS have an effect on the inequity created by large transnational agri-business and food corporations taking profits out of local rural communities?
3.2. Will ALUS help to compensate for the declining share of the food dollar that farmers receive from the marketplace?
3.3. What effect will ALUS have on the lack of municipal support for farming, and the loss of influence of farmers in local politics?

[35] Erin Rogozinski provided the initial design and overall structure for this framework which was used in the Joint Review Panel for the Mackenzie Gas project (Gibson, 2006a, Gibson, 2006b).

3.4. Might ALUS help to address the issue of the intrusion of non-farm values and the decline of the farming community? Might ALUS help to alleviate the growing sense of social isolation experienced by farmers in urban-fringe areas?
3.5. Can ALUS help to counter the negative impacts of non-farm residential development on the ability to farm efficiently?
4. Intergenerational equity
4.1. Will ALUS help to preserve or enhance the opportunities and capabilities of future generations of farmers in the Greenbelt to live sustainably?
4.2. Will ALUS help to ensure that future generations of farmers in the Greenbelt have a secure land base?
5. Resource Maintenance and Efficiency
5.1. Will ALUS help to bring a greater reliance on natural processes such as nutrient cycling, nitrogen fixation, and pest-predator relationships in the production process?
5.2. Will ALUS help to maximize the reliance on natural, renewable and on-farm inputs, and less on purchased (off-farm) commercial inputs? Will ALUS help to maximize the reliance on the management of internal resources of the farm (i.e., management skills, knowledge and labour).Will ALUS help to promote a greater reliance on human resources in terms of the quality and quantity of labour and management, and relatively less reliance on land and capital?
5.3. Will ALUS contribute to the productive use of the biological and genetic potential of plant and animal species?
5.4. Will ALUS lead to improved matching of cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of production levels?
5.5. Will ALUS help to ensure profitable and efficient production with greater emphasis on farm resource management and conservation of soil, water, energy and biological resources?
6. Socio-ecological civility and democratic governance
6.1. Might ALUS lead to more democratic decision-making processes with respect to farming and farm issues by helping to increase the representation of farmers at the municipal level?
6.2. Might ALUS help to increase the profile of the farming community in municipal governance and lead to greater awareness amongst municipal politicians of the farming community's concerns? Might ALUS foster reciprocal awareness and collective responsibility with respect to farming issues?
6.3. Might ALUS help to foster greater understanding and appreciation of ecological realities among farmers and others involved in the program?
6.4. Might ALUS encourage links to broader initiatives linking producers and consumers (or farmers and other land beneficiaries) in ways that strengthen communities of interest? Does the contribute to the enhancement of mutually supporting political engagement?
7. Precaution and adaptation
7.1. Does ALUS help to support a precautionary approach to environmental management?
7.2. Does ALUS help to foster an adaptive approach to managing environmental systems? i.e., does it enable flexibility and adaptation?
8. Intermediate and long-term integration
8.1. Does ALUS reinforce the interdependence of the requirements for sustainability? Does ALUS seek or promote mutually reinforcing benefits?

7.11 Conclusion

This chapter presented a framework for a sustainable agricultural economy in Ontario's Greenbelt. The framework was created by examining the requirements for progress towards sustainability and the important issues relevant to farming in Ontario's Greenbelt together.

This chapter has outlined a number of challenges associated with farming in the Greenbelt. This includes a decline in the number of farms as well as the loss of farmland in the GTA region due to competition with other land uses. There are also concerns associated with making a living from farming, ensuring the next generation of farmers, and the loss of farm community and culture. However, farming in the Greenbelt also presents opportunities for positive adaptation, including entrepreneurialism and innovation. Access to urban markets and changing consumer preferences present new marketing opportunities for GTA farmers.

The key findings of this chapter suggest that building a sustainable agricultural economy in the Greenbelt will require more than just protecting agricultural lands and restricting land use. It will also involve addressing the long-term sustainability of rural and agricultural communities. This may include addressing the barriers new farmers face, such as access to land and high start up costs, providing agricultural and non-agricultural skills training, and assisting farmers in seizing new opportunities in the international agri-food market. The implications from these conclusions is that more than just the Greenbelt legislation will be required to ensure the sustainability of the agricultural economy in the region. Other policies and programs will need to be implemented to work with the Greenbelt legislation to address the challenges the region is facing and to exploit the opportunities that have been identified.

The next chapter will present the results from interviews with key stakeholders, regarding the potential of the ALUS program as a means of supporting farm protection and farm stewardship in the Greenbelt. This will be followed by a evaluation, in Chapter Nine, some of the tools and programs currently available, other than ALUS, to complement the Greenbelt legislation and to help address the policy gaps that have been identified.

Chapter 8 **Views of ALUS**

8.1 Introduction

This chapter presents results from three sources regarding the potential application of an ALUS-type program to Ontario's Greenbelt. The three sources of data are government and non-government organization documents, the academic literature, and interviews with key stakeholders. The chapter presents insights from these three sources on the following topics: benefits of the ALUS program; what types of land use activities could be covered; who should be eligible to participate in the program; funding; maintaining the grassroots character of the ALUS program; linking ALUS into a wider conservation agenda; ensuring transparency and accountability; ensuring permanence of service delivery; what should be rewarded; contribution to livelihood benefits; and means, other than ALUS, for achieving the same results. The chapter will conclude with a well substantiated working hypothesis about the main principles and design considerations for developing an ALUS-type program for the Greenbelt.

8.2 Views from Government and Non-Government Organization Documents

8.2.1 Benefits of ALUS

A variety of farm organizations at the Federal and Provincial levels have come out in support of ALUS. The Canadian Federation of Agriculture has issued an Environmental Policy Statement on ecological goods and services in which they state that there is a need to provide a market mechanism to value the environmental goods and services that farmers have been providing to ensure the maintenance now and for future generations of these public benefits on private land. "The concept of paying agricultural producers for rendering EG&S," the CFA argues, "bridges the environmental demands of Canadians and the policy requirements of the industry to foster a socially and economically viable agricultural industry and sustainable rural communities." The CFA wants the Government of Canada to provide programs and policies that economically support the land stewardship practices of farmers by recognizing the market value of the resulting goods and services. The CFA also requests that government initiatives to increase environmental goods and services in the public interest must include adequately provisions for compensation or other offsets for farmers' costs (CFA 2007). The CFA cites ALUS as an example of such a program. CFA President Bob Friesen has noted that "[v]oluntary initiatives like ALUS empower farmers so they can provide these invaluable environmental benefits while they continue to provide consumers with high quality, safe food. And in addition to the solid environmental public

benefits ALUS provides it also benefits the public purse, lowering the burden on business risk management programs and creating income stability for farmers" (DW 2007).

The Ontario Federation of Agriculture has passed a motion stating that "the Ontario Federation of Agriculture endorsed the Norfolk ALUS project and provides support in government lobbying efforts to secure both government endorsement of the ALUS concept and government funding for the Norfolk ALUS pilot" (OFA 2007).

The Christian Farmers Federation of Ontario is also supporting ALUS. The CFFO issued a policy statement (CFFO 2005) that outlines the rationale for payments for environmental goods and services. The organization notes that payments for ecological goods and services recognize the valuable environmental services provided on farmland by farmland owners. ALUS will reposition the farmland owner's role with respect to the environment as proactive and will increase the farmland owner's control of the environmental agenda. The CFFO also recognizes the limitations of the conventional regulatory structure when it is applied to agriculture. Requiring farmland owners to maintain the public environmental values by regulation is expensive to enforce because of the diversity of environments. This approach will have mediocre results, the CFFO argues, as farmland owners only comply with the minimum required by the law. Payments for ecological services will create a new source of income for the countryside.

A number of government agencies and advisory bodies have also endorsed the concept of providing payments for ecological goods and services in the agricultural sector, and some have specifically cited ALUS as an example. The Ontario Greenbelt Agricultural Advisory Team identified the need for "[b]etter recognition of environmental services and benefits flowing to society from stewardship on rural lands." (AAT 2004, 5). With respect to the issue of environmental payments, the Task Force noted that "[w]e heard that farmers provide much more than food production. They provide society with many environmental and natural benefits, for which they may not always be appreciated, recognized or rewarded by government and the general public." The Team advised that the Ontario Government through the Ministries of Agriculture and Food, Environment, Natural Resources and Tourism and Recreation, should 1) recognize and take seriously the environmental benefits agriculture contributes to society; 2) lead research with both governmental and non-governmental stakeholders, to identify and assess what has been done in other jurisdictions; and 3) develop programs and financial incentives to farmers that recognize these societal contributions and which could provide an additional income stream for agriculture (AAT 2004, 12)

Support for environmental goods and services payments was also mentioned in the report from federal Parliamentary Secretary Wayne Easter, who was appointed in 2004 to meet with farmers

to discuss the issue of continuing low farm incomes among primary producers. In discussing the issue of investment into alternative land use, Easter reported that "[s]ome participants indicated a strong preference by producers to use all of their land for traditional farming purposes. Others recognize the growing trend towards alternative land use, particularly for environmental or conservationist purposes. Participants stressed the importance of compensating farmers for the value of land that is being put to alternative use" (Easter 2005, 27). Easter recommended exploring the environmental uses for agriculture such as carbon sinks, energy-generating technologies such as wind power, and environmental preserves and trails or greenbelts. He cites the ALUS program specifically.

A federal-provincial working group has been created to develop a framework for assessing how environmental goods and services can be considered within the broader agricultural and environmental policy context. Ministers have agreed to conduct a cost-benefit assessment of initiatives that may encourage the provision of environmental goods and services. The Federal-Provincial Working Group will develop an approach to carry out this work (AAFC 2006b, 11).

Agriculture and Agri-Food Canada has acknowledged that "the close interaction of agricultural production with the natural landscape offers possibilities to improve the provision of EG&S. However, market signals do not always reflect the value of EG&S to society, leading to under-production of these goods and services" (AAFC 2006b, 11).

Among the major political parties in Canada, only the Green Party has come out with an official position on ALUS. The Green Party of Ontario is highly in favour of paying farmers for providing ecological goods and services. A Green Party policy document states that "history has clearly demonstrated that a rewards system – not a punitive one – is the best way to achieve the provision of both food and ecological services." The Green Party Platform calls for a Land Owners Roundtable on the Greenbelt with strong farmer involvement. To assist this Roundtable, the Green Party suggests that an Economic Impact Study within the Greenbelt be conducted to determine the impact of this ecological legislation to farmers. The Green Party of Ontario has incorporated a provision of $100 million for an ALUS Program to provide an incentive for farmers to engage in land-use practices that benefit the environment (GP 2007).

Support for ecological goods and services payments is also being expressed at the regional and municipal level. Elbert van Donkersgoed, Executive Director of the Greater Toronto Area Agricultural Action Committee (GTAAAC), has noted that although payments for environmental goods and services does not exist in the current GTA Agricultural Action Plan, it has been a discussion issue for as long as he has been involved with the Committee. Van Donkersgoed reports that on December 5, 2007 there was a review of the Action Plan at which time the

following action was added: “Research and lobby for on-going and coordinated Ecological Goods and Services payments.” Van Donkersgoed notes that this revised Action Plan is only a proposal at this time. It went before the full GTAAAC in late January 2008 (van Donkersgoed 2007).

The report from the Region of Niagara’s Agricultural Task Force (RMON 2004) describes a strategy to support agriculture in the Niagara Region and tools to help implement the strategy. These tools include “compensation for environmental contributions.” The report notes that “[t]he expenses of many environmental initiatives, implemented for the benefit of society at large, are borne by farmers. Where this occurs, appropriate compensation should be provided.” The report provides several examples of negative impacts on farmers from actions which contribute to the greater public good; i.e., buffers established to protect non farm uses and environmental features are routinely applied to agricultural land thereby reducing the farmers options in managing the land. In considering compensation, the report notes, “it should be remembered that in addition to contributing to a healthy, accessible environment, farmers in Niagara produce high quality, home grown food for all residents of Ontario and are positive net contributors to the pubic good” (RMON 2004, 11).

The Regional Municipality of Niagara’s Regional Agricultural Economic Impact Study (RAEIS) notes the growing role that agricultural land plays providing critical habitat for the conservation of biodiversity, including providing linkages for wildlife corridors. The report notes that “[t]his important contribution to the environment in urbanizing area should be promoted and farmers should receive credit for acting as environmental stewards” (RAEIS, 9.3).

As noted in Chapter Six, the Town of Caledon has expressed an interest in payments for environmental goods and services in agriculture and has charged the Caledon Environmental Advisory Committee with investigating the issue and reporting back to Council.

Non-government agencies have also endorsed ALUS-type programs. The Ontario Farmland Trust (OFT), in its comments to the provincial government on the proposed Greenbelt legislation, noted that farmers have raised the central issue of compensation for lost development rights, and have cited the case of programs for the purchase of development rights such as that in Pennsylvania as a solution for Ontario. While the Canadian constitution does not establish development rights, or imply a right to compensation for loss of development opportunities, the OFT does feel that there are creative approaches to handling this issue that have not yet been considered. The OFT also recognizes that while compensation for lost development opportunities may not be a legitimate request, there is nevertheless a real question of equity in the imposition of the Greenbelt on a large group in the farm community. Outside the Greenbelt boundary, the OTF reports, land prices are very high; inside they are severely restricted in comparison. The OFT

cites programs to provide payments for environmental services, such as ALUS, as one way to address these concerns. "As society demands that farmers actually take land out of production for public benefits, such as buffers along streams, or tails for public access, payments for such services are entirely appropriate" (Hilts 2005).

8.2.2 Funding

The Christian Farmers Federation of Ontario has stated that initial funding for pilot projects and startups should come from the environmental pillar of the federal Agriculture Policy Framework (APF) (60% federal, 40% provincial). For medium-term funding, all federal, provincial and municipal resource-based departments should support the funding needed. The CFFO recommends that the environmental pillar of APF II should be redirected as payments for ALUS. For long-term funding, the CFFO recommends that consumers should pay directly though a "Thank You Countryside" program that is a consumption levy on food at retail (CFFO 2005).

8.3 Views in the Academic Literature

While there is a literature on the general concept of payment for ecological goods and services (see Chapter Three), the ALUS program has not yet attracted much scholarly attention. A review of the literature found only two papers that discuss the issue of payment for environmental goods and services and ALUS within the context of agriculture in southern Ontario.

8.3.1 Benefits of ALUS

Davidson discusses ecological goods and services payments as part of his exploration of the Ontario government's Smart Growth strategy and its impact on the viability of the agricultural sector. He focuses on the issue of fairness. Davidson notes that protection of the natural environment, both functionally and aesthetically, helps both urban and rural communities. However, he points out that the burden of this protection falls more heavily on rural community residents than on people residing in urban communities. There is a need, Davidson argues, to develop a mechanism to distribute these costs more equitably (Davidson, 2007, p.207). Providing payments for EG&S to farmers can serve as such a mechanism.

8.3.2 Limitations of ALUS

Caldwell et al. discuss ALUS in a review of farmland preservation strategies in peri-urban landscapes. The authors note that "[i]t is evident that these programs will promote the viability of the agricultural industry, but do not ensure protection of agricultural land in areas where urban

development pressures are strong." The relevant question with respect to farmland preservation within the peri-urban landscape, the authors argue, is whether ALUS-type payments would be sufficient to offset the high costs of near urban farming (Caldwell, et al, 2007, p.263).

8.4 Views from Key Informant Interviews

Interviews were conducted between November, 2007 and January, 2008. The interviewees and their positions are listed in the table below.

Table 8.1: The Interviews

	Interviewee	Position/ Affiliation	Interview Location	Interview Date
1	Charlotte McCallum	University of Guelph, Sessional Faculty, Department of Geography	University of Guelph	November 6, 2007
2	Melissa Watkins	Executive Director, Ontario Farmland Trust	University of Guelph	November 6, 2007
3	Burkhard Mausberg	President, Friends of the Greenbelt Foundation	Toronto	November 8, 2006
4.	Wayne Caldwell	Associate Professor, University of Guelph, School of Rural Planning and Development	Guelph	November 14, 2007
5.	Dave Reid	Coordinator, Norfolk Land Stewardship Council	Simcoe	November 22, 2007
6.	Bryan Gilvesy	ALUS demonstration farm owner	Tilsonburg	November 22, 2007
7.	Wayne Roberts	Coordinator, Toronto Food Policy Council	Toronto	November 23, 2007
8.	Tony McQuail	Farmer, Huron County	Lucknow	November 26, 2007
9.	Susanna Reid	Planner, Huron County Coordinator of Huron County Payment for Environmental Goods and Services Project	Goderich	November 26, 2007
11	Mary Ruth McDonald	Associate Professor, University of Guelph, Department of Plant Agriculture, and Muck Crops Research Station	Guelph	November 30, 2007
12.	Elbert van Donkersgoed	Executive Director, Greater Toronto Area Agricultural Action	Toronto	December 3, 2007

		Committee		
13.	Hugh Gayler	Professor, Brock University, Department of Geography	St. Catharines	December 4, 2007
14.	Neil Morris	Caledon Environmental Advisory Committee	Inglewood	December 7, 2007
15.	Ann Clark	Associate Professor, University of Guelph, Department of Plant Agriculture	Guelph	January 10, 2008
16.	Ron VanHart	Farmer, Holland Marsh	Kettleby	January 24, 2008
17.	Jean Grandoni	Farmer, Niagara	Niagara Falls	January 31, 2008

In addition to these formal interviews, informal interviews were conducted, over the phone, with Michael Schreiner, Vice-President of Local Food Plus, Darryl Finnigan, Resource Management Policy Analyst with the Ministry of Agriculture, Food and Rural Affairs, Maxine Kingston, Technical Director, Agriculture and Agri-Food Canada, and Darrell Gumieny, Environmental Policy Analyst, Agriculture and Agri-Food Canada.

8.4.1 Benefits of ALUS

The majority of interviewees were supportive of the concept of providing payments to farmers for the enhancement of environmental services, even if they had serious concerns about ALUS-type programs.

It was pointed out by interviewees that ALUS-type programs are needed because of the shared nature of resource ownership on private land. Particularly in areas where farming is a major land use, how farmers manage their land will have a significant impact on the water cycle, the mineral cycle and the ecological and biological community of life on that land. However, it is a challenge to effective conserve public resources on private land in the absence of markets for ecosystem services because of the challenges associated with making a living from farming. Interviewees pointed out that farmers in Canada, in general, cannot make a living farming for a variety of reasons including a small number of buyers in the major chain stores, products coming in from around the world, and the fact that North Americans value cheap food. These challenges force farmers to seek out incremental profits wherever they can. Gilvesy noted that this has led to the advent of factory farms and other ways to increase productivity, because this is the only way farmers can operate in an environment where profit margins are so thin. “If you expect cheap food,” Gilvesy argued, “then you should give farmers some incentive not to farm fenceline to fenceline, as this is otherwise the only way they can make a living.”

