

**METHODS IN PRICING AMENITIES PROVIDED BY
FARMLANDS IN BRITISH COLUMBIA**

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Abstract

British Columbia has been facing high conversion rate of rural land to urban use over the last 30 years as a result of population growth. This has caused the province's natural areas to be degraded and destroyed. The British Columbia government introduced a protected Agricultural Zone in 1973 in hopes of containing urban development. The result has seen a net loss of agricultural land in vulnerable areas despite a net gain in protected agricultural land in other parts of the province. One factor that contributes to the loss of agricultural land is the lack of valuation of ecological goods and services such as wetlands, forests, and riparian areas.

This study considers policy alternatives that British Columbia can consider to value non-marketed ecological goods and services on agricultural land. Through analysis based on case studies, I identify policy options that provide means to price ecological goods and services on farmland.

Executive Summary

This study considers policy options that the government of British Columbia can consider to encourage the conservation of ecosystems. Ecosystems produce ecological goods and services that are directly and indirectly consumed by society. With a large demand for land and limited natural areas, ecosystems in British Columbia are diminishing at an alarming rate. For example, up to 50 to 70 percent of the original wetlands have been lost in Lower Fraser Valley and parts of Vancouver Island, while South Okanagan has lost 85 percent.

British Columbia relies on the Agricultural Land Reserves (ALR) to preserve farmland from development pressure. This policy encourages farming and controls non-agricultural land uses in designated zones. Although the ALR has preserved a constant size of land protected, it has replaced parcels lost in the south to development pressure with less vulnerable land in the north. The government also employs a differential property tax system and other agricultural subsidies to encourage farming activities. However, these production policies have distorted farming returns and encourage expansion of farming on land that might have otherwise been conserved. Without a market for ecological goods and services, their values are not considered in the decision process of land use by private landowners.

This study uses qualitative data from case studies in Canada and the United States to develop three alternatives to address the lack of market for ecological goods and services. The cases were chosen because they are incentive based policies, which enable landowners' to make land use decisions in response to pricing of ecosystem goods and services. I analyze each of the alternatives, along with the status quo, on its ability to value EG&S, project cost, manageability, land use efficiency, and stakeholder acceptability. The following policy alternatives are identified as potential complements to the ALR and not as replacements:

- Permanent land easement through exchanges of development rights between landowners of agricultural zoned areas and developers in targeted growth areas.
- A voluntary program, Alternative Land Use Systems (ALUS) that directly pays for conservation practices of designated ecosystems.
- Property tax credits for conservation practices of designated ecosystems.

The proposed alternatives are not mutually exclusive and thus the selection of one should not eliminate potential use of another. As a result, I highlight tradeoffs for each option and emphasize:

- Loss of ecological goods and services can come from land conversion and agricultural production.
- A transfer of development rights program does not require continuous government funding and prices EG&S with a market mechanism, but it is highly complex to implement and operate.
- Direct payments and property tax credits require low set up costs and are quick to establish, but need continuous funding and have arbitrary prices for EG&S.

I recommend two future steps for the government of British Columbia:

1. Reform the current property tax system to include designated natural areas in the same category as farmland assessment.
2. Implement a pilot Alternative Land Use Services program in the eastern coastal lowland of Vancouver Island, which provides direct payments to landowners for conservation practices.

Dedication

To my mother, father, and brother, as well as relatives and friends for their continuous love and support.