Interviewees agreed that because of the livelihood challenges associated with farming, governments are not in a position to regulate the farming community in the same way that they regulate other industries. The conventional regulatory approach will be perceived by farmers to be unfair. Gilvesy considers the extra demands placed on farmers to protect the environment as a type of expropriation. "If actions get regulated," Gilvesy argued, "then you've simply expropriated something from a farmer. You've expropriated some value from his or her property. However you haven't expropriated the same value from a person in an urban area." This is because environmental regulations often reduce the productive potential of farmland. Because environmental stewardship is costly to a farmer, Gilvesy argued, this will reduce uptake in traditional stewardship programs.

Interviewees agreed that a more proactive and collaborative regulatory model will be needed for the farming sector. This can be achieved by directly rewarding farmers, through the incentive payments, for the environmental services they are providing.

Another benefit associated with ALUS-type programs that was mentioned in the interviews is that they help to fulfill an educational function. Gilvesy commented about the loss of Ontario Ministry of Agriculture extension staff, pointing out that "now we just have chemical and fertilizer companies influencing the farmer. The balance is missing." "If though ALUS we can reintroduce technical people back into farmers lives," he argued, "then we've done a service." They way ALUS does this is through farmer to farmer contact. "If you want to enter in to an environmental goods and services contract," Gilvesy noted, "you first talk to another farmer, which reduces some of the fears farmers may have."

D. Reid highlighted the important role ALUS has to play in helping to increase participation in land stewardship initiatives. He sees the potential in payment for environmental goods and services "as the little bit extra" that will help with uptake and participation, particularly on private farm land. "If you get the payment right," he argued, "you will get participation and if you get participation you will have a landscape impact and truly make some environmental improvements." Reid also noted that an advantage of ALUS is that "we can get our foot in the door of the farm and get past first base where many agencies, government or non government, can't. We can get greater uptake because we're farmer friendly, and we're seen as less threatening." Another advantage Reid cited is that the program is flexible so farmers can opt in and out.

One of the strongest benefits of the ALUS program, described in the interviews, is that it helps to foster a new mindset with respect to farming and the environment. Van

Donkersgoed argued that under the current cost share approach, there is a mindset that agriculture creates problems in the environment and that these problems have to be managed. This is achieved through regulations which create additional costs for farmers. Because it is difficult for farmers to bear these costs alone, the farm community has to make the case that the costs should be borne at least partly by society. And so, van Donkersgoed pointed out, we create cost-share programs of various levels, and a cost-share approach for farmers to manage their footprint on the environment. This approach, he argued, is not a stewardship mindset because it does not take a whole farm approach and it is not ongoing. "Once the farm entrepreneur spends the money and he gets his cost-share," van Donkersgoed noted, "he forgets about it, and pays very little attention, unless there is another problem and another cost-share program to address it." The advantages of moving to an environmental goods and services approach, van Donkersgoed argued, are that it's voluntary, and that it's a payment for the whole farm. Farmers are encouraged to think about the whole farm and what they can do on the whole farm in order to manage the environment better or to produce environmental goods and services in addition to producing food. Van Donkersgoed pointed out that with the present approach we don't have any way of thinking about the long-term impact of how farming relates to the environment. "The biggest benefit of going to payments for environmental goods and services in the long-run," he noted, "is that we end up with a whole different mindset about how farm entrepreneurs on private land relate to the environment."

Of all the interviewees only Clark had serious doubts about the potential benefits of an ALUS-type program. She suggested that paying farmers to farm sustainably is only fixing the symptoms and not addressing the root causes which are government policies that discourage farming sustainably. Programs such as ALUS do help people survive and stay in business, she noted, but they may also perpetuate a dysfunctional system and obscure the real problems. Clark would rather see "a phased program that explicitly acknowledged the causal role of government policy in creating the problems and committed government to rectifying its causal role at the same time you are paying people to behave." She said that she wouldn't support ALUS-type programs "unless they are linked to things which get back to causes."

8.4.2 What Land Use Activities Should Be Covered?

The interviewees identified a number of land use activities that they thought would be appropriate for an ALUS-type program in the Greenbelt. While interviewees agreed that the types of land use activities that are eligible to be rewarded will vary across the landscape, there was agreement on the general types of services that could be supported.

One way to identify land use activities that could be supported through an ALUS program is to start by asking what ecological goods and services society is concerned about protecting. One important concern in Ontario currently is water quality, with the public is demanding more actions be taken to protect water resources. Important considerations are water leaving the farm and going into the ground water or going in streams, rivers, ponds and lakes as runoff. The important concern is whether this is clean water or whether it is contaminated and what management practices help ensure that water entering the farm ends up leaving the farm clean.

Water quality and quantity can be ensured through cropping practices, manure handing and manure yards, fencing cattle out of watercourses, and paying farmers for watering devices to keep cattle away from watercourses. Interviewees agreed that one of the best land use activities that could be supported through an ALUS program in the Greenbelt is buffers along watercourses, lakes and ponds. Several interviewees pointed out that one advantage of the environmental goods and services approach is that payments can be provided for more than just taking land out of row crop production, which is what happens under the regulatory system. The regulatory regime, for example, requires three-meter buffers along watercourses, but not much is done in these buffers. An ALUS-type program allows the farmer and society to obtain services on buffers through plantings and other kinds of enhancements, as opposed to asking farmer to simply abandon the land. Gilvesy noted that farmer can still get some use out of the grass buffers, such as using them for a turning area or for feed stock to grow hay on.

ALUS could also support land use activities that help to preserve biological diversity. Management practices that encourage a variety of plant and animal communities over and above what the farmer is harvesting become a consideration. This can be achieved by having fence rows, preserving woodlots, and maintaining various types of buffers around watercourses. ALUS could also support activities which create links between naturalized areas. D. Reid pointed out that the agricultural landscape of southern Ontario is an agri-ecosystem in which connections and corridors are needed to help us adapt to climate change, for example by providing for biodiversity movement by plants and animals. Reforestation is another land use activity that could help promote biological diversity.

Several interviewees pointed out that the retiring or enhancement of lands that are marginal for agriculture can also be supported through ecological goods and services payments. Gilvesy noted that areas such as lowlands, bottom lands, and awkwardly shaped fields are places on the farm that aren't productive, because these areas are not necessarily easy to farm, nor are they entirely profitable. Marginal or fragile land would also include mediocre or low quality farmland that is too wet, too stony or too steep. Van Donkersgoed argued that there are a number of reasons for

farmers to reduce use of marginal lands for intensive row crop production. He noted that there are specific areas where paying for environmental goods and services could accomplish more than what could be achieved with a regulatory regime. For example, on steep slopes with sandy soil it would be better to have something permanent on these areas rather than annual row crops. This could be achieved, for example, through planting trees or tall grass prairie. Enhancement of marginal lands could be used to promote both water protection and to enhance biodiversity. Greening marginal lands that are closest to wetlands, for example, will help improve water quality. Immediate impacts can also be achieved in wildlife habitat enhancement services.

The ALUS program could also support land use activities which help to enhance the mineral cycle and the promotion of healthy, biologically diverse soil. Land use activities can also be used to stop soil erosion and its immediate impact on water quality and the long-term impact on the resource base of society.

Watkins questioned whether environmental goods and services could be broadened to include everyone involved in the food system, since the way in which food is produced is part of the ecology of the landscape and the ecology of farming. If a farmer is producing for the local food economy, she asked, could this also be considered an ecological benefit and service? Few of the existing environmental goods and services programs are considering the kind of food production and the services to the people who are taking part in the food system. We tend to consider environmental goods and services solely in terms of their benefits to natural systems, Watkins argued, but we are also part of that ecology.

Roberts put forward the idea supporting community services through these types of programs and not just environmental services. He argued that if a farmer is active in his or her community and supporting or contributing to the sustainability of rural society, this type of action should also be rewarded. Some payment for environmental goods and services programs which are supporting cultural services are moving in this direction.

When considering what types of land use activities would be supported through an ALUS-type program, it is important to distinguish between those activities which should receive support because they are a public responsibility and activities for which farmers are solely responsible. Caldwell noted that "there is a fine line between those goods and services which are in the public interest, to which there is a legitimate argument that farmers or other landowners should be compensated, versus a line which says it is simply your right and responsibility as a citizen of this province to do things well." For example, a local industry has certain legal obligations, such as not to contaminate water. Similarly, Caldwell argued, you wouldn't pay a farmer not to dispose of manure in a watercourse. There is a point, he noted, where it becomes the landowner's

responsibility and another point where it is a public opportunity. As a producer, he noted, you take on certain responsibilities. Caldwell does believe that there are many instances where there is public responsibility and a public benefit which accrues. However, he pointed out, there are also situations where it is simply good stewardship and good public relations, and the right thing to do for farmers to say "it is in my interest to do this even if society does benefit from it."

8.4.3 Who Should Be Eligible to Participate?

The majority of interviewees felt that only working farming operations should be eligible to participate in ALUS-type programs. In terms of what constitutes a working farming operation, interviewees referred to the accepted definition of a producer, as it has been defined through other programs for supporting farming. This would include operations with a farm business registration number. In Ontario, a farm has to produce over $7000 in gross sales from farmland to be eligible for a registered farm number.

Many interviewees also thought that the ALUS program should focus on farms that are producing food, as opposed to horse farms, hobby farms, and other non-food producing farms. The program, it was argued, is designed for lands that are used for the production of food and environmental services. It was noted that "working lands" should be eligible, irrespective of who the owner is or who the tenant is.

Some interviewees felt that the program should be limited specifically to family farm sized operations, especially if funding for the program is limited. It was argued that rural estate owners and large industrial operations are in less need of financial support than those who are trying to make a living from their farm. In addition, new environmental regulations will affect the viability of the family farm more than the industrial operation.

While the majority of the interviewees felt that only family farms, or farms producing food, should be eligible to participate in the program, a few interviewees felt that the program should extend to all farms, and possibly to other rural landowners. These interviewees argued that if the program is conceived in terms of what most benefits the environment, rather than as a farm support program (i.e., as a subsidy to farmers, or in terms of income stabilization), then it should be open to all landowners. Caldwell noted that there are many people in the rural countryside that aren't there for agricultural purposes. If there is a net benefit to society in terms of people planting trees, he argued, then these landowners should also be supported. Similarly, Mausberg notes, a factory farm might have an opportunity to do something that will have a significant positive effect on the biophysical environment. Caldwell suggested that the program might require different levels of value for different types of landowners. Farmers taking land out of

production to plant trees should be compensated for the value of that land taken out of production, whereas a rich landowner in the countryside whose land is sitting idle cannot be compensated because they are not taking land out production. Having a variable rate, Caldwell suggested, might be one way to address this issue. Another interview similarly suggested that there might be a way of recognizing the differences between types and sizes of farms and tailoring the program. This would mean not necessarily excluding the larger scale operations or the operations that are not food-production related. While acknowledging that issues of equity play an important part in financial distribution, and that millionaire hobby-farmers may not need the resources or support to do what they do, Mausberg noted that we have many universal programs in Canada and that there is something attractive in the notion that they apply to everyone. To make it truly effective, he feels, the program should be universal.

Interviewees expressed concerns about using social criteria**,** such as income**,** to determine eligibility. Interviewees argued that the program should be linked to the services targeted, and to the value of those services agreed on by society. Caldwell argued that retiring fragile land, for example, is not an issue of income. He noted that if this is a good thing to occur environmentally, and we want to create incentives for this, we should judge it on its environmental benefit and not look at the income of the farmer. Caldwell noted that unless you're prepared to support land stewardship through a regulatory perspective (where the action applies to everyone and only those in financial need are supported) then the program should support any action that we identify as sound environmentally, and should be open to all property owners. Targeting to income in agriculture has two major problems according to van Donkersgoed. One is that profitability cannot be determined by farm size alone. The difference between large and small farms is that small farms tend to provide only a contribution to family income rather than the full family income. A number of small farms, he notes, are very profitable, and they remain small not out of necessity but rather because it is a conscious decision. A second problem associated with targeting to income in agriculture is that because there are so many part-time farmers and small farms, the statistics on average income per farm are not helpful.

Not all interviewees agreed that income should not factor into eligibility criteria. Watkins noted that there might be some way to build in a component in terms of income, in order to make sure that the program supports those who need it most. The program could be designed so it is more appealing to those farmers who might need this kind of assistance. In addition, there could be limitations based on whether participants have a certain income to begin with.

Caldwell noted that the answer to this question of who should be eligible to participate may also depend on where the funding for the program comes from. If funding comes from the federal

and provincial ministries of agriculture, he pointed out, then it is going to be difficult to justify that the funds be spent in any context other than agriculture. If the funds are sourced out of the Ministry of Natural Resources or the Ministry of the Environment, it would speak to a much more broadly based position in terms of who would be eligible for the funding.

A few interviewees noted that the ALUS program may want to restrict eligibility in order to fulfill environmental program goals. McCallum acknowledged that if the program is part of a wider environmental agenda or plan, there will be priority areas for conservation, which means that certain farmers will not be eligible to participate. This is hugely problematic, she noted, and it would create friction within the farm community. Caldwell also noted that the question of eligibility is tied to knowing what to invest in from the view of the science in order to get the maximum benefits for the environment as possible.

The issues of accessibility and equity were also raised with respect to who should be able to participate in the program. It was acknowledged that there may be logistical challenges associated with promoting the program in a way that is fair and equitable and ensuring that it is broadly supported as opposed to being perceived as benefiting a few people. The program needs to be accessible to all farmers. It should not be a case where the farm needs to be of a certain size and scale to take advantage of the program and the only farms that can benefit are those that are large enough and have the staffing capacity to pursue grants.

8.4.4 Funding

One of the main concerns about ALUS that was raised in the interviews is how much the program will cost and where the funding will come from. Interviewees acknowledged that a large amount of public funding will be needed in order for the program to be effective. While no detailed projections have been conducted for how much a provincial ALUS program would cost, the Ontario Fruit and Vegetable Growers Association estimates that it "may be $10 million a year and approach $100 million if all agricultural lands are considered (OFVGA 2007). Tyrchniewicz (2007) estimated that an ALUS program for Eastern Canada would cost $103 million. The Green Party of Ontario has committed to provide $100 million for an ALUS program (GP 2007).[36]

The majority of interviewees agree that general government revenues should provide the bulk of funding for these types of programs. It was pointed out that the government is the guarantor of

[36] These figures assume universal eligibility rather than a targeted approach. Van Donkersgoed notes that if the program was designed as whole farm annual payments and uptake was similar to UK levels, the OFVGA estimate of $100 million would be too low. He notes that the UK program has 2.9 billion pounds over five years from the EU and they are moving some of the low level stewardship activities to the "required-unpaid" category to make the money go round (van Donkersgoed 2007).

the public interest, and the only institutional expression of a common will. Government, therefore, has to be involved in supporting programs like ALUS. The rationale is that if society benefits from these programs, then government should invest in them, either through the general revenue or transfer of existing programs. There is agreement that all three levels of government and many different departments need to be contributing. "At the heart of ALUS," D. Reid noted, "is stewardship of public resources on private land, and a shared responsibility for stewardship of those public resources. The incentive payments come from society as a base, and that's all levels of government and that's cross-departments."

Several interviewees pointed out that government funding is needed in order to provide continuity and to ensure that the program extends over time. A sense of permanence, it was pointed out, is very important to the farm community, and farmers may be reluctant to get involved without this long-term commitment. The problem is that most government programs have a limited horizon and politicians are concerned about not tying the hands of the next government. It was acknowledged that some mechanism is therefore needed to make the program a permanent part of society. This may involve taking it out of programming. If it's considered to be part of the agricultural support system, one interviewee argued, it has to be part of the strategic planning of government.

One concern with government funding was raised. A problem with ALUS, Roberts noted, is that it could easily become like the food banks and end up performing a service function rather than a public education function. The program, in his opinion, must be an educational vehicle to support change and not just an alternative to government action.

The interviewees outlined several options for where the funding for the program could come from. A number of interviewees suggested special levies or taxes, such as a one percent levy on food. Funds raised through this approach would equate to hundreds of millions of dollars. While some interviewees noted that this is a hot button issue and that consumer associations would be concerned, others felt that the public could be sold on the concept if it was promoted in the right way. One interviewee pointed out that the current public interest in purchasing carbon credits to offset actions such as air travel, and the fact that companies are trying to initiate practices that are carbon neutral are signs of an emerging marketplace and new money that society is willing to spend on conservation. Another suggestion for funding is to include a carbon tax on imported food, since this food carries the burden of an environmental subsidy. There is also the option of a voluntary approach where consumers are asked at the supermarket checkout to support environmental services by adding small amount to their food bill.

Some interviewees disagree with the idea of a tax on food. For Mausberg the idea of an extra cost on domestic food products is a "non starter." He argued that we don't want to penalize domestic producers even more. Food products, he pointed out, are already too expensive from the consumers' point of view and from the point of view of competition with foreign products which are much cheaper. The majority of people, he argued, will not be willing to pay more. McQuail also noted that he is leery of taxing food, pointing out that it seems that we already have enough regressive taxes such as sales tax and GST. He also noted that this would require the poorest members of society individually to pay a larger proportion towards this than the wealthy. This is unfair because, in many ways, the more wealth you have, the more damage you often end up doing to the environment.

Other ideas presented for funding the ALUS program involve transferring money from existing programs. Morris pointed out that a large amount of public money is being spent for maintenance of services such as the water supply and air quality. Morris argued that if the premise is valid that what we're going to spend money on has an obvious and defensible benefit to water quality, than a portion of whatever money is now being spent on water quality could go towards this. For example, the Conservation Authorities have money that they are spending on these types of activities. Morris noted that wherever benefits are gained can be looked at as potential source of revenue to support the program.

Some interviewees suggested that funding for the ALUS program could come from the reallocation of existing production subsidies. As one interviewee noted, ALUS could be an alternative to various subsidy programs, crop support programs, diesel fuel price reduction programs and hidden subsidies for fertilizers and pesticides. As this person pointed out, this would start a process of rebalancing the externalized versus internalized costs of environmental degradation.

D. Reid noted that there an also an opportunity to tap into private funding with ALUS-type programs. He pointed out that the ALUS proponents in Norfolk county see ALUS as a potential delivery mechanism in the farm community. The program has a base funding level, but there are also opportunities for a specific non-government organization that is interested in a specific issue to become involved. The organization may top up government funding and provide an added incentive in a particular area of the province. For example, the Wild Turkey Federation invested in the Norfolk ALUS project because they want to invest in areas where there are wild turkeys.

Caldwell pointed out that that questions about funding must be addressed in the context of his concern, described above, regarding what is legitimately a public good versus what is a simply the responsibility of the landowner. "I don't know that as a society," Caldwell argued, "that we

can afford to pay people for doing what they should simply be doing." This, he said, is part of the dilemma of saying that we have limited funds and how do we maximize them into a program like this. There are things, Caldwell notes, that are relatively cost neutral that we can ask people to do, and there are things which are relatively expensive. He pointed out that "you can't push the one side of that equation too hard because if you do you end up jeopardizing people's livelihoods." For example, he asked, how much money do we provide to a landowner to reforest fragile land? "If you go with market values," he noted, "it diminishes the amount of total land that can be involved, as opposed to finding sufficient landowners who are willing to accept a much lesser rate of compensation." The real challenges, he noted, are around deciding what are the appropriate rates and how far do we push those rates in terms of what is allowed to occur on a parcel of land.