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Table of Contents

Approval	ii
Abstract	iii
Executive Summary	iv
Dedication	vi
Acknowledgements	vii
Table of Contents	viii
List of Figures	x
List of Tables	xi
Glossary	xii
1: Introduction:	1
2: Background	4
2.1 Non-Consumptive Values of Farmland.....	4
2.2 Challenges for Land Use in British Columbia	7
2.2.1 Brief Background	7
2.2.2 Quantifying and Valuing Amenities	8
3: Methodology and Framework Analysis	10
3.1 Methodology	13
3.1.1 Key Informant Interviews.....	13
3.1.2 Document Source Analysis.....	14
3.1.3 European Land Use Policies in the North American Context.....	14
3.2 Framework of Analysis	16
3.2.1 Ability to Price EG&S	16
3.2.2 Type of Mechanism.....	16
3.2.3 Level of Government Support.....	17
3.2.4 Farmland Retention	17
4: Case Studies	18
4.1 Montgomery County, Maryland, United States	18
4.1.1 Brief Background	18
4.1.2 Framework and Program Procedures	19
4.1.3 Rate of Success.....	22
4.1.4 Challenges and Future Initiatives	24
4.2 Rural Municipality of Blanshard, Manitoba	27
4.2.1 Brief Background	27
4.2.2 Framework and Program Procedures	27
4.2.3 Rate of Success.....	30
4.2.4 Future Initiatives and Challenges	32

4.3	Property Tax Credit (various counties in Alberta, Saskatchewan, Manitoba, Ontario)	33
4.3.1	Brief Background	33
4.3.2	Framework and Program Procedures	34
4.3.3	Rate of Success.....	36
4.3.4	Future Initiatives and Challenges	38
4.4	Summary of Findings	39
5:	Policy Options	42
5.1	Option 1: Retain the Status Quo	42
5.2	Option 2: Transfer Development Rights	43
5.3	Option 3: Alternative Land Use Services	45
5.4	Option 4: Property Tax Credit	47
6:	Evaluation of Policy Options	49
6.1	Evaluation Criteria.....	49
6.1.1	Criteria Explanation and Justification.....	51
6.1.2	Omitted Criteria.....	51
6.1.3	Measures Explanation and Justification	52
6.2	Evaluation.....	53
6.2.1	Evaluation of Retaining Status Quo	55
6.2.2	Evaluation of Transfer Development Rights	57
6.2.3	Evaluation of Alternative Land Use Services	60
6.2.4	Evaluation of Property Tax Credit	62
6.3	Tradeoffs and Analysis.....	65
6.4	Applicability to British Columbia.....	67
6.4.1	Transfer of Development Rights	67
6.4.2	Property Tax Credit.....	68
6.4.3	Alternative Land Use Services	69
7:	Conclusion	72
Appendices		74
Appendix A:	Ecological Goods and Service	75
Appendix B:	Policy Evaluation	77
Bibliography		80
Works Cited		80

List of Figures

Figure 1	Policy Options.....	11
Figure 2	Accumulated Farmland Preserved from TDR.....	23
Figure 3	Annual TDRs recorded vs average TDR price.....	24

List of Tables

Table 1	Case Selection Criteria.....	12
Table 2	Summary of Case Study Policies.....	18
Table 3	ALUS Payment Scheme.....	29
Table 4	Programs using Property Tax Incentives	35
Table 5	Results of Property Tax Incentive Programs.....	37
Table 6	Summary of Findings.....	39
Table 7	Criteria and Measures	50
Table 8	Evaluation of Policy Options	54
Table 9	Policy Alternatives Tradeoffs.....	65
Table 10	List of Ecosystems and Economic Impacts	75
Table 11	Full Table of Policy Evaluation.....	77

Glossary

Acre (ac)	Commonly used unit of measurement that equals to 4046.85 square metres.
ALUS	Alternative Land Use Services
Agricultural Land Commission (ALC)	A crown agency that administers the Agricultural Land Reserve.
Agricultural Land Reserve (ALR)	A collection of land in British Columbia zoned for the purpose of encouraging farming and controlling non-agricultural uses.
Ecological Goods and Services (EG&S)	Direct and indirect benefits derived from the ecological functions of the ecosystems.
Ecosystems	Is a natural unit of consisting of animal, plants, and micro-organisms in an area functioning and interacting along with the environment.
Hectare (ha)	A unit of measurement that equals to 10,000 square metres.
TDR	Transfer of Development Rights

1: Introduction:

Natural areas and their natural capital provide a large range of ecological goods and services to their surrounding communities. Examples of benefits from ecological goods and services (EG&S) include provision of drinking water, flood control, and retention of soil. The ecosystem provides benefits to residents of British Columbia through direct consumption of natural resources and indirect enjoyment of its services. Retention of such goods and services can be difficult when there is competition for the land from economic development and growth in agricultural production. Development and agricultural production are crucial to the functioning of society, but because EG&S often do not have well-defined markets where they are bought and sold, they are largely ignored when deciding on the most effective use of land. If degraded or destroyed, these goods and services have to be substituted by human made infrastructure and that may have a greater cost than protecting the ecosystem. As well, certain goods and services such as ecotourism and wildlife habitat cannot be replaced despite technological improvement.

Demand for ecological goods and services will continue to grow in the coming decades. British Columbia is one of the fastest growing provinces in Canada with a population that grew from 2.2 million to over 4.3 million between 1971 and 2008. According to forecast, the population is expected to grow to over 6 million by 2035 (BC Stats. 2009). This rapid growth in population will continue to increase the demand for development, food production, and ecological goods and services. Natural areas are distributed across British Columbia and consist of crown and private lands. When private landowners decide on development plans, agricultural production, or other land usage of their properties, they calculate the private returns on their activities. They do not take into account the benefits that the natural capital generates on their

land because there are few markets for ecological goods and services. This creates a policy problem where a gap exists between private and public valuation of a land.

For over the past three decades, the province has been able to preserve over 4.7 million hectares of farmland through the establishment of the Agricultural Land Reserve (ALR) (Agricultural Land Commission, 2008). Despite its success, the ALR faces criticism on its allocation of land removal and addition practices. From 1974 to 2008, Lower Fraser Valley 10,899 hectares of land were removed from the ALR. If we include non-ALR land, the conversion rate would be much higher. According to Environment Canada (1996), the conversion rate of rural land to urban use in Metro-Vancouver from 1986-1991 was 6%, or 4,400 hectares per year. This is a slightly lower rate than the 7.9 percent from 1971-1976, which prompted the creation of the ALR.

Aside from land conversion, natural areas also face threats from the over expansion of agricultural production on marginal cropland. Not all natural areas have land characteristics that are ideal for farming activities. Federal and provincial agricultural production policies have led to the expansion of farming into what would normally be unprofitable territories. The government of British Columbia has long supported farmland preservation policies and the agricultural industry. In the past, benefits from ecological goods and services were not very well understood and agricultural production was a form of natural capital that was concrete to both the public and the government. Therefore, policies concerning land conservation are intertwined with farmland preservation. A lack of formal valuation of natural capital leads government policies to favour agricultural production over land conservation. While the ALR protects land for agriculture, it does not help prevent non-marketed ecological goods and services on farmland from being destroyed by farming and other activities. Establishing prices for these goods and services can help decide effective use of land between conservation and agricultural production, and between agricultural production and uses of the land that do not sustain EG&S.

The purpose of this study is to identify potential policies for the province of British Columbia that help to provide prices for non-marketed ecological goods and services on agricultural land. This research bases its results on findings from case studies of other jurisdictions. Estimations on costs and other criteria I use to assess policy options are approximations from case studies in other jurisdictions.

In the following section, the study provides a brief background on British Columbia's current conservation practices and the concept of EG&S as a public good. I then outline the methodology used to determine the cases selected to analyze, and then present the results from the case studies. Following the analysis, I offer four policy options to address the lack of pricing mechanism in land evaluation and then analyze each case against a set of criteria. I then present a set of tradeoffs that future policy makers can base their decisions on.