8.4.5 Establishing the Value of Services

Another concern raised by some of the interviewees is the issue of getting agreement on how to establish the value of services. It was pointed out that compensation rates are currently based on land rental rates. This is the good criteria to begin with in that it helps to recognize the disparity between land rental rates in different regions. However, a number of interviewees agreed that the norm for establishing values should not be land rental rates, but rather the actual economic value of the environmental services being protected. It was acknowledged, however, that establishing market-based evaluations for ecological goods and services is very difficult. Van Donkersgoed argued that "we have to find a valuing system so that a buffer kept in a certain fashion is worth so many points towards the overall farm enterprise, versus reducing the amount of fertilizer being applied on sandy soil so that there is less nitrogen trickling down into the ground water." The difficulty, he said, "is in getting agreement from a significant number of parties and to compare very unique activities to agree that a certain activity is worth so many points on a scale and the next one is worth so many points."

One method for determining the value for environmental goods and service payments is to base the values on a comparison of the cost of providing those services through built structures. For example, if an action can lead to net reduction of so many units of phosphorus or bacteria going into surface water, this can be compared with how much it would cost to build a water treatment plant.

Several interviewees pointed out that it is better to use a price-discovery process to determine values once the program unfolds. In this method, participation rates are used to help establish the values. If participation rates are very high, this is probably an indication that the compensation rates are too high. If participation rates are low, this is an indication that payments should be

increased. Another means of setting compensation rates is to use a cost of production formula. In this method, for each particular action there is a range of values for what it costs the farmer to provide that service. This provides the basis for establishing payment values.

Regardless of how the compensation values are established, it is important to remember that the program must also recognize and address regional and local differences.

Another question that must be addressed is who do we assign to establish these values. Van Donkersgoed acknowledged that it cannot just be the Ministry of Agriculture or just the Ministry of the Environment. Rather, we need a combination of interests that accept a joint mandate to undertake this valuing.

8.4.6 Maintaining the Grassroots Character of the ALUS Program

A challenge that was identified in the interviews was how to maintain the grassroots nature of the ALUS program. It was pointed out that one concern farmers have had with ALUS-type programs has to do with creating another bureaucracy to manage the program. Farmers have expressed concerns about putting too much authority in to the hands of civil servants. As one interviewee noted, "farmers will have some concerns about whether this group is making wise decisions, and whether they are spending money wisely."

It was also noted that if the ALUS program is going to have broad and lasting public support, the governance structure needs to include more than just the farm community. Federal and provincial ministries, the environmentally community and municipalities will all have to be involved. Program administrators will also need to be able to do some local customizing. While the farm community may be concerned about being treated equally, the environmental needs in each area will demand a variety of approaches.

D. Reid noted that one of his concerns with the Norfolk ALUS project is whether the administrators of the program can build the existing capacity to deliver the program at the community level. He notes that this means increasing the county's ability to administer the banking, increasing the Conservation Authority's ability to provide extension, and increasing the Ministry of Natural Resources' ability to supply GIS services. He acknowledged that coordinating the workload and the complexity of the different sources of funds can be challenging. He also pointed out that the Norfolk project was based on a county and municipal level because this allowed for a community-based approach, which you cannot get at a watershed level.

Roberts similarly noted that there are challenges with keeping the program grassroots-based. A positive characteristic of the program, he pointed out, is that it is decentralized and very

community-based. However, Roberts argued, there is an evitable price for this. A condition of the program is that it is empowering, but this aspect has its drawbacks. A participant in the program, for example, may want to target payments around actions that are not necessarily sustainable. Roberts noted that "the alternative is that only the federal government decides what the qualities of the program are, which destroys the grassroots feel of it, the enthusiasm people have for it, and the self regulation."

8.4.7 Linking ALUS to a Larger Conservation Agenda

Another concern that was raised in the interviews was whether the ALUS program would be linked with any larger conservation agenda or program.

Those interviewees who considered ALUS primarily as an agri-enviornmental stewardship program felt that it should be tied into a conservation agenda. Some interviewees expressed concerns that the program, as it is currently conceived, is not connected to any larger conservation or social vision. McCallum noted that ALUS-type programs are highly selective in the types of land use activities that they support, and the activities are not necessarily part of an environmental or conservation agenda. The pricing mechanism, she argued, is conflated with compensation to farmers for loss of productive land, and it does not seem to be part of a wider agenda. She noted that this kind of payment is helpful for farmers who are struggling, but unless it is tied to a wider conservation concern, it is very farmer driven. The risk from this is that the public isn't aware of what is going on and doesn't have much input. In this respect ALUS can be seen as part of the subsidy or safety-net programming in Canada rather than part of a wider social or environmental policy. McCallum argued that the thinking behind the program "seems to be 'grab the bone and run with it,' rather than working with society to identify where the priorities are, and where is it best to implement." She noted that this is very characteristic of farming in Ontario. Farmers here like to keep things to themselves, she pointed out, and they don't work well with government or the conservation sector. This is part of the culture of farm organizations and farmers who are separated from environmental or social planning. McCallum's concern is that ALUS is not yet part of federal or provincial agricultural or environmental policy.

D. Reid suggested that one way to link the ALUS program in to a larger conservation agenda might be to base the program on watersheds. His own Norfolk project was based on a county and municipal level because this allowed them to get more of a sense of community, which you can't get at a watershed level. "If a watershed extends over a municipal boundary and you truly want to have community participating in directing it," Reid noted, it becomes very complex." Reid

pointed out that while it may be better to delivery the program on a municipal basis, monitoring and measuring the effects might be done best on an ecosystem or a watershed basis.

D. Reid also noted that he sees ALUS as a delivery mechanism, and that non-government organizations may want to focus their funding. To a certain extent this allows for targeting based on conservation priorities.

D. Reid pointed out that there are technologies such as GIS, which can help identify priorities and make landscape connections, and programs such as Carolinan Canada's Big Picture project and the Nature Conservancy of Canada's Great Lakes Blueprint. However, he questioned whether it is necessary to link with these broader conservation agendas and whether GIS is needed to identify where those connections are going to be made. Reid argued that "we already know that we will make connections along stream corridors, along property boundary lines, with fencerows or windbreaks. And the farmers know where they want these things." That landscape connection will come, he believes, if you provide enough environmental services.

8.4.8 Ensuring Transparency and Accountability

The issues of transparency and accountability also need to be taken into consideration when developing an ALUS-type program. McCallum noted that a general issue with farmers and agricultural activities is that independent observers, researchers and onlookers can seldom get access to information. She argued that farmers would be reluctant to get involved if they had to reveal publicly the results of their programs. However, McCallum pointed out that there needs to be accountability if public money is involved. As ALUS involves a collection of funds coming from a variety of sources, the question of how to be accountable to funders becomes important. In order to implement the program widely there must be some kind of accountability, monitoring and reporting available to Parliament and to the public.

Monitoring will be important in order to assess the impact of the ALUS program on issues such as water quality and quantity, the amount and quality of wildlife habitat, soil health, and also whether the program and activities are helping to maintain food security capabilities. Monitoring will also help to test assumptions about the effects of the land use activities promoted through the ALUS program. Having an appropriate monitoring structure is therefore key to the long-term success of the ALUS program. The indicators and benchmarks for success, and whether these are biophysical, socio-ecological, or both, will also have to be established.

8.4.9 Ensuring Permanence of Service Delivery

Assuring permanence of delivery of environmental services was raised by several interviewees as an important issue. It was pointed out that for an environmental goods and services program to work best it has to be voluntary and whole farm. However, because of this there is a risk that once payments end, or during periods of commodity price spikes, the farmer will not maintain his/ her services and instead put the land back into production. Van Donkersgoed argued that if we are going to reward farmers for providing environmental goods and services we need assurance that there is some permanence to this, that that benefit is ongoing. If society invests money, there is an obligation on the part of the farmer to maintain those services. Van Donkersgoed conceded that "I'm reluctant to create obligations that aren't voluntary, but during price spikes environmental stewardship might not survive."

One way to address this concern is to design the program so that the landowners buy in voluntarily, but once they have done this, safeguards are built in to ensure that the farm entrepreneur doesn't destroy the environmental services that have been created by public money five or ten years into the future. The UK provides an example of one way to deal with this concern. In the UK, the participating farmer enters a voluntary five- or ten-year agreement to provide ecological services. This agreement includes a clause that stipulates that even if the farmer bows out he/she still has certain obligations to uphold. Van Donkersgoed notes that while adding conditions such as these will create reluctance on the part of the farmer, the public will want to see some constraints built into the program.

Several of the interviewees did not see the risk of drop-outs as a major concern. It was pointed out that in a market system flexibility needs to be built into the program. D. Reid argued that this flexibility is necessary in order to ensure high rates of participation. Morris pointed out that the landowner is a party in the contract and has a right to negotiate. He noted that this necessitates that there "is someone with their finger on the pulse of the contracts that are out there and the direction that they are tending to go. This will give you a sense of whether you are going to loose a lot of benefits that you have recently accrued and whether you will need to take appropriate action" Both D. Reid and Gilvesy noted that it is acceptable for participants opt out, as long as the total environmental service benefit remains the same. For example, Reid argued that if a farmer puts his buffer back into production because the price of corn has gone up, ALUS program administrators will try to get those buffers on another farm.

Watkins noted that conservation easements may be a useful tool to address the issue of permanence. The easement will permanently protect land for a specific purpose. Working with

land trusts is also beneficial, because the land trust ensures that the conditions of the easement are being met and makes sure landowners understand the restrictions that are in place.

8.4.10 What Should be Rewarded

One of the issues that came up in the interviews had to do with what ALUS is rewarding. Is the program about creating incentives to encourage "bad actors" to change their practices, or is it about rewarding good stewards for their ongoing stewardship? A related question is whether the program is rewarding actions or results.

One way of approaching the problem, McQuail noted, is to consider the goal of program and how broad it wants to be. If you're trying to get a maximum return for dollars invested in the program, he argued, then you want the worst practitioners to be your target audience, because improving their practices would give you the best return. In this case administrators don't need to provide incentives to the people who are already doing what you want. This type of approach has positive and negative consequences. On the positive side, McQuail noted, rewarding the bad actors to improve their practices will lead to environmental improvements on the land. However, by providing an economic reward and benefit to the bad actors, you are creating a situation where the formerly bad actors are more economically competitive than the good actors. "From the point of view of fairness," McQuail noted, "a system which rewards the bad actors creates a philosophical and ethical dilemma for society if we're saying that society wants to reward and encourage environmental goods and services."

The other option for the ALUS program is to provide support to farmers who have already made changes in their practices, and who are providing environmental services on an ongoing basis. Van Donkersgoed argued that environmental goods and services is not about providing payments for making changes, but rather is about supporting annual delivery of services. It is about supporting ongoing stewardship carried out over a number of years. Environmental goods and services, he feels, should be payable to those who have already made the changes in their practices that the program wants to reward. This is one of the fairness aspects of this kind of approach. "One of the reasons why we are stuck in cost share approach," van Donkersgoed argued, "is that society doesn't want to pay for anything other than change. As a result, they get a lousy fit." If we're going to get stewardship thinking, he noted, we need annual payments because that is what drives it. In the more advanced environmental goods ands services models (such as those in the UK), the farmer makes the upfront investment and pays to plant trees, and then every year those trees grow the farmer receives a payment.

McQuail was concerned that many ALUS-type programs that have been proposed tend to provide payments for remedial actions (such as planting trees) as opposed to rewarding farmers for ongoing stewardship (such as maintaining forest cover over a period of years). “Is society willing to pay on a broad scale for environmental goods and services through these programs,” McQuail asked, “or is it only willing to pay to remediate the worst examples of failure to provide those goods and services?” In the latter scenario, he pointed out, you end up rewarding those people who have externalized the costs of poor environmental stewardship, but not the people who have internalized the costs of good environmental stewardship. McQuail questioned whether ALUS is prepared to pay farmers for those services that they have been providing all along. Van Donkdersgoed felt that the concern about rewarding those who are lagging to get into stewardship is especially true of the cost share model which ALUS is tying to move away from.

Roberts noted that we must be careful to distinguish between classification and performance-type regulations. He pointed out that the school of regulation that has dominated in North America is classification regulation, where regulations specify certain qualities or criteria that must be met. A performance regulation, in contrast, will look at the results, not the specific actions, that have been taken. Roberts noted that an important consideration is whether ALUS reinforces all of the problems of classification regulation or whether it moves towards a new school of regulation based on performance. ALUS should move towards a performance based regulation approach, he felt, because classification regulation often stifles innovation by promoting a single path to improvement

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8.4.11 Contribution to Livelihood benefits

As noted above, several of the interviewees viewed ALUS solely in terms of its potential contribution to environmental stewardship. These interviewees tended to downplay, or completely ignore, the program’s livelihood benefit. It was pointed out that the payments as they are current conceived are fairly modest (between $5 and $49 per hectare) compared to those in the European model ($50 - $1,000 per hectare). It was acknowledged by several interviewees that it very difficult to affect the viability of farming with this level of payments. D. Reid, for example, noted that he doesn’t see ALUS as a farm support program. “It is hopefully about creating a third stream of income for the farmer,” he argued, “but to the extent that it will help the farmer’s bottom line, you won’t get rich over ALUS.” ALUS, as he sees is, is about making some environmental improvements and having an impact on the landscape. In this sense, he argued, ALUS “would work in good times and bad.”

Several interviewees acknowledged that while the ALUS payments are fairly modest as they are currently conceived, there is potential for them to be much more. Under the European subsidies program, for example, there is a greater willingness to pay farmers for being stewards of the land. Caldwell believes that if this kind of philosophy were to permeate thinking in Ontario, and there was a large financial commitment from the government towards keeping farmers on the land, this would make a significant contribution to supporting viable farming operations. Van Donkersgoed pointed out that in the UK, environmental stewardship programs pay quite well and farms can get as much cash flow from producing environmental goods and services as they do from producing food. Van Donkersgoed observed that "if we do this well, if we really look at the significant opportunities, and society really truly values environmental services, then there is every reason to see that payment for environmental goods ands services can be a very substantial contribution to the bottom line of any farm land owner or farm land tenant." He noted that he visited a farm in the UK where the contribution to the bottom line was fifty percent environmental goods and services and fifty percent food production on three thousand acres.

Several interviewees observed that the livelihood benefits associated with the program may come through means other than the payments themselves. Caldwell noted that ALUS-type programs work best when there is a net benefit to the environment and to the farmer. The incentives may encourage the farmer to adopt new practices that are more efficient and that provide significant savings. There are some practices that we might promote though ALUS, he pointed out, that in fact have no payback in terms of economic savings or benefits. "While there are some instances where the environmental concerns are so significant that addressing them overrides any economic concerns," he argued, "ideally you are looking for those win-win situations where there is both an environmental and economic benefit."

Gilvesy pointed out that while the ALUS payments he receives are small, he is able to leverage that many times over when he markets his products. He feels that ALUS could contribute more to livelihoods if participants can use this marketing potential. If we leverage an ALUS program properly, he argued, we can say that only an Ontario farmer provides environmental goods and services and healthy food. He feels that marketing is very important because this is value attribute that farmers from other countries cannot claim. Any time you raise the value of your product on the marketplace, he argued, you're likely to get either more uptake of it or more money for it.

Watkins noted that ALUS would provide farmers with an additional source of income that is not based on them needing to do something in order to receive it. They could use this extra

income to invest in their farm, or to change the market they are serving and the types of food they are growing to respond to the huge opportunity that is arising from local food production. Watkins argued that the extra income provides flexibility and empowers farmers to make choices instead of being forced into doing the right thing. She pointed out that in the U.S., where purchase of conservation easements can have a payout that is fifty percent of the agricultural value of that land, this has worked to allow farmers to reinvest in their farms. Through payments for easements there is a one-time payout to farmers to give up future development potential. This can create an incentive for reinvestment in the farm because the farmers know that the land will need to stay in agriculture, and they know that they will need to make their agricultural business work. And hopefully the payment provides them with enough funding to make the business work. Watkins noted that the ALUS program could be extended to be similar to a purchase of easement program. In this case, payments would not be calculated based on how many trees are planted, or land rental rates, but rather on the cost related to the whole farm and keeping the farm in production. In broad terms, Watkins noted, this represents the total ecological service provided by the farm.

8.4.12 Other Means for Achieving the Same Goals

Interviewees agreed that ALUS has a number of advantages over current programs. Van Donkersgoed noted that "I see no other ways of achieving the goals I have in mind, which is to create farming in the context of a very strong stewardship mindset," and that he is "absolutely confident that the regulatory approach will not deliver that, and especially not in agriculture."

D. Reid noted that the large number of existing programs can be confusing for the people they are trying to target. He acknowledged that bringing them together under one umbrella or window would be helpful. However, without payments for environmental services, he noted, participation rates in these programs may be modest. D. Reid also pointed out that they are trying to see ALUS as complementary to, or working with, existing programs. One of the research foci for the Norfolk ALUS project, he noted, is whether they can integrate with existing programs and not take away from them. In the Norfolk project they are trying to integrate with the erosion control services of the Conservation Authority, Ontario Power Generation's forest corridor project, and the Environmental Farm Plan.

Watkins noted that there are options, other than ALUS, for providing support to farmers. The British National Trust, for example, pays farmers to support heritage and cultural values, including things such as rewarding farmers for keeping certain kinds of livestock or for providing amenity values. Watkins pointed out that we also need some kind of retirement option for farmers, whether it be a retirement plan or collective pension plan. This could enable farmers to

have more flexibility in their lives knowing that they don't have to dispose of their land as a way to retire.

Another alternative to ALUS that was raised was the use of conservation easements and Payment for Development Rights programs. Watkins notes that easements are more than just a farm protection strategy. Potential participants have to apply and have to make a case for why their farm should be protected, and the land trust has some role in deciding where the money should be directed, where the threats are the greatest and how to keep that land available for agriculture. Although it is fundamentally about keeping the land available to agriculture, there are other benefits from programs like this. They encourage good stewardship and enable reinvestment in practices that are good for the environment. The idea is that the payment is significant enough that it has long-term benefits. Van Donkersgoed noted, however, that he can see only a modest number of farmers wanting to put such easements on their property. He noted that the success in the U.S. is based on the fact that municipalities were either willing to purchase the development rights for the land and then put the easements on, or just purchase the development rights. He argued that paying for the development rights is "a long shot" in this province. Van Donkersgoed feels that public money will be better spent if it goes towards environmental services. While paying for development rights does have the results of protecting land, he argued, it does not create a stewardship mindset in the current generation.

It was acknowledged that the Environmental Farm Plan (EFP) is an excellent educational tool, and excellent preparation for farmers to start thinking environmentally.
It involves undertaking a risk assessment on the farm, identifying where there are problems and then receiving funding to help fix them. However, it was argued that participants enroll in the program once every five or ten years, go through the training and then, for the most part, leave the program behind except when there is funding available to undertake another project. As Van Donkersgoed argued, "there is no on-going stewardship mindset that drives the overall enterprise so that the farmer is thinking as an entrepreneur for the environment as well as food production." The EFP, he notes, "is still an excellent piece for getting people started in the direction of stewardship thinking, but it's not delivering for society what society wants. It's not providing assurances." Gilvesy noted that while the EFP is a comprehensive program with a number of Best Management Practices that farmers can adopt, compensation for lost opportunity costs and annual incentive payments are explicitly prohibited in that program. Having a shared use with the environment[37] is not particularly well addressed in that program either.

[37] ALUS pays Gilvesy $400 a year to leave the field alone until mid-July, when birds start to migrate. After the birds leave, Gilvesy uses the grass as feed stock for his cattle.

Interviewees pointed out that there are ways in which the two programs, ALUS and the EFP, can work together. It is possible to have environmental goods and services under the umbrella of the EFP, as long as the program recognizes the two levels of stewardship. ALUS, Gilvesy noted, can be seen as an EFP plus. The EFP, he argues, will help bring the farmer into compliance. ALUS, on the other hand, "is for the good stewards who have gone beyond EFP and who are actively involved in environmental goods and services programs." He observed that the EFP-plus farmer receives the incentive payments, but he or she also gets to use the marketing potential associated with participating in the program.

ALUS was also contrasted with the Greencover Canada program. Under the Greencover program, Gilvesy pointed out, participants can receive funding to replant tall grass prairie under a fifty percent cost share arrangement. However, they can't use that land as part of their grazing rotation, and they don't receive any compensation for lost opportunity costs. Gilvesy pointed out that "that ten acres is lost to you. You can't use it….so you've cost-shared on something and wound up taking ten acres effectively off your farm." ALUS, when applied to the same project, cost-shares on up front costs, provides an annual incentive payment to keep it there and allows him - under a part-pay scenario - to use it as part of his feed stock. So he can either receive a full payment and not use the land or receive a part payment and get partial use of the land for his operation. Gilvesy argued that a farmer would be much more likely to buy into this type of arrangement.

In considering alternatives to ALUS, Caldwell noted that the existing programs could be made to be cross-compliant with environmental practices. There is always the potential to do that he argued, but whether the political will is there is an important question. He pointed out that the one of the challenges is that the practices that are supported and promoted in these types of programs will cost farmers. For example, if you are asking farmers to retire land, new dollars will be needed from the program.

8.5 Conclusion

The observations from the literature, government documents and interviews with key informants provide a set of well substantiated working hypothesis about the main principles and design considerations for developing an ALUS-type programme, situated within a larger agricultural, ecological and livelihood context.

With respect to the general attractiveness and potential viability of the ALUS program, the literature, government documents and the experts all agree that there is a strong need for an ALUS-type program in Canada. All three sources acknowledge the need to recognize the value of

environmental goods and services and the benefits flowing to society from stewardship on rural lands. They all also recognized that government initiatives to increase environmental goods and services in the public interest must include adequate provisions for compensation or other offsets for farmers' costs. Evidence from all three sources indicates that ALUS is a viable option for promoting land stewardship and livelihood benefits. The farmer-to-farmer approach, grassroots nature of the program and the ongoing payments for services provided may lead to higher participation rates than traditional stewardship programs. This will result in greater environmental improvements. There is also a strong potential to enhance livelihood benefits through ALUS. This will come through the incentive payments but also from other economic benefits such as the ability to leverage participation in the program through the marketing of products, economic savings through the adoption of new practices, and an additional source of income that can be reinvested in the farm enterprise. One of the strongest aspects of the program is its ability to link land stewardship with livelihood benefits in ways that are mutually supportive.

The overall viability of the ALUS program will depend, in part, on the costs of the program, and the potential availability of means of covering these costs. While some funding options were presented in this chapter, governments will need to be convinced of the benefits of ALUS, and its advantages over other means of delivering environmental goods and services on farms. Widespread public support for environmental goods and services payments will play a key role in securing government funding.

The results presented in this chapter also provide an outline of the key design considerations and design features for an ALUS application, as well as insights into some of unresolved issues and potential response options. While the comments in the previous paragraphs established the overall desirability and viability of the ALUS approach, a number of matters of detail need to be addressed at the program design specifics stage. The program will need to outline what kinds of land use activities will be supported. While some general land use activities, such as buffering watercourses and taking fragile land out of production, were suggested, local needs will define the specific land use activities for each area. Whom the program aims to support and who will be eligible to participate will also need to be defined. Response options presented include a focus on working farming operations or the inclusion of all rural landowners. Whether to focus the program specifically on family-farm size operations is another consideration. Program administrators will have to set up a process for establishing the values of services, and also decide who is to be involved in making these decisions. Response options include basing the values on land rental rates, a comparison with providing the services through built structures, or basing rates on the true economic value of environmental services. How to maintain the grassroots character

of the program will also need to be addressed. A governance structure that includes all levels of government, farm organizations and environmental non-government organizations will need to be determined. How much the program will cost and where the funding will come from will have to be defined. It was estimated that a provincial ALUS program will cost at least $100 million. Response options for where the money would come from include new funding (e.g., from a levy on food) or transfer from existing sources (i.e., other farm support programs, production subsidies, or funding which is being used to provide services at the municipal level). Ensuring that the program is promoted in a fair and equitable way is another consideration. How to address the issue of drop-outs and ensuring permanence of service delivery will have to be addressed. An option to address this concern would be to include obligations that continue even if the participant drops out of the program. Issues of transparency and accountability will need to be considered, including the setting up of a monitoring program and the development of monitoring protocols. Program administrators will need to decide whether the ALUS program will link with an existing conservation agenda, and whether participation will be limited, based on conservation priorities. Program administrators will also need to decide whether the goal of the program is to act as an incentive to induce bad actors to change their practices or as a reward for ongoing and appropriate stewardship. Special design considerations for the Greenbelt will be discussed in detail in chapter nine. The unresolved issues and response options outlined here will also be discussed in detail in chapter nine.

The results presented indicate a number of areas where ALUS could also link with existing programs and other initiatives. ALUS is designed to be flexible enough to work with existing programs in the areas where it is implemented. ALUS could work well with the Environmental Farm Plan, local Conservation Authority programs, and the Local Food Plus certification process (specifically the program's biodiversity standard).

Interviewees described other supplementary options for achieving the same goals as ALUS. These include agri-environmental programs such as Environmental Farm Plan and the GreenCover Canada program. Conservation easements and the transfer of development credits were some of the farmland protection programs that were described. Creating a retirement program for farmers to help ensure financial security is another option.

The design considerations presented here suggest that ALUS could be applied usefully on a regional basis (e.g. to lands in the Greenbelt) – as a stand alone initiative or part of a broader application or both. The basic design principles, unresolved issues and response options presented here will establish a base for the next chapter, where I will provide details on how ALUS could be applied to the Greenbelt, if designed in light of the wisdom from the literature and from the

key informants. The specific form that an ALUS program would take in the Greenbelt, as well as specific issues that the program will need to address, will be discussed. An assessment of ALUS using sustainability-based criteria will assist in identifying weaknesses that could be addressed by combining ALUS with a number of existing programs.

Chapter 9 **Analysis: An ALUS Program for Ontario's Greenbelt**

9.1 Creation of an ALUS Program in the Greenbelt

This chapter will describe an ALUS-based program for Ontario's Greenbelt applying the general design principles developed and discussed in Chapter Eight. The characteristics of such a program will be set out in some detail, as will some of the unresolved concerns that need to be addressed in developing the program. Possible response options to address these concerns will be described. This Greenbelt ALUS program design will then be assessed using the sustainability criteria and framework created in Chapter Seven. Alternatives to the ALUS program will be discussed and evaluated using the same criteria and framework. A comparative evaluation of the relative strengths and weaknesses of each approach will be conducted and conclusions will be drawn.

9.2 Characteristics of a Greenbelt-Based ALUS Program

The data reported on in Chapter Eight, and the conclusions drawn from these data, provide insight into the key characteristics of a Greenbelt-based ALUS program.

There is strong evidence from the interview data and non-government organization documents that an ALUS-type program in the Greenbelt could provide many benefits to the agricultural community in this region. The program could help to increase participation in land stewardship initiatives. Statements by land stewardship officers and farmers as well as the results from public polling indicate that the program's farmer-to-farmer, grassroots-based approach might be more successful in attracting new participants than traditional stewardship programs. The program could also help to address the issue of fairness that has been raised in the academic literature and by the farming community. ALUS could help to distribute the costs of environmental protection more equitably between urban and rural communities. Most importantly, an ALUS program could help to develop a stewardship mindset amongst farmers, something which the current cost-share approach does not promote.

The data suggest a number of land-use activities could be supported in the Greenbelt through an ALUS-type program. Key informants and non-government documents agree that water quality and quantity can be enhanced through activities such as creating buffers along watercourses and riparian areas, fencing cattle out of watercourses, paying farmers for watering devices to keep cattle away from watercourses, and taking marginal land out of production. Biodiversity enhancement can be supported through activities such as taking marginal land out of production, reforestation, and tallgrass prairie restoration. The use of organic production methods is another

land use activity that could be supported through an ALUS program. This could lead to improvements in water quality and soil productivity. Suitable options for appropriate land use activities will vary according to location. Activities that could be supported in each of the case study areas are discussed below.

Eligibility for the ALUS-based Greenbelt program would be open to all working farming operations, meaning those farms that qualify for a farm business registration number.[38] There is agreement among the key informants interviewed that eligibility in the program should be limited to those farmers who are in the business of food production (as opposed to rural estate owners, hobby farmers, horse farmers, etc.). This view is supported in documents from non-government organizations. There was agreement among the interviewees that other rural landowners could be targeted through other programs.

An important design consideration is establishing the values for environmental services. Land rental rates are currently the most widely used basis for establishing the values of services. While acknowledging that it is difficult to establish market-based values for services, the majority of the experts interviewed agreed that the most accurate means for assessing values would be to base them on the actual economic value of those services.

The issues of transparency and accountability will also have to be addressed in the development of a Greenbelt ALUS program. As noted by one interviewee, farmers may be reticent to disclose information about activities undertaken and the results achieved, which could conflict with the need for accountability if public money is being spent. There must be some form of monitoring and reporting available to the government and the public. Creating a monitoring structure and developing appropriate monitoring indicators will need to be considered.

The governance structure of the ALUS program will also need to be considered. It was agreed that all levels of government, and many different departments within government as well as non-government farm organizations and environmental organizations will need to be involved. The grassroots character and decentralized structure of the ALUS program will need to be maintained. Whether there is the capacity at the grassroots level to deliver and support this type of program in the Greenbelt is another consideration. The ability of the Conservation Authorities, local ministry offices, and municipalities to administer the program and provide support will have to be assessed. On the positive side, there is a strong network of grassroots organizations on the Oak Ridges Moraine and the Niagara Escarpment, as well as provincial agencies focused on protection of the Moraine, the Escarpment and the Greenbelt, which could provide assistance.

[38] To be more precise, "working lands" should be eligible, irrespective of who the owner or the tenant is.

Promoting the program in a way that is fair and equitable and ensuring that it is accessible to everyone are also important considerations. The program needs to be broadly supported and cannot be perceived as benefiting only a few people. This means that even small operations, and not just those of certain scale, should be able to take advantage of it. Making the program accessible and uniform across the diversity of food sectors may also pose challenges.

The issue of how to assure the permanence of service delivery will also need to be addressed. One way to do this is to create obligations that farmers have to uphold even if they drop out of the program. While this may affect participation, it seems necessary to include this type of condition.

The majority of interviewees agreed that the program should also support services delivered rather than actions taken. That is, the focus should be on payments for annual delivery of services rather than for specific remedial-type activities. Payments will be made to those farmers who have already made the changes in their practices.

The Greenbelt ALUS program should work with existing agri-environmental stewardship programs such as the Environmental Farm Plan, and should be seen as a complement to these programs rather than as an alternative.

The data reported in chapter eight suggest the type of farming that would be best suited to support a sustainable agricultural economy in the Greenbelt. Several of the interviewees pointed out that affordability of land is an underlying tension in urban fringe agriculture. It is expensive to acquire land in most of the Greenbelt relative to other areas in the province. The Greenbelt, therefore, will require different forms of agriculture that can be effective in areas where land values are higher. This would include a transition to high value production activities such as market gardening, direct farm sales, agritourism, culinary tourism, farm shops, entertainment farming, and any other activities that might have the potential to benefit from a nearby urban population. While some of this is already happening in the Greenbelt, the data suggest that more needs to be done. This requires having those markets available and accessible to farmers so they can tie into those higher value products. As one interviewee pointed out, “this, in turn, speaks to an organization of agriculture, a psyche of agriculture and a culture of agriculture that may not necessarily already be there. People still like to produce their corn and soybeans and you have to adapt from that.” Another interviewee echoed similar concerns when he noted that “it takes a lot to change over from a group of entrepreneurs who were farming extensively to a group of farmers who are focused on high value crops on smaller acreages, perhaps putting up greenhouses and going into the winery business.” One interviewee observed that farmers who are in the Greenbelt now, whose average age is about fifty-four, would rather carry on farming the way they are.

"They would love to carry on doing what they're doing," he noted, "rather than change to the underlying new opportunity that takes an investment in hardware and software and a different kind of management and management thinking." Despite this inertia , many interviewees felt this is what needs to happen for near urban agriculture to thrive in the Greenbelt. Existing farm families may not be the ones to make this change. As one interviewee observed, this new type of farming "is going to attract a whole new tribe of farmers that aren't the conventional producers." These may be people from the city, or farmers coming from social justice or an environmental perspective.

The need to focus on high value production in the urban fringe is supported in the literature. Bryant and Johnston note that there are various socio-economic farming systems as well as a variety of farming types based on enterprise and marketing structures. These are matched by a wide range of capital structures on farms and of farmers and farm managers. Conditions in the urban fringe, they argue, present many opportunities for entrepreneurial farmers, and these are epitomized in many farms with a diversified enterprise structure which has moved into various types of direct selling. "The nature of the evolving market for farm produce, and the greatest possibility of selling product differentiated by process (e.g., environmentally-friendly produce, organically and biologically produced food) may provide even greater opportunities in the urban fringe for farmers to participate in lucrative local and regional markets" (Bryan and Johnston 1992).

There is a very strong interest in locally-sourced food in the GTA region, which indicates that there are opportunities for this type of farm enterprise in the Greenbelt. As one interviewee pointed out, ALUS works well in all three case study areas, because one thing they have in common is access to urban markets. There are opportunities to create market based farming enterprises based on high value food products. This is already happening in the Holland Marsh where vegetables and specialty ethnic foods go to markets in Toronto. In the case of Caledon, Brampton presents very important marketing opportunities. Ron VanHart, an organic farmer in the Holland Marsh, who was interviewed as part of this research, exemplifies this entrepreneurial spirit. His business has survived and even thrived because he has adapted to focus on greenhouse grown organic vegetables, which he sells to select markets in the GTA through direct sales and farmers' markets. There is a huge demand in the GTA for farmers' markets that is not being met. One interviewee noted that this type of farming will work if farmers are flexible and new interests to farming are willing to take up some niche specialties, and if the government promotes artisanal production in the Greenbelt and regional branding. This will require political will and public support, but if the interest is there, there is a huge opportunity to test both ALUS and a number of

other initiatives. Greenbelt farmers, as one interviewee observed, "have opportunities to rebuild and reconnect, to take Greenbelt funding and leverage it into an ALUS program."

There are other ways that farming in the Greenbelt may need to adapt in order to survive and flourish. Many farm families engage in pluri-activity[39] and in many respects, this can be considered a very healthy thing. One interviewee pointed out that part-time farming and hobby farming support important and viable life-styles and we should recognize them in our approaches to managing agricultural land. Another interviewee noted that "it could become more like European landscape where people never intended to make their entire living off of farming." "Maybe," she pointed out, "people will relax about this notion that farming should be a full-time occupation and whole agrarian mythology that surrounds it. Why shouldn't farmers adjust? Maybe the whole paradigm has to shift."[40] As one farmer noted, ecological goods and services can be seen as one more thing that farmers can grow, in addition to food and fibre. ALUS, therefore, supports an approach to farming based on pluri-activity.

9.3 Issues to be Resolved and Challenges to be Overcome

There are a number of issues that need to be addressed in the creation of an ALUS program for Ontario's Greenbelt. These issues will be discussed and, to the extent possible, response options will be identified.

The creation of an ALUS-type program in Ontario's Greenbelt must first recognize that there is an equity issue with respect to farmers within the Greenbelt and those outside of its boundaries. If we provide significant funding for farmers in the Greenbelt to undertake more environmentally responsible practices, one interviewee questioned, what is the basis for saying that those funds are available in the Greenbelt but not for people outside of Greenbelt, especially if the funding is coming from the same public source? This is something, the interviewee pointed out, that a provincial bureaucrat would consider.

While applying ALUS only to Greenbelt may be seen as unfair to those outside of its boundaries, ALUS could also help address inequities created by the Greenbelt. An important issue in the Greenbelt is the inequity in land value effects for farmland owners inside and outside the Greenbelt. On one side of the Greenbelt boundary, land prices are very high; on the other,

[39] Pluri-activity refers to the fact that one person or a group of persons (farmers or rural entrepreneurs) are involved in different activities (i.e., farming and non-farming).

[40] Off-farm income, however, should be seen as voluntary option for farmers to supplement their incomes, and not as a solution to the farm income crisis. In a healthy agricultural economy, farmers who want to make a living solely from their farm income should be able to do so.

prices are severely restricted in comparison. Provincial government officials are clearly not acting to deal with the evident problem. Moveover, ALUS based advantages for farmers in the Greenbelt could be seen as compensation for the development opportunity losses they have suffered by being included in the Greenbelt.

In addition to helping to address inequities created by the Greenbelt legislation, there are other justifications for an ALUS program targeted specifically at Greenbelt farmers. The pressures associated with near urban agriculture, which were described in detail in Chapter Six, are felt more strongly in the Greenbelt than in other parts of the province. This includes the high cost of purchasing or renting land and other factors that make it more challenging to make a living from farming in the Greenbelt. The kinds of support that society provides to producers to keep them on the land is particularly important in near-urban agriculture. It is also important to note that the present research is not about creating an ALUS program exclusively for the Greenbelt. It is about testing how well the ALUS program would work in a near-urban setting, as a basis for something more comprehensive.

A number of other issues need to be resolved in the creation of an ALUS program for the Greenbelt. One of these issues is where the funding would come from to support the program. There is agreement that the bulk of the funding should come from general government revenues with all three levels of government participating. A number of ideas were presented by the interviewees regarding potential sources of funding. One idea is to fund the program through a one percent levy on food. Another idea is to shift some of the money that is currently being spent to maintain environmental services towards protection of those services through an ALUS-type program. This would include, for example, some of the funding that Conservation Authorities are spending to maintain water quantity and quality. Some interviewees were supportive of shifting some production subsidy funding to ecological goods and services. There may also be opportunities for local non-government organizations or private funders to provide additional funding to support projects in particular locations. The data suggest that the size of the payments will have to be increased from those that are currently being used in the Norfolk ALUS pilot project ($10 to $150 per acre/ per year) in order to make a significant impact on the livelihoods of participants.[41]

[41] It is difficult to estimate exactly what size the payments would have to be in order to make a significant contribution to livelihood benefits. While an income ratio of sixty/ forty or even fifty/ fifty between food commodities and services may be common in European programs, this level of support seems unlikely at the current time in Ontario. If farm products sales were approximately $1.2. billion in the southern Greenbelt region in 2001 (FGBF 2007), the $100 million estimated cost for a provincial ALUS program would only make a small (but significant) contribution to overall farm income.