2: Background

In British Columbia, there is a lack of well-defined markets for ecosystem goods and services. Without a formal market, the benefits of EG&S provided by natural areas are often invisible to society and therefore are not reflected in land values. To better understand why conserving EG&S should be of concern to British Columbians, I will first discuss the goods and services provided by natural areas and the economic impact from losing these services. After providing evidence that there are public benefits from the use of natural capital, this section describes the current state and challenges of land conservation in the province

2.1 Non-Consumptive Values of Farmland

Beyond the production of agricultural goods, research suggests that there are also non-consumptive values associated with farmland (Bergstrom, Dillman, and Stoll. 1985). In a perfect market, prices are supposed to reflect all the characteristics that determine the utility of a good. This might be true if farmlands produce only private benefits. However, farmlands also produce direct and indirect social benefits that are not captured in the market price including amenity benefits and the ecological goods and services that the land provides.

Amenity benefits involve the scenic, nostalgic, and lifestyle value of farmland. Certain farmland amenities can be revealed by the actions of individuals. For example, many people enjoy the rural community and scenic beauty provided by farmlands. They go to the extent of purchasing houses in farming communities or live close by. This sort of action is very visible in the Fraser Valley and especially in townships like Langley and Abbotsford. Farmlands also produce other non-farm amenities such as wildlife habitats, open space, and ground water recharge. Consumers also value farm output produced locally. With growing concern for food

security and scarcity, British Columbians are now interested in having a secure and stable food supply. These amenities do not simply apply to residents living within farming communities, but also to the greater metropolitan area. Although Vancouverites do not always distinguish between foods they buy from local producers, they derive utility from the knowledge of the existence of these farms. The support the ALR receives from urbanites of British Columbia shows their interest in preserving farmland.

To have a better understanding on the size of such amenities, the Ministry of Agriculture and Lands (2007) recently conducted a study surveying residents of Abbotsford their motivation for living in a farming community and their willingness to pay to preserve farmlands. The study surveyed 2,500 residents of Abbotsford their maximum willingness to pay to preserve 1,000 acres of farmland from turning into residential or commercial use. Through the use of hedonic pricing, postal survey, travel cost, benefit transfer and other methods, the Ministry of Agriculture estimated that the public value per acre in Abbotsford is \$26,518 (Ministry of Agriculture and Lands. 2007). Converting this to an annual value, the average household in Abbotsford is willing to pay \$33.52 per year above the current property taxes that they are already paying in order to preserve 1,000 acres of farmland. Much of the farmland preservation policies in the past few decades have involved the need to protect these values.

Due to market failure, market prices of farmland properties have under priced the total value of the land. A farm parcel includes residential home, farm buildings, and ecosystems. Ecosystems generate ecological goods and services, which have significant economic impact on society. In *The Value of Natural Capital in Settled Areas of Canada* (2004), Olewiler provides estimates of the values of different natural capital in the Fraser Valley. The value of wetlands for example can be represented by the cost of water treatment of phosphorus and nitrogen, water supply, natural habitats, erosion control, storm and flood control, and recreational activities. Aggregating the values of all these amenities and applying them to the 40,000 hectares of

wetlands in Fraser Valley results in an annual value of \$231.7 million. Natural areas are estimated to be worth \$19 million per year for recreational and wild life viewing purposes. The ecosystem produced by natural areas also generate values of \$22,832/ha for estuaries, \$8,498/ha for lakes and rivers, \$2,007/ha for temperate/boreal forests, and \$232/ha for grass/rangelands. These values, as the author notes, are overestimates since not all wetlands, natural areas, and forests provide each good and services indicated. As well, these figures were gathered from several studies and some values might have been double counted. Nonetheless, these figures show that environmental goods and services produced by the land have substantial hidden values. For a full list of ecological goods and services and their impacts, refer to Appendix A at the end of this paper. When individuals make private decisions regarding land use, they take into account private benefits and market prices. There is no market where ecological goods and services are priced and exchanged. As a result, EG&S are not considered when evaluating the list of land use options. Without an incentive mechanism, landowners will use the land based on its private economic returns (Olewiler, N. 2004). It is unfair and also unrealistic to expect farmers to bear the burden of provision of ecological goods and services.

It is important to note the tradeoffs between the conservation of ecological goods and services and other usage of the land. Development and agricultural production are also necessary for the survival and economic growth of a society. Priority given to a type of land use is not based on moral or ideological grounds, but rather because one usage is more efficient than the others. The establishment of a market provides landowners a mean to compare the returns on conservation of ecological goods and services with development and agricultural production. It does not guarantee conservation, but it enhances the process of decision making by ensuring that a wider range of land usage is taken into consideration. Without conservation as part of the decision making process, the province of British Columbia loses ecosystems at an alarming rate. Lower Fraser Valley and parts of Vancouver Island have lost up to 50 percent to 70 percent of the

original wetlands, while South Okanagan has lost up to 85 percent (Ministry of Environment, 2002).

2.2 Challenges for Land Use in British Columbia

2.2.1 Brief Background

In British Columbia, only 5% the total land base is considered suitable for agricultural purposes and only 1% categorized as prime farmland. Due to high quality soil and mild climate, farmlands in BC are highly productive and play an important part in the province's economy. However, the ideal geography and climate of this province also attracts a large influx of people and industries. To develop the province, agricultural land gave way for residential, commercial, and industrial development. Up until the early 1970s, BC was losing up to 6,000 hectares of farmland per year to urban development and other uses (Legislative Library of British Columbia, 2006).

In 1973, the government established the Agricultural Land Commission (ALC) and designated zones around the province known as the Agricultural Land Reserve (ALR) in hopes of retaining farmlands. The ALR encourages farming activities and controls all other non-agricultural land uses. Non-agricultural use of the land requires the permission of the Agricultural Land Commission. From the moment the ALR was first established in 1974 to today, its size has grown from 4,716,516 hectares to 4,759,682 hectares (ALC, 2008). The ALR has been able to maintain a constant size of land base because it increases designated lands in the north when land is lost to development pressure in the south (David Suzuki Foundation, 2006). Productive lands in Lower Mainland, Vancouver Island and the Okanagan have lost a total of over 86,000 acres to residential, industrial, commercial, and recreational development.

To encourage farming activities and the retention of farmlands, the province and its municipalities also provides property tax relief for properties classified as farmland.¹ In British Columbia, a property is taxed based on its market value determined by BC Assessment. If a property qualifies as a farmland, it is then assessed based on its production value, which is typically significantly lower than the market value. As a result of lower assessment rate, properties that qualify for farmland status have lower property tax obligations. While these policies encourage farming activities in agricultural lands, they do not value the other attributes from the land. Farmers do not use every inch of their properties for farming or dwelling purposes. Land that is untouched faces the same tax rates as residential land. Since farming the land is given a tax break, this creates incentives to expand agricultural activities on land that might have otherwise been conserved.

2.2.2 Quantifying and Valuing Amenities

Like the exchange of any goods and services in a free market, amenities need to be quantified and valued. As Olewiler (2004) points out, this is not always a straightforward calculation. Current measurements of Canadian natural capital focus on stocks of land, energy, mineral and timber reserves. This provides a snap shot of the current stock of natural capital, but does not measure the rate of change of these goods nor capture all the EG&S. Calculating the flow can provide a better understanding towards a sustainable consumption of our natural capital. While this task might prove to be difficult, it can be overcome by investing more in research in this field.