Although it is recognized that government support is essential for the successful implementation of a regional or national ALUS program, government officials contacted as part of this research project expressed a number of concerns with the ALUS concept. An official at the Ontario Ministry of Agriculture, Food and Rural Affairs noted that the ministry is not interested in investing in ALUS at this point. He noted that the ministry would rather build on the success of existing programs, particularly the Environmental Farm Plan, which they consider to be very effective. The government is also hesitant to invest in ALUS at this point because questions remain with respect to how the program will be administered and implemented. This official also noted that the environmental benefits of ALUS have yet to be substantiated. An official with Agriculture and Agri-Food Canada expressed similar concerns. She noted that the federal government has invested in the Blanchard, Manitoba ALUS pilot project and the PEI ALUS pilot project and is waiting to see how those projects progress before investing further. The level of public support is also an important factor for the government. While surveys have indicated public support for ALUS-type programs, the true level of public support needs to be assessed (i.e., are people willing to make sacrifices to other program such as health care in order to support this type of activity). This Agriculture Canada official also pointed out that there are few details about the environmental benefits of the ALUS program, and reiterated the interest in building on the success of the Environmental Farm Plan. Another official with Agriculture and Agri-Food Canada noted that ALUS is only one option for delivering environmental goods and services and that his department is currently doing a cost-benefit analysis of four of these approaches.[42]

Designers of a Greenbelt ALUS program will also have to set up a process for getting agreement to establish the values of services. As noted above, land rental rates may be a good starting point in terms of recognizing regional differences. However, in the long-run, it would be better to base the compensation rates on the actual costs of those services. This can be done through comparison with the costs to maintain services through built structures, or through a cost of production formula supported a price-discovery process.

Another issue to be resolved is whether the Greenbelt ALUS program will be linked to any larger conservation agenda. As one interviewee noted, if the program is part of a wider environmental agenda or plan, then there will be priority areas for conservation within it. This means, however, that only certain farmers would be eligible to participate. From an

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[42] These options are: annual payments; water quality trading (i.e., the Clean Water Program in the South Nation River watershed, as described in Chapter 3, section 3.15); reverse options (such as the EcoTender program in Australia where farmers make sealed bids to carry out work that will achieve multiple

administrative and public relations point of view this is problematic. This concern connects back to the issue, raised by several interviewees, about the purpose of the program and whether it is seen as another farm support mechanism or if it about protecting the environment. If it is the latter, some interviewees argue, then there are justifications for restricting eligibility. However, if we acknowledge that this project is testing ALUS because it promises to be beneficial in both areas, the issue is not which option it will favour, but how it can best be designed to maximize mutual benefits in a lasting way. This option would involve applying the program universally (i.e., not restrict eligibility in any way), and to create linkages with conservation programs where possible.

Consideration will also have to be given to the issue of who is eligible to participate in the program. While there is agreement, noted above, that the program should be for working farming operations (or "working lands"), there is debate about whether to limit eligibility to family farm size operations. It was pointed out by several interviewees that with commercial cash cropping, or large-scale industrial farming, there is less attachment to the land than with family farming, and less time spent managing the land. Other interviewees saw the program as a means of supporting the family farm and helping to keep it viable, because this is where the need and the challenges are the greatest. The other option is that all farming operations be eligible to participate in order to maximize the environmental benefits. This would mean that large-scale industrial operations and horse farms could participate, if they have a farm business registration number. There is also the option of having different levels of support for different types of producers, however this might be perceived as unfair if certain producers receive smaller payments for providing the same service.

9.4 Application of ALUS to Case Study Sites

Interviewees suggested a number of land use activities that could be supported through an ALUS program in each of the three case study areas.

Holland Marsh

Interviewees pointed out that in the Marsh there is a need to support activities that encourage a reduced level of fertilizer, pesticide and herbicide use, support soil conservation, and assist with the restoration of wetlands to promote drainage and provide habitat.

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environmental outcomes and the government selects those that will provide the best outcome at the lowest cost); and one time conditional payments.

The types of land use activities that could be supported in the Marsh include the filling in of drains,[43] Integrated Pest Management, alternative cultivation methods, and the use of cover crops. It was suggested that ALUS could help with the cost of soil analysis which is conducted every year, and which used to be overseen by the Ministry of Agriculture extension agents. Supporting this service, which should be done as an independent service, may help to encourage reduction in fertilizer use.

Retiring land, and/or restoring some areas to wetland is another land use activity that could be supported, though this would require close monitoring of the effects, due to the small size of the Marsh and the fact that everything is so closely connected**.** It is important to consider what the impact would be on the agriculture industry in the Marsh if some of the land was retired into other land uses such as wetlands. In addition, does turning some parcel of land back into wetland threaten the overall ecosystem (even though it is artificial), and is this possible without some way negatively affecting the neighbouring farms?

Farming using organic methods is another land use activity that could be supported through an ALUS-type program. One way to do this is to have a number of services that farmers could address, but with an added premium for doing them in an organic fashion.
Several interviewees pointed out that because of the concentrated character of the Marsh, converting to organic methods would have more of an impact in the Marsh than in the other case study areas.

Some interviewees thought that it may be more difficult to gain the support and participation of farmers in the Marsh for an ALUS-type program. McDonald pointed out that the Marsh is quite different from the other areas. The land is very valuable and unique and there is only a small amount of it. Getting growers there to take on some of these activities, she concedes, may be difficult. McDonald didn't think that taking land out production and retiring land would be feasible in the Marsh.

The program would also need to have higher compensation rates in the Marsh, in comparison to the other two areas. In other locations, such as Caledon, where the focus is on conventional field crops (such as corn, soybeans ,wheat), the lower returns mean you can influence practices with payments of a few hundred dollars per acre. In the Holland Marsh, in contrast, the returns on a per acre basis are in the thousands of dollars. Because of this, compensation rates would have to be much higher in the Marsh in order to make an impact.

[43] With respect to filling in drains, McDonald notes that the Marsh was originally drained by ditches. Many of the growers have put in header tile drains, so they can fill in a number of the ditches and the drainage is all underground. They can manage the water table and manage drainage without having the ditches.

Niagara

In Niagara, the land use activities eligible for support could include a focus on Integrated Pest Management in the fruit sector. In the uplands, in the southern Niagara Peninsula, where the soil is of poor quality due to being heavy and damp, payments for environmental services should focus on maintaining water quality and quality (in both drainage and irrigation) for agriculture in ways that benefit the environment.

Caledon

It was pointed out that there is potential for ALUS-type programs in Greenbelt Caledon (as opposed to "White Belt" Caledon[44]) because some approaches to agriculture there have a very significant environmental footprint. There were no specific ideas for land use activities presented for Caledon. One interviewee pointed out that the farm economy in Caledon could benefit from more value added enterprises such as orchards, wineries and tourism, where what is on the land is fairly permanent as opposed to annual row crops. A Greenbelt ALUS program might be able to support these types of activities through the marketing of value-added products that are produced with environmental goods and services. This strategy could also be effective in the other case study areas.

9.5 Summary of Major Design Features

Table 9.1. presents a summary of the major design features of an initial proposed approach to ALUS in the Greenbelt, based on the conclusions from the literature, government and non-government documents, and the key informant interviews.

Table 9.1. Summary of Design Elements, Issues and Response Options for a Greenbelt ALUS Program.

Design element	Issues and Response Options
What land use activities should be covered?	- Various depending on location. - Could include riparian buffering and retiring of fragile land - Use of Integrated Pest Management in fruit belt in Niagara, and in Holland Marsh - Include added payment premium for organic

[44] White Belt Caledon refers to the area, within the Town of Caldeon, that has been designated by the Town as prime agricultural land. While the Town envisions this land as being protected for agriculture in the long-term, the *Places to Grow* plan and Greenbelt legislation have identified this area for urban expansion.

	production - Land use activities will help to promote water protection, and biodiversity enhancement
Who is eligible to participate?	Options: - All landowners eligible to participate, or - **Only farmers involved in food production should participate,** or - Program should focus on family-farm size operations - eligibility may be limited if ALUS program connects with larger conservation agenda and identifies priority areas
How much will the program cost and where will the funding come from?	- Provincial program to cost approximately $100 million - Primarily government funded with all three levels of government and various departments participating - Options for funding include new sources of funding (i.e., 1% levy on food) or transfer from existing programs
How to get agreement to establish values of services.	- Options for establishing values of services: - Land rental rates - Comparison with built structures - Price discovery process (scale adjusted according to response) - **True economic value of services**
Assuring permanence of service delivery	- Create obligations that participants have to uphold even if they drop out of the program.
Governance	- Important to maintain grassroots, decentralized character of ALUS - Multi-polar governance structure with all levels of government, farm organizations, and environmental organizations represented
Transparency and accountability	- Ensure transparency and establish reporting mechanism - Establish monitoring protocols. - Use performance-based regulations
Equity and access	- Promote program in a way that is fair and equitable
Whom is the program meant to target, and is the program supporting actions or results?	Options: -Use program as incentive to target worst offenders through funding remediation activities *or* **-Support ongoing stewardship and annual delivery of services**

Note: Bold represents preferred option

9.6 Evaluation of ALUS Using Sustainability Assessment and Criteria

The following discussion presents an evaluation of the potential contribution of the ALUS program to the creation of a sustainable agricultural economy in Ontario's Greenbelt, using the sustainability criteria and assessment framework presented in Chapter Six (see figure 6.2 on page 79). This assessment of the initial proposed approach to ALUS in the Greenbelt will help to identify weak aspects and means of strengthening them, and identify which responses to the unresolved issues would be most suitable.

Socio-Ecological System Integrity

The literature and key informants agree that ALUS could help to increase participation in land stewardship activities, and could support the development of a new approach to farming and the environment. ALUS can play an important role in alleviating some of the negative environmental aspects of modern industrial agriculture. The types of resource-conserving practices supported through ALUS could lead to improved water quality and quantity, improved air quality, improved soil productivity, and increased habitat to support biodiversity conservation. These practices are especially important in areas such as the Holland Marsh where issues such as declining soil productivity, water contamination and loss of habitat threaten the long-term integrity of both the social and ecological systems. ALUS will contribute to building more resilient socio-ecological systems by protecting the resource-base of society through the enhancement of environmental services and by connecting environmental protection to livelihood benefits.

There are also indications that ALUS could provide economic benefits to farmers and society through cost reductions. A report commissioned by Delta Waterfowl found that the costs of a national ALUS program are significantly outweighed by the benefits to Canadians. The report estimates annual cost reductions within government of over $61 million and a total benefit to society of over $820 million/year though the program's positive results in greenhouse gas sequestration, increased value of outdoor recreational activities, and other services (Tyrchniewicz 2007)[45]

ALUS could help to encourage long-term investment in land by making farming more appealing as an occupation. This would be achieved through the incentive payments, which would provide an additional and on-going source of income to eligible farmers. This may lead to a higher proportion of farmland under production that is owned rather than rented. The data

[45] This is in addition to cost reductions of $61 million/ year associated with saved government payments for crop insurance premiums, improved water quality and reduced wind erosion. The total cost for a Canada-wide ALUS program is estimated at $738 million.

suggest that ALUS, on its own, will not help to stop the loss of valuable farmland in the GTA region to urban development. The payments, as they are currently structured, are not large enough to make an impact in this area. This would hold true, even if the payments were to increase significantly. The data suggest that because local specialty foods are very lucrative and highly prized, the local food movement has some potential to challenge the effects of urban development. The value of local food products may help to make the productive potential of land in the Greenbelt competitive with its speculative potential. To the extent that ALUS can contribute to or support local food production, it could help to counter the effects of urban sprawl. This could be done, for example, through increasing the marketing potential of local and specialty foods and helping to develop new markets. However, as noted above, the farmers who would be involved in this type of ALUS program may not be coming from the conventional farm population. At least initially, they may be people from urban areas, or younger farmers coming from a social justice or environmental perspective.

ALUS may be helpful in attracting a new generation of farmers by making farming more appealing as an occupation. In recognizing the role that farmers play in delivering and protecting environmental services, and the true value of those services, the ALUS program is contributing to a positive image of farming. This was described by one interviewee as "psychic income." The increased livelihood potential, though the incentive payments, may also help to attract a new generation of farmers.

ALUS could contribute to enhancing the resilience of farming communities and rural economies by creating an additional income stream for farmers. The extra income could provide flexibility by allowing farmers to reinvest in their farm enterprises, or to change the markets they are serving and the types of foods they are growing to respond to the opportunities arising from local food production. The extra income would also help foster more resilient rural communities by protecting farmers against the vulnerability associated with commodity price spikes. ALUS would fit well with a model of farming based on pluri-activity which can create resilience by diversifying income streams for farmers.

ALUS will encourage broader initiatives linking producers and consumers in ways that strengthen communities of interest. It was noted previously that producers can leverage participation in the ALUS program in the marketing of their products by creating an additional value attribute. Participating in the ALUS program could help Greenbelt farmers in making a shift to high value products to serve urban markets. Participating in the ALUS program may also put farmers on the path to making additional modifications in their practices. This includes a transition to organic methods if this type of activity was supported through ALUS. Both of these

changes could contribute to strengthening the resilience of socio-ecological systems in the Greenbelt. The linkages would open up new economic opportunities for farmers, but also help to shift agriculture practices in more environmentally sustainable direction. Consumers could also benefit from these linkages. A growing number of consumers are eager to purchase locally-sourced foods, but also foods that are produced using sustainable methods. ALUS may be able to link with the Local Food Plus, a non-government organization that has developed a certification process for locally-sourced food in the GTA region.

Livelihood Sufficiency and Opportunity

The data suggest that ALUS payments, as they are currently structured, will not make a significant difference to the livelihood prospects of farmers in the Greenbelt. This is because the payments are currently relatively small (between $5 to $49 per hectare), compared to the UK, for example, where they range from 25£ to 500£ (apx. $50 to $1000) per hectare. However, there is the potential for the payments to make a much larger contribution to the farmer's income. For example, in the European model up to fifty percent of farm income can come from environmental services. A contribution of this size could make a significant impact on the livelihoods of farmers in the Greenbelt, however this would require a strong public investment.

While the payments themselves have the potential to play a larger role in contributing to the farmer's income, there are a number of other direct economic benefits associated with participating in an ALUS-type program. Participants in these types of programs can leverage the fact that their foods are produced with environmental services many times over in the marketing of their products. This can be achieved, for example, if production is tied to a certification scheme such as the Local Food Plus certification. This could help to increase the value farmers receive for those products and open up new markets.

The measures adopted through the ALUS program would not only generate payments, but the activities themselves could save farmers money in the long-term. Farmers could realize that there are significant economic savings associated with some of the new practices that are being promoted through ALUS. The ALUS payments would also provide farmers with an extra income source that they don't have to do anything additional to receive (i.e., because the payments are for services provided rather than actions taken). This extra income could provide flexibility and farmers could use these funds it to reinvest in the farm enterprise. This may assist farmers who want to expand their operations to acquire more land, or to change the types of foods they are producing in order to access new markets.

The potential benefits just described, i.e., larger payments, increased marketing potential, spin-off economic benefits, and extra income to reinvest in the farm enterprise indicate that ALUS could help to address the challenges of making a living from farming in the Greenbelt. However, as it has been pointed out, it may take a different approach to farming and possibly a new breed of farmers to take advantage of the economic opportunities available in the Greenbelt. It will require a shift to value added production, and an embracing of pluri-activity.

The shift to high value production may also help to address some of the challenges associated with competition and a declining portion of the food dollar going to farmers. Because value-added products often involve direct sales (i.e., farm-gate sales or farmers' markets) they result in a greater portion of the food dollar staying with the farmer. Any actions that support a local food system and decrease the distancing of consumers from food products help to alleviate the cost-price squeeze experienced by farmers. Through supporting a focus on high-value, locally-produced food marketed directly to consumers, ALUS may also help increase the ability of farmers to compete with large grocery chains and agricultural imports. It is questionable whether ALUS will help the situation of conventional farmers (i.e., those unwilling to shift to high-value production) with respect to these issues. The inability of farmers to compete with cheap imports and the cost-price squeeze are byproducts of national and international agri-food policies and trends which promote intensification, specialization and concentration. Whether ALUS has the ability to affect these foundational issues is uncertain. On the one hand, these challenges could support the criticism that ALUS is only addressing the symptoms of a flawed system, but not fundamentally challenging the problems inherent in the system itself. On the other hand, ALUS could address some of these foundational issues through the inclusion of the characteristics of a more sustainable food system in the ALUS program criteria. For example, it was noted that farming using organic methods could receive a premium through the ALUS program, in a fashion similar to that which occurs in the UK.

Intragenerational Equity

Evidence from non-government documents and key informants suggests that ALUS may help to address the lack of municipal support for farming and the loss of influence of farmers in local politics. Municipalities may be able to save significantly on infrastructure costs though promotion of an ALUS program (Tyrchniewicz, 2007). There is, therefore, the potential for municipalities to see agricultural lands and farmers as playing important functions in delivery of municipal services. This could lead to greater support for farming at the municipal level, and increased influence of farmers in local politics. The influence of farmers in municipal affairs may also be

strengthened if ALUS adopts a multi-polar governance structure that includes representatives of the farm community, municipalities and other levels of government. If municipalities do end up coming to the table as one partner in both the funding and implementing of such a program, this may lead to a change in culture and greater municipal support of farming.

To some degree, ALUS may help to address the issue of the intrusion of non-farm values on farming in the Greenbelt. To the extent that ALUS can assist in keeping farmers on the land, either through the monetary payments, or the "psychic income" it provides, the program may help to address the decline of the farming community and the growing sense of social isolation experienced by farmers in urban-fringe areas. The focus on value added production and the creation of linkages with the local food movement could provide a moral and economic boost to the farming community in the Greenbelt, leading to greater investment in farming enterprises and the agricultural infrastructure that supports them. These initiatives could help to counter the "impermanence syndrome," which is characterized by "the belief among farmers that agriculture in their area has limited or no future and that urbanization will absorb the farm in the not-too distant future. It is manifested by disinvestment in framing inputs, sale of farmland tracts for hobby farm or acreage development, and shifting of crops from those requiring labor or capital intensity, such as berries or orchards, to those requiring little labour or investment, such as pasture or annual crops" (Nelson 1992, 469).

The ALUS program may also help to support the viability of the family farm.
Family farms are generally struggling now for a variety of reasons including a public policy bias towards greater concentration of assets and wealth in fewer and larger farms and few and larger agribusiness firms (CFFO 2007).

ALUS can also assist in providing public recognition for the role farmers and farmlands play in providing ecosystem services. As Davidson has pointed out, protection of the natural environment, both functionally and aesthetically, helps both urban and rural communities. However, the burden of the protection falls more heavily on rural community residents. An ALUS program could help to distribute the costs of environmental protection more equitably between urban and rural communities (Davidson 2007).

The issue of a universally-applied versus a targeted ALUS program also has implications for intragenerational equity that would need to be considered.

Intergenerational Equity

Evidence from non-government organization documents, the academic literature on peri-urban farming, and interviewees comments indicate that ALUS will help to preserve and enhance not

merely ecosystems and ecosystem services needed in the future, but also the opportunities and capabilities of future generations of farmers in the Greenbelt to live sustainably. By focusing on protecting the resource base of society, ALUS will help to ensure the viability of rural communities economically and socially. A permanent ALUS program could help to sustain farming as a viable career with a real livelihood potential.

The academic literature and interviewees comments support the argument that ALUS may help to encourage a transformation of farming in the Greenbelt to something which it needs to become in order to remain viable and survive – that is, farming with a focus on systems that are sustainable, emphasize high-value crops, respond to local market demand, and feature private enterprise and innovation. To the extent that ALUS can contribute to this change, it will be assisting in preserving the opportunities and capabilities of future generations of farmers in the Greenbelt. ALUS may also help to support a model of farming based on pluri-activity, which also presents a more sustainable lifestyle for farmers in the Greenbelt.

ALUS, on its own, will most likely not make a significant contribution in helping to ensure that future generations of farmers in the Greenbelt have a secure land base. As noted above, ALUS will not directly help to stop the loss of farmland to residential and other forms of development. The program might, if coupled with a powerful local food movement, help to increase the productive potential of farmland to the point where it can begin to counter development pressures.

Resource Maintenance and Efficiency

Implementation of an ALUS program in the Greenbelt could make a substantial contribution in the areas of resource maintenance and efficiency. Through the on-going annual payments, ALUS contributes to the long-term maintenance and health of natural systems and the efficient use of resources.

ALUS will help to bring a greater reliance on natural processes such as nutrient cycling, nitrogen fixation and pest-predator relationships through supporting activities such as organic farming methods and Integrated Pest Management. Through promoting these methods, ALUS will also help to maximize the reliance on natural, renewable farm inputs, and less on purchased commercial inputs. In adopting these methods, ALUS may also help to maximize the reliance on management using the internal resources of the farm (i.e., management skills, knowledge and labour).

An important determinant in the potential contribution of ALUS to resource maintenance and efficiency is the degree to which it will be able to promote organic[46] production methods. For the most part, the land use activates and practices supported through ALUS do not focus on production methods. The potential focus on rewarding organic production is one exception to this. If ALUS only concerns itself with activities such as the buffering of watercourses or taking land out of production, it may not help address the problems associated with intensification, specialization and the striving for high yields through capital intensive solutions. In this case ALUS may not lead to the improved matching of cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of production levels. It also may not contribute to the productive use of the biological and genetic potential of plant and animal species. The contribution of ALUS in this area also depends on the educational function of the program and the extent to which the practices receiving payments lead to modifications in other practices on the farm.

Socio-Ecological Civility and Democratic Governance

As noted above, ALUS presents a more proactive and collaborative approach to environmental regulation. This model encourages a multi-polar governance structure with representation from farmers, non-government organizations, and all levels of government. Because it is anticipated that municipalities will be a partner in funding and administration of the program, implementing an ALUS program could lead to greater support for farming at the municipal level. This, in turn, could lead to a greater role for farmers in decision-making processes and a greater understanding at the municipal level of the concerns of the farming community.

The interview data suggest that ALUS would contribute to fostering a greater understanding and appreciation of ecological realities among farmers and others involved in the program. There is an educational aspect of the program that goes beyond the protection of specific environmental services. Several people interviewed as part of this research project anticipated that farmers who take part in the program will begin to see agriculture in relation to environment in a new way, and will start to initiate new practices on their own. Highlighting the role of environmental goods and services will also serve an educational function for others involved in the program (municipal officials, non-government organization representatives, and the general public).

ALUS will encourage links to broader initiatives linking producers and consumers in ways that strengthen communities of interest. It was noted previously that producers can leverage

[46] Organic here refers to a particular set of production goals, methods and values, as presented in chapter two of this thesis, rather than certified organic which refers to a marketing strategy and structure.

participation in the ALUS program in the marketing of their products, perhaps introducing them to new markets. The program may also put farmers on the path to making additional modification in their practices. These actions may lead to greater political engagement of farmers, consumers and other land beneficiaries in ways that are mutually supportive. Farmers' participation in the ALUS program helps to educate consumers about the ways in which their food is produced, empowering them to make choices and become more engaged. By supporting food produced with ecological goods and services, consumers are empowering farmers to make changes in their practices and increasing their involvement in building a sustainable food system.

Precaution and Adaptation

ALUS does encourage a precautionary approach. The current cost-share and regulatory models of farm stewardship pay farmers to address problems after they have been created. With ALUS, the emphasis is on maintaining or enhancing environmental services on an on-going basis in order to ensure their healthy functioning. The focus is on prevention of problems before they arise.

ALUS does manage for adaptation. The program is flexible and will take a differently form in each location it is implemented in. The land use activities receiving support through ALUS, as well as the remuneration rates, will vary according to the conditions in those areas (i.e., environmental concerns, land rental rates). This is part of the decentralized and grassroots approach of ALUS which fosters innovation.

Investment in an ALUS program can foster a precautionary approach in other ways. The emphases on local foods, social learning, and strengthening of ecological system integrity will all help to foster more resilience in the socio-ecological systems of agricultural lands. There are also long-term advantages associated with a system that fosters local production and organics if energy, fertilizer and pesticide input costs continue to rise globally.

Intermediate and Long-Term Integration

The ALUS program does reinforce the interdependence of the requirements for sustainability. The program explicitly links socio-ecological system integrity and livelihood sufficiently and opportunity in ways that are mutually beneficial. Benefits in one of these areas automatically lead to benefits in the other area. While many of the interviewees wanted to see ALUS as either an environmental program or a farm support program, its innovation lies in how it links the two.

9.7 Evaluation of Alternatives to the ALUS Program

The main alternative to the ALUS program is the current suite of government and non-government programs and tools that are available to farmers in the Greenbelt. This includes land stewardship programs such as the Environmental Farm Plan, and income support programs such as the Canadian Agricultural Income Stabilization (CAIS) fund. The suite of available options also includes farm protection programs and tools such as conservation easements, property tax relief, agricultural zoning, and acquisition and transfer of development "rights". The currently available agri-environmental, farm support, and farmland protection programs and tools were described in detail in Chapter Six.

The evaluation of alternatives to ALUS will not only compare the relative merits of ALUS and the alternatives but also identify programs and tools that might complement ALUS and be included in a larger overall package that would deliver more sustainability gains, more effectively and/or more efficiently.

9.8 Evaluation of Alternatives Using Sustainability Assessment Criteria

Socio-Ecological System Integrity

Existing agri-environmental programs, such as the Environmental Farm Plan, do promote compliance with existing environmental regulations and therefore do contribute to alleviating some of the negative aspects associated with modern industrial agriculture. However, these programs do not promote a stewardship mindset. The focus, in many of these programs, is on fixing problems on an ad hoc basis through the provision of one-time grants. The programs do not encourage a whole farm approach to growing food and providing environmental services.

In terms of stopping the loss of viable farmland in the Greenbelt to residential, industrial and commercial development, there is evidence to suggest that the existing farm protection strategies and tools (such as differential tax assessment laws, the creation of agricultural districts, and the purchase of development "rights") have generally not been successful when used in peri-urban areas. Caldwell et al. report on a study that found that very few if any of the existing farmland preservation tools decreased the rate of farmland loss on the fringe of metropolitan areas. In order for near-urban agricultural industry to survive, Caldwell et al. note, other approaches will therefore be needed. One option that has been presented is the integration of regulatory and incentive based techniques. Conversely, the authors point out, "some studies have shown that the viability of near-urban agriculture will be ensured with the adaptation of production and marketing methods to meet the requirement of the urban populations. This calls for the birth of a

new and innovative near-urban agricultural industry" (Caldwell et al. 2007, 264). Some of existing programs and tools do, to some extent, support this transition. Programs such as the Planning and Assessment for Value-Added Enterprises (PAVE) and the Can Advance program will help to promote value-added enterprises and the development of new marketing opportunities. These programs, however, may not have the scope or reach to make a significant impact in helping to transition the agricultural economy in the Greenbelt towards innovative value-added production. They also may not do so in ways that promote ecological integrity. The Greenbelt Plan also represents a new planning strategy (for southern Ontario) for protecting farmland that could provide permanence, if coupled with strong policies to support a countryside economy.

Some existing non-government run programs will help to attract a new generation of farmers. This includes FarmStart's Incubator Farms program, which is designed to assist young and new farmers in starting agricultural enterprises. The program supports new farm enterprises by offering access to land, equipment and infrastructure at reasonable rates, along with business planning support, technical training, mentorship and experience with ecological and emerging farming methods. However, this is only one program and its impact may be modest.

Some of available programs encourage links to broader initiatives linking producers and consumers in ways that strengthen communities of interest. Government farm support programs such as PAVE and Can Advance, which aim to create value-added enterprises and other marketing opportunities, and programs such as Foodland Ontario and Savour Ontario, which promote locally-grown food, are encouraging these links. Non-government programs such as the Local Food Plus (LFP) certification program are also making a contribution in this area. The linkages created through these programs could help to open up new economic opportunities for farmers. Consumers could also benefit from these linkages. As noted previously, a growing number of consumers are eager to purchase locally-sourced foods. None of the government-based value-added and local food programs mentioned here, however, promotes the ecological aspects of food production.[47] The effectiveness of these programs will also be tied to their ability to attract participants and/ or consumers.

Livelihood Sufficiency and Opportunity

Current programs, such as the Canadian Agricultural Income Stabilization (CAIS) program, are designed as income support, not as an alternative income stream. For example, with CAIS producers receive a payment when their current year farm income is less than their average farm

income from the previous years. The Canadian Farm Families Options Program provides income support to farm families with total family income below $25,000 or individuals with total income below $15,000 on the condition that they participate either in business planning or in skills training for off-farm employment. The program is designed to provide short-term income assistance to lower-income farmers and their families. The Canadian-Ontario Farm Stewardship Program (COFSP) provides grants for specific projects identified in the Environmental Farm Plan. The Farm Property Tax Rate Program reduces the tax rate for farm properties. Because these programs are not designed as an ongoing source of income earned for a service delivered, they will not make a strong contribution to enhancing the livelihood capabilities and opportunities for farmers in the Greenbelt in the long-term.

Available programs that focus on farmer skills enhancement and development of the farm enterprise as a business have the potential to make a stronger contribution to livelihood capabilities and opportunities. The Canadian Agricultural Skills Service (CASS) provides farmers and their spouses with opportunities to access skills assessment and training with the goal of improving their farm profitability and net family income. Funding supports both agricultural and non-agricultural skills training. The PAVE program provides producers with financial support to establish and expand a value-added enterprise with the hiring of consultant to develop a feasibly assessment or business plan for specific value-added enterprises. The Can Advance program also helps to create new marketing opportunities. These three programs are focused on the long-term transformation of the farm enterprise into something more profitable for the farmer. However, it is unclear what the new marketing opportunities promoted under programs like Can Advance are and whether they will also promote socio-ecological integrity. The existing programs are not making the connection that livelihoods are dependent upon the functioning of biophysical environment.

The extent to which the many available programs are helping to address the challenges of making a living from farming that are associated with the cost-price squeeze is difficult to assess as the literature includes no overall assessments. Government programs, for example, are not helping to address the challenges of competing commercially with big grocery chains and agricultural imports in regional and global markets. It could be argued that government agri-food programs and policies at the national and international level are making it more difficult for

[47] The Local Food Plus certification program, however, does include a biodiversity standard.

farmers to make a living. This includes production subsidies, and programs which support specialization, intensification and export production. [48]

Existing programs, to some extent, do facilitate pluri-activity and the pursuit of off-farm income. The CASS program provides funding for both agricultural and non-agricultural skills training for farmers and their spouses. The Canadian Farm Families Options Program also promotes pluri-activity by linking income support to skills training for off-farm employment. As noted previously, off-farm income should be seen as voluntary option for farmers to supplement their incomes, and not as a solution to the farm income crisis.

Current programs, for the most part, do not address the high cost of purchasing or renting land in the Greenbelt, nor will they help compensate farmers for the high cost of getting into farming. Programs such as FarmStart's Incubator Farms Program, may help young people with some of the costs associated with getting into farming. However, because this is only one small program its impact may be limited.

Intragenerational Equity

Currently available programs may help to address the inequities faced by farmers, however only to a limited extent. The PAVE program, which aim to expand value-added farm enterprises, may have some impact in addressing the inequity created by large transnational agri-business and food corporations taking profits out of local rural communities. This program may help to compensate for the declining share of the food dollar that farmers receive from the marketplace. They can do this by increasing both the value of the food products and the share of the food dollar that the farmer receives. However, because this is only one program, its scope will be limited and it will probably not have a major impact in reducing inequities currently experienced by farmers in the Greenbelt.

Existing programs also do not significantly address the intrusion of non-farm values in agricultural communities, the decline of the farming community, and the growing sense of isolation experienced by farmers in the Greenbelt. Ontario's *Farm and Food Production Protection Act*, a right to farm law, may need to be strengthened in order to be effective in helping to resolve conflicts between farmers and their non-farm neighbours (AAT, 2004). To the extent that some of the farm support programs described above can contribute to increasing the

[48] For example, the Canadian government has vigorously pursued a trade-based policy in agriculture, focused on exports and winning foreign markets. Canada's agriculture and agri-food exports have more than doubled in the past fifteen years, but realized net income from the market has declined just as noticeably. Trade has generally benefited the agri-food industry but farmers have yet to share in the bounty (Easter 2005).

productive potential of farmland in the Greenbelt, they might help to maintain a "critical mass" of farms needed to sustain the local farming economy. This could help to counter the "impermanence syndrome," as discussed above.

Another issue that has to be addressed is the relationship between a Greenbelt ALUS program and equity in the treatment of farmers beyond the Greenbelt. As noted in section 9.3, there is a case to be made for a focused Greenbelt ALUS program. In addition, a Greenbelt ALUS program could help to address inequities created by the Greenbelt. ALUS based advantages for farmers in the Greenbelt could be seen as compensation for the development opportunity losses they have suffered by being included in the Greenbelt.

Intergenerational Equity

Programs, such as CAIS, which provide income support or COFSP which provide one-time payments, will not contribute significantly to the livelihood prospects of farmers in the long term. As noted above, programs such as CASS, PAVE and Can Advance do focus on creating new and long-term livelihood opportunities and in this sense may help to preserve or enhance the opportunities and capabilities of future generations of farmers in the Greenbelt to live sustainably. However, these programs may only promote financial security. As noted above, it is unclear whether the new practices these programs are encouraging will also promote socio-ecological integrity. Without addressing this aspect, it is unclear whether these programs will be able to make a strong contribution to ensuring intergenerational equity. A critical determinant will also be how successful these programs are in attracting participants.

Current programs are also not helping to ensure that farmers in the Greenbelt have a secure land base. As discussed above, farm protection strategies described in Chapter Six are not working to protect farmland in the Greenbelt. Agricultural conservation easements hold some promise in that they provide permanent protection. However, the number of landowners willing to apply conservation easements may be limited. The Purchase of Development Rights programs are also unlikely to have widespread appeal in Ontario, as noted previously, in part because of the underlying principles upon which Canadian property laws are based.[49] New strategies to protect farmland in peri-urban areas will most likely be required. The Greenbelt Plan does represent a new planning strategy (for southern Ontario) for protecting farmland. If coupled with strong policies to support a countryside economy in the Greenbelt, this legislation could help to provide a secure land base for farming into the future.

[49] However, there has been some promising research on the potential for the Transfer of Development Credits (TDC) programs for the Canadian context (See page 95, including footnote 37).

Resource Maintenance and Efficiency

Programs such as the Environmental Farm Plan (EFP) do promote resource maintenance and efficiency to some degree. The EFP practices, for example, include the use of biological control agents in pest management, composting of manure and the use of anaerobic digesters, and practices for soil maintenance. They also include alternative practices for product and waste management and riparian area management, the use of cover crops, and nutrient recovery from waste water. These programs help to bring greater attention to and resilience in natural processes such as nutrient cycling, nitrogen fixation and pest-predator relationships.

The existing programs, for the most part, do not focus on production methods and in this sense may not contribute to the productive use of the biological and genetic potential of plant and animals species or to improved matching of cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of production methods. Current production methods which promote intensification, monocropping, specialization and the striving for high yields through capital intensive solutions are very unsustainable in how efficiently they use and maintain resources. Current programs do not promote more sustainable production methods.

Socio-Ecological Civility and Democratic Governance

The existing suite of programs do not help to promote more democratic decision making processes with respect to farming and farm issues by helping to increase the representation of farmers at the municipal level. They also do not help to increase the profile of the farming community in municipal governance or lead to greater awareness amongst municipal politicians of the farming community's concerns. They do not help to foster reciprocal awareness and collective responsibility with respect to farming issues.

To some extent the existing agri-environmental programs do foster understanding and appreciation of ecological realities among farmers and others involved in the program. This is true of the Environmental Farm Plan and GreenCover programs which help to educate farmers about environmental stewardship. The GreenCover program includes a Technical Assistance component that focuses on providing farmers with information about various Beneficial Management Practices.

Precaution and Adaptation

The existing programs do not promote a precautionary or adaptive approach to farm management. As noted above, many of the existing agri-environmental programs are focused on the remediation of existing problems, and not on the avoidance of risks or the building of greater system resilience in anticipation of future surprises. The focus of the existing programs is not on the protection and enhancement of the services provided by natural systems. The existing programs also do not provide for or plan for flexibility, learning, designing for surprise or managing for adaptation.

Immediate and Long-Term Integration

For the most part, the existing programs work independently in addressing particular goals. Income support programs, for example, are not linked in any way with land stewardship programs. Program administrators are not looking at how the goals of each of these programs are connected and how the programs could be linked to promote their goals in a mutually beneficial ways. The existing programs do not successfully integrate all of the requirements for sustainability.

In summary, it appears from these comments that at least some of these initiatives could well complement ALUS, though the complementarity would not be automatic and carefully integrated design would be needed. Because it was observed at various points that ALUS by itself is unlikely to be sufficient (e.g. to ensure family farm viability), assembling a package of mutually complementary tools may be needed. This will be discussed further in section 9.9.

9.9 Analysis and Comparisons

The preceding analysis indicates that the there are areas where the ALUS program presents advantages over existing programs, and areas where the existing programs may be better suited.

The evidence indicates that ALUS would be better at promoting socio-ecological system integrity than the current programs. ALUS may be more successful in attracting participants than traditional stewardship programs because of the ongoing payments and the fact that these payments can be for services delivered rather than actions taken. The farmer-to-farmer approach and grassroots nature of the program also offer advantages over current programs. Greater participation would result in an increased benefit to the environment.