After quantifying the goods and services from the land, it is necessary to associate them with a monetary value. Since each component of natural capital provides its own distinctive

¹ The provincial along with the municipal governments are responsible for matters related to property taxes. Municipal governments receive the majority of their funding through property tax revenue and each municipality is responsible for setting their own tax rate. Policies regarding the property tax fall under the jurisdiction of the provincial government in the Municipal Act, the Taxation Act, and the Assessment Act. Together, the two levels of government offer farm properties a differential property tax system.

service, it is not possible to directly compare their benefits unless a monetary value is provided. Monetary valuation presents a standardized method for comparing the benefits between each type of natural capital. It is relatively simple to determine a value of a good when market prices exist. However, this is not always the case for goods and services derived from natural capital. In cases where there are no market values for these goods and services, economists have developed a number of techniques to capture their worth. The first method calculates the economic damages that would occur without the goods and services or the value of the foregone services that nature provided and now have to come from physical capital or other substitutes. The second method calculates the willingness that people are willing to pay for the provision of these goods or willingness to accept the loss of these goods. Neither method is perfect because of their reliance on economic assumptions, measurement techniques, and sample population. There is a lot literature and research available on how ecological goods and services can be valued for policy makers who wish to seek advice regarding methods of pricing. The focus of this research is not on methods of valuation, but rather policies that help establish values for non-marketed EG&S.

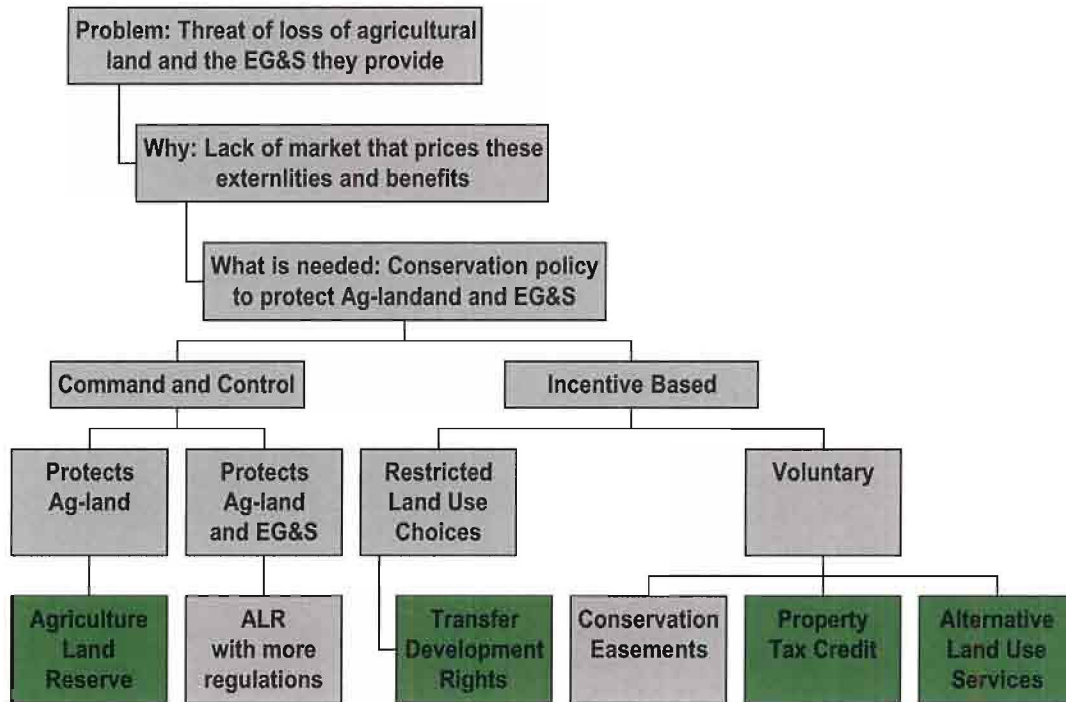
3: Methodology and Framework Analysis

There are many programs implemented across Canada and the United States promoting the conservation of land. To examine the range of policy options that help incorporate social amenities and benefits into valuation of farmland properties, I have selected the following four cases to explore:

- 1. The Agriculture Land Reserve (ALR), British Columbia**
- 2. Transferable Development Rights (TDR), Maryland (USA)**
- 3. Alternative Land Use Services (ALUS), Rural Municipality of Blanshard (Manitoba)**
- 4. Property Tax Credit, various counties in Alberta Saskatchewan, Manitoba, Ontario**