The ALUS program is also more promising in that it takes a whole farm approach and focuses on long-term protection of environmental services. With programs such as the Environmental Farm Plan, projects are undertaken on an ad hoc basis. There is no ongoing stewardship mindset

that drives the overall enterprise. If well designed, ALUS, in contrast to the existing programs, would provide assurances of the delivery of environmental services over the long-term.

The characteristic which most distinguishes ALUS from existing programs is that it links land stewardship initiatives with livelihood benefits. In doing so it makes a stronger contribution to ensuring socio-ecological system integrity than currently available programs do. Existing income stabilization and farm support programs are not making the connection between livelihood opportunities and the health of the biophysical environment.

The existing farmland protection strategies may be able to address the loss of viable farmland in the Greenbelt to residential, industrial and commercial development. The use of agricultural conservation easements hold some promise, as do Purchase of Development Credits programs, if they can be successfully applied in a Canadian context. In addition, the Greenbelt legislation, if coupled with strong policies to support a countryside economy, could help to provide a secure land base for farming into the future. The adaptation of production and marketing methods to meet the requirements of urban populations may also assist in protecting farmland in the Greenbelt. As noted above, both ALUS and exiting programs such as PAVE may help to shift agriculture in this direction. However, ALUS may have greater success in attracting participants. In addition, only ALUS has the potential to link value-added production to the enhancement of environmental services in the public interest.

ALUS may present a more promising approach in its ability to attract a new generation of farmers. If the payments received through the program are large enough to affect livelihood prospects, this will help to make the profession of farming more attractive. The ALUS program also recognizes the valuable role that farmers play as stewards of the land. Farmstart's Incubator Farms program may also help to encourage and support young farmers. This program has some advantages over ALUS in that it is specifically focused on providing support to young farmers.

The evidence suggests that ALUS presents a more promising approach to ensuring livelihood sufficiency and opportunity than the suite of available programs. ALUS can be designed as an ongoing source of income for farmers, in contrast to the short-term income assistance currently available through programs such as CAIS. Continuity of payment is important in terms of providing flexibility and stability for long-term planning. ALUS payments have the potential to become a significant portion of farmers' income. It is unlikely that the existing farm-support programs would be able to match this level of support. Combined with its other economic benefits, which were described above, ALUS has the potential to make a more significant contribution to the enhancement of livelihood benefits than the current programs.

ALUS and the existing programs seem to have equal potential in their ability to address the challenges of making a living from farming, which include the cost price squeeze and the ability to compete commercially. Programs such as PAVE have same potential as ALUS to support value added enterprises. ALUS may have a greater potential to attract participants, and therefore greater scope and impact. ALUS may also present a better option because it links these new opportunities to the promotion of ecological integrity in a strong way.

ALUS and the existing programs seem equally capable of supporting pluri-activity and the diversification of income sources. Some existing programs, such as the Canadian Farm Families Options Program and CASS provide skills training for off-farm work. In viewing environmental goods and services as "one more things farmers can grow," in addition to food and fiber, ALUS is also supporting pluri-activity. ALUS may have one advantage over existing programs in that it would provide an additional and ongoing income source rather than simply skills training.

Neither ALUS nor the existing programs are particularly strong in their ability to promote intragenerational equity, though ALUS may present a more promising approach.
If the ALUS governance structure is multi-polar, with farmers and municipalities working collaboratively, this may lead to greater involvement of the farming community in municipal affairs. As noted previously, ALUS does help to highlight the important role farmers and farmlands play in providing municipal services. This could lead to greater involvement of farmers in municipal affairs. If ALUS is successful in helping to revitalize farming communities and keeping more farmers on the land, it could contribute to building a "critical mass" of farming production needed to sustain the local farming economy. This in turn may help to support the agricultural infrastructure, strengthening the presence of farm communities.

ALUS may present a more promising approach to enhancing the opportunities and capabilities of future generations to live sustainably than the current programs. Programs such as CFFOP, CASS, PAVE, and Can Advance are focused on the long-term transformation of the farm enterprise into something more profitable for the farmer. They will help to develop new income streams, such as valued added products, and new marketing opportunities. In this sense they do have the potential to contribute to enhancing the long-term opportunities and capabilities for farmers. However, it is unclear what the new marketing opportunities promoted under these programs will be, and whether they will also promote socio-ecological integrity. Current programs do not recognize that the sustainability of livelihoods is linked to the protection of the biophysical environment.

Both ALUS and some of the existing programs promote resource maintenance and sufficiency to some degree. Neither ALUS nor the existing programs are good at focusing on production

methods and so may not make an impact in this area. For the most part both ALUS and the existing programs focus on activities such as taking marginal land out production, planting of riparian buffer strips. They do not address issues of intensification, specialization and the striving for high yields through capital-intensive but apparently unsustainable solutions. Programs such as the EFP do not promote organic methods such as reduced use of pesticides and fertilizers. ALUS has the potential to provide a much stronger contribution in this area if it can successfully encourage and support organic production methods.

Neither ALUS nor the existing programs are particularly strong in their ability to promote socio-ecological civility and democratic governance. Both ALUS and existing programs such as the EFP will foster greater understanding of ecological realities amongst farmers and others involved in the program. The community-based grassroots approach of ALUS may lead to greater public engagement in the food system, and influence both production and consumption habits. If the ALUS program adopts a multi-polar governance structure, it may be more successful than the current programs in increasing the representation of farmers and farmers' concerns at the municipal level. In addition, implementing an ALUS program may lead to a greater profile of the farming community in municipal governance. This governance structure might be more successful in fostering reciprocal awareness and collective responsibility with respect to farming issues.

ALUS may present a more promising approach than the current programs in promoting precaution and adaptation. By enhancing and protecting environmental services ALUS takes a more precautionary approach than current agri-environmental programs. It is also more adaptable to different locations and different environmental conditions and needs. This is the part of grassroots character which fosters innovation.

ALUS is more promising in its ability to promote immediate and long-term integration. As noted above, the program links socio-ecological system integrity with livelihood sufficiency and opportunity in a direct way, where benefits in one automatically lead to benefits in the other. Other programs pursue their goals separately.

9.10 An Enhanced ALUS for Ontario's Greenbelt

The above analysis raises the issue of potential compatibilities and mutual strengthening if ALUS were designed and adopted as part of a carefully crafted package including use of some of these other tools.

There may be a way to link the ALUS program to funding currently available through farm support programs such as Canadian Agricultural Income Subsidy program (CAIS). The funding

would still be available but participants would have to deliver environmental goods and services to receive it. This would be similar to the way in which the Canadian Farm Families Options Program ties support payments to participation to business planning for skills development.

ALUS would work well with programs such as Planning and Assessment for Value-Added Enterprises (PAVE) which provides assistance with business planning for specific value-added enterprises. ALUS may also work well with the Can Advance program which helps farmers capture new marketing opportunities. Foods produced with environmental goods and services could provide one of these new marketing opportunities. ALUS could work well with Local Food Plus certification process, particularly with respect to the program's biodiversity standard. The ALUS program might also complement government programs such as Foodland Ontario and Savour Ontario which promote locally-grown foods.

An ALUS program package for the Greenbelt would also include programs which promote skills development or training for off-farm income, such as the Canadian Agricultural Skills Service (CASS) program, as this is not something ALUS provides.

Existing programs which are focused specifically on supporting the next generation of farmers are also an important complement to a Greenbelt ALUS program. This would include Farmstart's Farm Incubator Farms program.

An ALUS program for the Greenbelt work well with some existing agri-environmental programs, most notably the Environmental Farm Plan. With the ALUS pilot project in Norfolk County, enrollment in the EFP program is a prerequisite for obtaining ALUS payments. ALUS should link with local conservation strategies and initiatives in the Greenbelt including those run by the Conservation Authorities. This includes the Lake Simcoe Water Quality Improvement Program which provides support to a number of activities also covered through the ALUS program. There may be cases where local programs such as this may be able to provide "top up" support for ALUS payments when the same activities are being funded.

9.11 Summary of Findings

The chapter has presented a package for how ALUS would best be applied to the Greenbelt, in combination with other initiatives.

An ALUS program in the Greenbelt could be established as a stand-alone regional project or as part of a provincial or national program. It has been estimated that a provincial ALUS program will cost at least $100 million. The program should be funded by the federal, provincial and municipal governments. Funding could come from new sources such as a one per cent levy on food or from a transfer from existing sources (i.e., money currently supporting production

subsidies). This core or base funding could be supplemented by non-government organizations or the private sector for specific projects. The program will have to establish a process for getting agreement on the value of services. Although it is difficult determine market values for environmental services, ALUS payments should be based on the actual economic value of those services. All working farms (or working lands), as defined by current agricultural policy, should be eligible to participate in the program. Administrators may want to focus the program on family farm size operations, or find ways to make the program especially appealing to family farm size operations. Measures to ensure transparency and accountability will have to be developed. The program will also have to ensure accessibility and equity. Permanence of service delivery can be assured through the creation of obligations that participations have to uphold, even if they drop out of the program. The issue of whether the ALUS program will link with existing conservation programs needs to be addressed. If administrators choose to do this, this will mean restricting eligibility based on conservation priorities. A better option would be to keep the program open to all working farms and link with conservation programs, where possible, at the local level. There is acknowledgement that the ALUS program should reward ongoing delivery of services rather than funding remediation type projects or specific actions. Land use activities that could be supported through the program will vary for each location. These activities could include buffering around riparian areas and taking marginal land out of production. Integrated Pest Management may be an appropriate land use activity to support in Niagara and the Holland Marsh. Providing a premium payment for organic production methods could also be supported because of resulting enhancements of the quality of ecological goods and services..

ALUS could work with existing agri-environmental stewardship programs such as the Environmental Farm Plan and GreenCover Canada. The program could also work well with the Local Food Plus certification program, particularly the program's biodiversity standard. ALUS would also compliment existing farm support programs such as the Planning and Assessment for Value-Added Enterprises (PAVE) program and CanAdvance that support new marketing opportunities and value-added production. An ALUS package for the Greenbelt would include The Canadian Agricultural Skills Service (CASS), to support skills development and pluri-activity as well as programs that support young farmers, such as FarmStart's Incubator Farms program.

It is important to note that decisions regarding the design of an ALUS program are not merely administrative, but are also politically sensitive and likely to require political level approval. As noted in Chapter Eight, the overall viability of the ALUS program will depend, in part, on the costs of the program, and the potential availability of means of covering these costs.

Governments, as major funders for a Greenbelt ALUS program, will need to be convinced of the benefits of ALUS, and its advantages over other means of delivering environmental goods and services on farms. Widespread public support for environmental goods and services payments will play a key role in securing government support.

Chapter 10 **Conclusion**

10.1 Introduction

This research study assessed the potential of the Alternative Land Use Services Program (ALUS) as a tool for promoting agricultural viability and associated land stewardship in Ontario's Greenbelt. The thesis included a review of the literature on sustainability and food systems. This review assisted in the development of criteria and a framework for identifying what is needed for, and what might contribute to, a sustainable agricultural economy in Ontario's Greenbelt. This framework was used to assess the potential of the ALUS program, as well as existing programs, which may be alternatives or complements to ALUS. The main design elements of a Greenbelt ALUS program were described. Limitations of the ALUS program, and how existing programs could help to address these limitations were also discussed.

This chapter will discuss the significance of these findings for the Greenbelt as well as the potential applicability of the findings for design of ALUS-type programs for other peri-urban areas. The implications for regulatory, legislative, policy and financial contexts, and the implications for theory will also be discussed.

10.2 Implications for the Case

As noted in Chapter One, one of the limitations of the Greenbelt legislation is its failure to address the question of how to ensure the viability of the agricultural sector in the areas that the legislation covers. This question continues to be important, especially now that the province is in the process of conducting public consultations regarding the potential expansion of the Greenbelt boundaries. As the Ontario Farmland Trust pointed out in its submission to the government regarding this proposal, any Greenbelt expansion must clearly recognize the farm business economy of the Greenbelt and surrounding areas. The ALUS concept and means of applying it could play an important role in discussions regarding how to support the farm economy and rural communities in the Greenbelt.

Agriculture is central to the economies of all three case study areas, particularly the Holland Marsh and Niagara areas, which are classified as Specialty Crop Lands. Agriculture in these areas faces many challenges and remains quite vulnerable to environmental and economic forces. Municipal governments in all three case study areas are concerned about the future of the agricultural industry in their jurisdictions. Officials in Caledon and Niagara have recognized the need for innovative programs, such as payments for ecological goods and services, in helping to build a sustainable agricultural economy. Officials in the municipalities around the Holland

Marsh have not been active in addressing these concerns. The environmental concerns in the Marsh, such as the vulnerability of the rich organic soil to degradation over time, necessitate innovative approaches to stewardship such as ALUS. Officials in Caledon and Niagara need to move beyond an endorsement of ecological goods and services payments in principle. Details about how the program would be administered and funded need to be addressed.

10.3 Implications for Broader Practical Application: ALUS and Peri-Urban Farming

This case study of the Greenbelt suggests that ALUS may be particular appropriate as a means of enhancing the economic and ecological aspects of peri-urban agriculture. The research reported here confirms that the kinds of support that society provides to producers to keep them on the land is particularly important in near-urban agriculture. This is because of the unique challenges associated with near-urban farming, the fact that these areas contain some of the richest agricultural lands, and the fact that these lands are often very desirable as locations for urban development. ALUS would be an effective means for providing farm support in peri-urban areas.

Peri-urban agriculture also offers certain opportunities, particularly for innovation and entrepreneurialism. The suitability of peri-urban areas to a farm economy based on value-added production and the ability to respond to local-market demand, fits well with ALUS. ALUS can help to enhance value-added production by creating an additional "value attribute" that can be used in marketing food products.

The literature on peri-urban agriculture emphasizes that the sustainability of the farm economy in peri-urban areas can and should be enhanced through supporting the pluri-activity that farmers are already engaged in. The ALUS program supports pluri-activity by providing an additional income stream, beyond food and fiber production, for rural communities.

The results of this study can be generalized to other peri-urban areas that share characteristics with Ontario's Greenbelt. This would include areas where development pressures are strong and where there are important prime agricultural lands. Peri-urban areas that might benefit from an ALUS program in Canada include prime farmland areas in British Columbia including areas within the Okanagan, Lower Fraser Valley, and Southern Vancouver Island. These are all areas within British Columbia's Agricultural Land Reserve. As in Ontario, where ALUS would function in the context of the Greenbelt Plan, an ALUS program in British Columbia could be designed to work with and support the goals of the Agricultural Land Reserve. Other peri-urban areas where ALUS might be applied are those areas around Calgary and Montreal, both of which are experiencing the loss and fragmentation of farmland due to the pressures of urban sprawl.

The ALUS program is adaptable enough that a near-urban version of the program could be created. This thesis has outlined the basic elements of such a program.

10.4 Implications for Regulatory, Legislative, Policy and Financial Contexts

One implication of the thesis conclusions is that the while ALUS could play a positive role in the Greenbelt, the program would be insufficient if it were applied on its own. ALUS will need to be packaged with a suite of existing programs that would be able to complement some of its weaknesses. This package of programs would need to address farmland protection, the economic viability of agricultural and rural communities, and environmental stewardship. Jurisdictions where ALUS is being implemented have, for the most part, not considered how best to construct and deliver ALUS as part of a package of complementary programs.

A second implication of the thesis conclusions has to do with how ecological goods and services are conceptualized. The ALUS program works within a particular understanding of ecological goods and services. Ecological goods and services is a valuable and rich concept, and ALUS initiatives so far have involved only a primitive application. The use of land rental rates to determine compensation rates, for example, does not reflect a sophisticated understanding of the true economic value of environmental services. Ecological goods and services have also been defined, within the ALUS program, primarily in terms of their economic value to humans, with little attention given to the interaction of biophysical systems or cultural services. One of the complications of applying the ecological goods and services concept to agriculture is that the value of environmental goods and services on farmlands is open to question. This is something the ALUS program has not addressed.

The conclusions of this research also have economic implications. Ecological goods and services programs, such as ALUS, will require significant public funding. Governments at all levels must consider the implications associated with sourcing these funds. Developing new sources of funding, such as through a levy on food, would require public support, which can only be achieved through public education. Reallocating existing funds, such as diverting funding from existing production subsidies to ecological goods and services, will also need to be carefully considered. There will also be significant financial and social implications if providing widespread funding for ecological goods and services entails diverting funds from other social services, such as health or education.

Preliminary research has suggested that there would be net savings for municipalities from implementing ALUS type programs. This would come through reduced infrastructure costs due to reduced ecological damage (ALUS has potential to impact drainage, water supply, bridges, roads,

etc.), and reduced social costs in the farm community (such as savings with crop insurance payments).

10.5 Implications for Theory

The conclusions of this research have a number of implications for theory. As noted in Chapter One, very little academic attention has been devoted to the application of ecological goods and services to agriculture. The research conclusions suggest that model ecological goods and services frameworks need to be created, as has been done in this thesis, and these frameworks should be assessed and compared. An ecological goods and services framework would address issues such as cataloguing of ecological goods and services, demand of ecological goods and services, supply of ecological goods and services and adjusting and administering supply and demand. A framework could also address what land use activities are most appropriate for agricultural lands, and how these land use activities reinforce the agricultural practices.

ALUS presents only one method for delivering ecological goods and services on farms. As such, there is a need to develop theory to support the application of this program versus other approaches.

Another implication for theory has to do with the usefulness and broader applicability of the framework for analysis that was applied in this research. This study has identified new opportunities to promote land stewardship and enhance livelihoods in the agriculture sector as well as a new agenda for sustainable agriculture in the Greenbelt. The framework that was developed and the approach taken have implications for how we undertake sustainability-based decision making processes. These decision-making processes, what can also be termed "sustainability assessments," include program design and application, as well as the evaluation of policies, laws and processes. The approach used in this thesis indicates how these types of assessments might specificity sustainability considerations and integrate them together. Gibson (2005) has described the evolution of sustainability assessments and has outlined a number of basic characteristics. First, sustainability-based decision makings processes ought to encourage the turnaround from unsustainability, and the test of acceptability of new undertakings should be more demanding that mere mitigation. Second, the essential requirements for progress towards sustainability demand that the scope of concern must extend into the long term and beyond merely biophysical considerations. Assessment should cover the full suite of factors, because they interact and the interrelated effects of all of them will determine whether our futures are more viable, desirable and durable. Third, the approach taken also suggests the need for an appreciation of the particular circumstances. Finally, there is a need for agreement on key considerations.

This approach has advantages over other means of assessing programs, such as environmental assessments and cost-benefit analysis, in that it evaluates the potential contribution of a program against the whole suite of sustainability requirements rather than a single criteria. It also assesses the potential contribution in an integrated fashion, in terms of both the criteria themselves and in terms of the short and long term impacts. In doing so the approach more accurately reflects current understanding of how complex systems function. Another advantage of this approach is the universal and context dependent aspect. Sustainability assessments have the double role of vehicles for the general pursuit of sustainability and contributions to defining the specifics of sustainability in particular circumstances.

The implication for program design, specifically, is that this agenda should apply to a variety of mechanisms. Programs should be designed to realize multiple benefits in ways that are mutually reinforcing.

10.6 Final Recommendations

As the ALUS program has only been pilot tested in fully rural areas in Canada, it would be beneficial to test ALUS in a peri-urban setting, such as Ontario's Greenbelt. Farm organizations and other organizations in the Greenbelt area, perhaps in consultation with ALUS-experienced groups as well as with the province, the federal government, and regional authorities with stewardship interests, should investigate a pilot project in the Greenbelt to assess the contribution of the program to near-urban agriculture. This research could possibly be supported by Agriculture and Agri-Food Canada funding, as part of its Agricultural Policy Framework, and perhaps supplemented by the province, the Friends of the Greenbelt Foundation, and/or private foundations such as the Metcalf Foundation through its "Healthy Lands" program. This research would be valuable to Agriculture and Agri-Food Canada as it evaluates the various options, including ALUS, for delivering ecological goods and services on agricultural lands.

10.7 Directions for Further Research

This study has identified a number of directions for further research. Detailed cost projections for a provincial ALUS program will be required, and plans for funding this program will need to be developed. Additional research on the potential cost savings to municipalities from implementing an ecological goods and services program would assist in addressing concerns about the cost of ALUS. More research is also needed on the economic value of environmental services provided by agricultural lands in the Greenbelt.

Comments from provincial and federal government representatives indicate that more details about how the ALUS program would be implemented and administered are needed before significant government investment is provided. Additional details about the environmental benefits of the ALUS program will also be needed in order to secure government support. Additional research on the advantages of ALUS over other options for delivering ecological goods and services would help support government investment in the program.

Additional research on how ALUS could work with the Environmental Farm Plan and other existing programs would also be beneficial. As suggested in the conclusions, ALUS would work best in concert with other programs which help to address some of its weaknesses. The details about how ALUS would work with these programs, including areas of overlap and potential cost savings through shared infrastructure costs will need to be worked out.

Finally, research should be conducted to test the applicability of ALUS in peri-urban settings and what adjustments to the program are needed in order to meet the requirements of peri-urban agriculture.

The application of the ALUS program to the Greenbelt has left a number of open questions and options available for implementing the ALUS program. These questions include whether to base compensation on the economic value of ecosystem functions, land rental rates, a response mechanism or some form of competitive bid. The boundary between private responsibility and pubic service, with respect to land stewardship, will also need to be considered. The program will need to consider who is to be included, that is, whether it will take a universal versus targeted approach, and whether it will include both small and large operations, and whether it will target the "bad actors" or the "early adopters." The program will also need to consider a central versus decentralized administration; what activities are to be encouraged and to what extent; and the source of funds. The criteria used in this thesis could be transformed into an evaluation matrix (Appendix C), and this matrix used as a means of comparative evaluation of the options for response to the open questions. The matrix could thus provide a means of selecting among the various options. The evaluation could be adjusted over time, and could encourage a shift to more generally sustainable agricultural system.

Appendix A A Core Set of Questions In Semi-Structured Interviews

Part I: General Questions

1. What are your thoughts on providing remuneration to farmers for the provision of environmental goods and services in the form of ongoing payments? Do you think society has a responsibility for compensating farmers for doing the 'right thing' and providing ecological services?

2. Have you heard of the ALUS program? What do you think about it?

3. What kinds of land use activities do you think ALUS would be best able to support?

4. Who should be able to participate in the ALUS program? Is it assumed that just working farming operations are eligible, and if so, what should qualify as a working farming operation? Another way of saying this is "what kinds of farming operations are worthy of support? Just family farms facing economic stress (defined how?), rich people's horse farms, estate owners who have replanted the land in trees, big industrial farms, prime foodland farms, marginal land farms, etc."

Part II: Concerns with or limitations of ALUS

5. A number of criticisms or concerns about ALUS have been raised. I have a few to ask you to respond to, but maybe you could first tell me what your concerns are.

6. One of the concerns that has been raised with respect to ALUS has to do with long-term sustainability since it is relatively expensive. At least it is expensive in terms of ecosystem protection, but not necessarily expensive in terms of farm support. However, there would be new expenditures here; this may entail shifting the kinds of farm support from one area to another. Where could or should the money come from? And where should it go i.e., to whom?

7. Another concern with ALUS-type programs is that participants can sign agreements to preserve lands for several years, collect their payments and then resume farming. What happens, for example, if the price of a particular crop goes up three years after signing an agreement and the farmer puts the land back into production? Do you see this as a concern, and do you have any thoughts on how it can be addressed?

8. Another concern that has been raised about the ALUS program has to do with what is being rewarded. You may have a case where you have a farmer who has been a good environmental steward for many years, undertaking many of the initiatives which ALUS is now proposing to provide payments for. And you may have another farmer who hasn't been practicing environmental stewardship but who sees this as an opportunity to receive payments for undertaking some minor modifications in his/ her practices. This is related to the issue of whether your PEGS program is rewarding actions or results. There is the

concern that many of the current ALUS and PEGS-type programs are focused rewarding remediation activities (i.e., tree planting along waterways) as opposed to rewarding ongoing holistic stewardship. Will ALUS benefit only those farmers who are willing to undertake remediation activities, or can it also benefit those who have been engaged in these activities all along?

9. Finally, from an equity point of view, how can you ensure that ALUS benefits those who need it, i.e., those who are poor, rather than those who are already well off?

Part III: Supporting Stewardship and Livelihood Benefits in Ontario's Greenbelt

In my research, I am concerned with how this concept of remuneration for ecological goods and services could apply in Ontario's Greenbelt. I'm interested in understanding the particular challenges of farming and land stewardship and therefore of doing ALUS in the Greenbelt.

10. I have identified a number of issues that summarize the challenges associated with farming in the Greenbelt. But before I present my list for reaction, I want to ask you what you think the key issues are in the Greenbelt?

Can you tell me whether you think the following list encompasses the relevant issues in the Greenbelt:

1. The loss of farms and the loss of viable farmland. Both the number of farms and the amount of viable farmland have decreased markedly in the GTA. Competition for land comes in the form of development, namely residential, industrial, and commercial development, but also from golf courses, aggregate extraction, transportation corridors, service corridors, wetland complexes, and open space facilities. There has also been an increase in the amount of land under production that is rented, which often results in a less stable agricultural community.
2. The challenge of making a living from farming. This includes issues such as the cost-price squeeze, market competition, the need to supplement farm income, and the high cost of farmland and competition for rental land.
3. Concerns about the next generation of farmers. The farm population is aging and there is widespread concern that fewer young people are interested in inheriting the family farm and that the farm population will decline as farmers retire and interest within farm families and the broader community wanes. The high cost of getting into farming has also been identified as a major obstacle to new operators.
4. Loss of farm community and culture. This includes the issues of non-farm residential development and competition for land, the lack of municipal support for farming, and reduction in local farm services.
5. Opportunities. Large or highly capitalized operations with resources for investment and expansion seem to doing well. Here the common theme is entrepreneurialism, adaptation and innovation. A number of operations have increased their financial security by emphasizing value-added activities; on-farm

processing, greenhouse operations, farm shops, wineries, pick-your-own arrangements, and other types of direct sales. The agricultural community can benefit from proximity to urban areas. Benefits include increased access to services and research facilities in urban areas; access to large and sophisticated markets; and access to transportation services.

11. To what extent do you think ALUS (or an ALUS-type program) could contribute to land stewardship initiatives in the three areas that have been identified? (i.e., Caledon, Niagara, and Holland Marsh)

12. To what extent do you think ALUS (or an ALUS-type program) could contribute to enhancing the livelihood benefits of farmers in the three areas that have been identified? Is the lost income from agricultural land taken out of production a significant barrier to some farmers undertaking stewardship projects on their land?

13. A big issue in the Greenbelt is farmland loss and farmland protection. Wayne Caldwell and Stew Hilts in their book on farmland preservation have said, with respect to ALUS, that "It is evident that these programs will promote the viability of the agricultural industry, but do not ensure protection of agricultural land in areas where urban development pressures are strong. Would these payments be sufficient to offset the high costs of near-urban farming?" Do you think that ALUS could help to offset the development pressures in near-urban areas?

14. Are there particular barriers that would prevent the successful application of ALUS to the Greenbelt?

Case-specific questions:

For the Niagara region.

The Region of Niagara's Agricultural Action Plan has stated:

15. There is also the reality that this large protected area in close proximity to the GTA is desirable as the location for rural residences. The nature of agriculture in Niagara is such that the farm parcels are small enough to be viable as large estate lots. Competition for land between agricultural and estate residential use could drive prices up making it difficult for farmers to afford to acquire or rent land, introduce conflicting uses, take land out of production, and result in fragmentation of the agricultural area.

The Regional Agricultural Economic Impact Study, completed in 2003, also identified some challenges for the region. The study noted that while the number of acres under production is relatively steady, the amount of rental land being farmed is growing. "This reluctance, or inability of farmers to make capital investments in land, generally points to vulnerability of the land base." The study also noted that "there is the pressure for urban

expansions, and urban-type uses and related infrastructure are encroaching into agricultural areas."

To what extent could a program that provides ongoing remuneration for the provision of ecological services address these challenges (i.e., competition between farmland and other land uses, and the reluctance or inability of farmers to make capital investments in land)?

For Holland Marsh

16. There are a number of challenges currently facing Holland Marsh.
Phosphorous pollution, partially as a result of farm runoff, has showed a marked effect on the health of Lake Simcoe and the surrounding watershed.

Soil erosion is another major concern, as its natural decomposition rate combined with farming practices will drain the soil of its potency in about 100-200 years. Sustainable farming practices such as the use of cover crops and improved cropping systems, reducing the use of herbicides, pesticides and commercial fertilizers, and low impact irrigation and riparian planting have been identified as necessary to reduce the environmental impact.

The Lake Simcoe Region Conservation Association's Rural Water Quality Improvement Program, (LSWQIP) currently underway, has identified a number of activities for farmers to undertake that would be eligible for grants. These include retirement of fragile land (reforestation), buffer strip creation, and wind breaks.

In terms of the challenges facing farmers in the marsh, it has also been noted the strong Canadian dollar has meant that profit margins have shrunk for Holland Marsh farmers who export the bulk of their products to the US.

Could ALUS help to address the environmental challenges facing the Holland Marsh, while at the same time providing livelihood benefits to farmers that would help to offset the reduced profit margins that they are currently experiencing? Could ALUS work with existing programs such as LSWQIP?

Part IV: Comparison of ALUS With Alternatives

17. Are there means, other than ALUS, for achieving the same goals (i.e., mutually reinforcing stewardship and livelihood benefits)? What are some of these other alternatives?

Examples:

Farmland Protection Tools
Agricultural districts/ agricultural zoning; conservation easements; purchase of development rights; right to farm laws; differential assessment laws; transfer of development rights; land stewardship programs; municipal official plans and zoning by-laws

Agri-environmental programs
GreenCover Canada
Environmental Farm Plan

Farm Assistance Tools
Canadian agricultural income stabilization (CAIS) program; Canadian-Ontario Farm Stewardship Program (COFSP)

18. Does ALUS have particular advantages, or disadvantages, compared these other options? (i.e., cost effective, easier to administer).

Appendix B Ecological Goods and Services

Binning et al. (2001)	Costanza et al. (1999)	Whitten et. al (2003)	Daily (1997)
• Pollination • Fulfillment of people's cultural spiritual and intellectual needs • Regulation of climate • Insect pest control • Maintenance and provision of genetic resources • Maintenance and regeneration of habitat • Provision of shade and shelter • Prevention of soil erosion • Maintenance of soil fertility • Maintenance of soil health • Maintenance of healthy waterways • Water filtration • Regulation of river flows and groundwater levels • Waste absorption and breakdown	• Gas regulation (Atmospheric stabilization) • Climate regulation (Climate stabilization) • Disturbance regulation (Disturbance avoidance) • Water regulation (Water stabilization) • Water supply • Erosion control and sediment retention • Soil formation • Nutrient cycling • Waste treatment • Pollination • Biological control • Refugia (Habitat) • Food production • Raw materials • Genetic resources • Recreation • Cultural	• Provision of clean water • Maintenance of liveable climates and atmospheres (carbon sequestration) • Pollination of crops and native vegetation • Fulfillment of people's cultural, spiritual, intellectual needs • Provision of options for the future, for example though the maintenance of biodiversity	• Purification of air and water • Mitigation of floods and droughts • Detoxification and decomposition of wastes • Generation and renewal of soil and soil fertility • Pollination of crops and natural vegetation • Control of the vast majority of potential agricultural pests • Dispersal of seeds and translocation of nutrients • Maintenance of biodiversity, from which humanity has derived key elements of its agricultural, medicinal and industrial enterprise • Protection from the sun’s harmful ultraviolet rays • Partial stabilization of climate • Moderation of temperature extremes and the force of winds and waves • Support of diverse human cultures • Providing of aesthetic beauty and intellectual stimulation that life the human spirit

Appendix C Evaluation Matrix for a Sustainable Agricultural Economy in Ontario's Greenbelt[50]

Major categories of sustainability issues and associated questions	**I**	**II***	**III***	**IV**	*Comments on the significance of factors, uncertainties, requirements to enhance or mitigate effects, etc.
1. Socio-ecological system integrity					
1.1. Might ALUS help to alleviate some of the negative environmental aspects of modern industrial agriculture (i.e., contamination to ground and surface water, loss of soil productivity, loss of biodiversity, etc.), contribute to more resilient ecosystems in the Greenbelt, and help to reduce the costs to society associated with these externalities?					
1.2. Could ALUS help to encourage long-term investment in land, leading to a higher proportion of land under production that is owned rather than rented, thereby contributing to a more stable agricultural community?					
1.3. Might ALUS have any effect on the loss of viable farmland in the Greenbelt to residential, industrial and commercial development? What affect might ALUS have on land speculation and the purchase of large tracts of farmland by mainly absentee non-farmers who rent out the land until development ensues?					
1.4. Might ALUS help farmers maintain the flexibility that has been lost through tightened regulations such as those imposed by the Greenbelt legislation, thereby contributing to their ability to farm successfully?					
1.5. Could ALUS help to attract a new generation of farmers by making farming more appealing as an occupation?					
1.6. Might ALUS contribute to the					

[50] Erin Rogozinski provided the initial design and overall structure for this framework which was used in the Joint Review Panel for the Mackenzie Gas project (Gibson, 2006a, Gibson, 2006b).

resilience of farming communities and rural economies by reducing the economic vulnerability that comes from relying on a few crops produced mainly for export, high rates of debt to pay for chemicals and other inputs, and dependence on the federal government to protect farmers when things go wrong?					
1.7. Does ALUS encourage links to broader initiatives linking producers and consumers (or farmers and other land beneficiaries) in ways that strengthen communities of interest, helping to enhance resilience?					
2. Livelihood sufficiency and opportunity					
2.1. What effect might ALUS have in addressing the challenges of making a living from farming associated with the cost-price squeeze?					
2.2. What effect will ALUS have on the ability of farmers to compete commercially with big grocery chains and agricultural imports in regional and global markets?					
2.3. Will ALUS help to support pluri-activity and diversification of income sources (including off-farm income) for farmers, thereby supporting the resilience of the farm enterprise?					
2.4. What effect will ALUS have on the land market, and the high costs of purchasing and renting land in the Greenbelt? Will ALUS help farmers who want to continue farming and expand their operations acquire more land?					
2.5. Can ALUS help to compensate for the high costs of getting into farming?					
3. Intragenerational equity					
3.1. Will ALUS have an effect on the inequity created by large transnational agri-business and food corporations taking profits out of local rural communities?					
3.2. Will ALUS help to compensate for the declining share of the food dollar that farmers receive from the marketplace?					

3.3. What effect will ALUS have on the lack of municipal support for farming, and the loss of influence of farmers in local politics?					
3.4. Might ALUS help to address the issue of the intrusion of non-farm values and the decline of the farming community? Might ALUS help to alleviate the growing sense of social isolation experienced by farmers in urban-fringe areas?					
3.5. Can ALUS help to counter the negative impacts of non-farm residential development on the ability to farm efficiently?					
4. **Intergenerational equity**					
4.1. Will ALUS help to preserve or enhance the opportunities and capabilities of future generations of farmers in the Greenbelt to live sustainably?					
4.2. Will ALUS help to ensure that future generations of farmers in the Greenbelt have a secure land base?					
5. Resource Maintenance and Efficiency					
5.1. Will ALUS help to bring a greater reliance on natural processes such as nutrient cycling, nitrogen fixation, and pest-predator relationships in the production process?					
5.2. Will ALUS help to maximize the reliance on natural, renewable and on-farm inputs, and less on purchased (off-farm) commercial inputs? Will ALUS help to maximize the reliance on the management of internal resources of the farm (i.e., management skills, knowledge and labour).Will ALUS help to promote a greater reliance on human resources in terms of the quality and quantity of labour and management, and relatively less reliance on land and capital?					
5.3. Will ALUS contribute to the productive use of the biological and genetic potential of plant and animal species?					
5.4. Will ALUS lead to improved					

matching of cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of production levels?					
5.5. Will ALUS help to ensure profitable and efficient production with greater emphasis on farm resource management and conservation of soil, water, energy and biological resources?					
6. Socio-ecological civility and democratic governance					
6.1. Might ALUS lead to more democratic decision-making processes with respect to farming and farm issues by helping to increase the representation of farmers at the municipal level?					
6.2. Might ALUS help to increase the profile of the farming community in municipal governance and lead to greater awareness amongst municipal politicians of the farming community's concerns? Might ALUS foster reciprocal awareness and collective responsibility with respect to farming issues?					
6.3. Might ALUS help to foster greater understanding and appreciation of ecological realities among farmers and others involved in the program?					
6.4. Might ALUS encourage links to broader initiatives linking producers and consumers (or farmers and other land beneficiaries) in ways that strengthen communities of interest? Does the contribute to the enhancement of mutually supporting political engagement?					
7. Precaution and adaptation					
7.1. Does ALUS help to support a precautionary approach to environmental management?					
7.2. Does ALUS help to foster an adaptive approach to managing environmental systems? i.e., does it enable flexibility and adaptation?					
8. Intermediate and long-term integration					
8.1. Does ALUS reinforce the					

interdependence of the requirements for sustainability? Does ALUS seek or promote mutually reinforcing benefits?					

In the matrix, the columns numbered I-IV represent a continuum of anticipated gains and losses. The four identified points along the continuum are as follows:
I. Fully beneficial. There are firm grounds for expecting improved outcomes. No significant damages or risks in any aspect are anticipated.
II. Net benefits expected but with some negative effects and risks. The latter should be mitigable through tested methods.
III. Net benefits not assured. Significant damages or risks are likely or possible. Adequate enhancement of positive effects and/or mitigation of adverse effects may depend on more information or firmly imposed conditions.
IV. Net losses expected, including significant negative effects or risks that are not adequately mitigable using tested methods.

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