The case studies in this research focus on several of the policies employed across North America. There are more options available for policy makers to choose from. The figure below demonstrates the four policies chosen (green boxes) and others that were considered:

Figure 1 Policy Options



The Agricultural Land Reserve is selected because it is the status quo and it will not be removed. Therefore, any policy alternative analyzed is offered as a complement to the ALR and not a replacement. The three alternatives chosen are all incentive based policies. Incentive based policies can induce landowners to make changes in their land use practices by more fully pricing the tradeoffs between different land uses.

I have chosen two indicators for selecting cases:

1. Attempts to identify EG&S provided by farmlands
2. Attempts to bridge market and social values

With a large number of policy options to choose from, it is necessary to establish indicators to help select cases and simplify the process. The indicators selected connect with the goal of the research, which is to identify policies that value non-marketed ecological goods and services on agricultural land.

All four cases chosen acknowledge and identify amenities provided by farmlands and provide examples of specific policies that address agricultural land use. The ALR is chosen because it is a policy that protects farmland but does not incorporate valuation of non-marketed EG&S. This research aims at enhancing the status quo to include provide a more comprehensive valuation to agricultural land.

Table 1 Case Selection Criteria

Cases	Identify Amenities	Attempts to bridge market and social values
Agricultural Land Reserve (British Columbia)	Yes	No
Transfer of Development Rights (Maryland, USA)	Yes	Through transfer payments from "receiving" zones to "sending" zones.
Alternative Land Use Services (Rural Municipality of Blanshard, Manitoba)	Yes	Payments given to farmers and ranchers in conserving natural capital
Property Tax Credits (Manitoba, Alberta, Ontario, and Saskatchewan)	Yes	Tax rebate given to landowners who sign an agreement to retain natural areas

The table above shows the different approach each case uses to value social benefits. I examine each case using a set of criteria that define their important characteristics, as explained in section 3.2.

I do not consider some other important policies that can help price EG&S and protect farmlands. An example is the conservation easement. A conservation easement is a preservation agreement between a landowner and a government. This can come in the form of a purchased development right or a land trust. Regardless of the form, the government directly pays landowners for conservation practices and restricts real estate development. While conservation

easement is an incentive based policy, it is not chosen in the case study because of the high cost it would require government to purchase sensitive ecosystem areas. For example, the total area of sensitive ecosystem in the Saanich Capital Regional District is 9,756 hectares (Ministry of Environment. 1993). Sensitive ecosystem areas are defined as ecologically significant and relatively unmodified ecosystems. They include wetlands, riparian areas, older forests and woodlots, coastal bluffs, sparsely vegetated dunes, spits and cliffs, and terrestrial herbaceous ecosystems. The average price of agricultural land in Saanich Peninsula from 2001-2006 is estimated to be \$149,000 (Stobbe et al. 2008). The total cost of conserving the entire sensitive ecosystem area in Capital Regional District could thus amount to approximately \$1.45 billion. The total cost of conservation easements in Lower Fraser Valley would be much greater with higher agricultural land prices and over 40,000 hectares in wetlands alone. This is a maximum estimate; often conservation easements only cover a portion of the land or restrict the types of use of the land and do not represent outright land purchase.

3.1 Methodology

While case studies can offer a more complete form of analysis, it is important to acknowledge the weakness of this approach and what can be done to mitigate difficulties. Academic researchers may view the practice of case studies as less rigorous and less scientific than other research methods. I hope to address the issue of lack of rigour by making the process of case selection as transparent as possible and by stating the framework of analysis. (Robson, 2002) One common criticism about case studies is its inability to generalize one case from another.

3.1.1 Key Informant Interviews

During the research phase, I faced numerous difficulties finding information and data regarding the ALUS and property tax credit policies. Attempts were made to contact the parties

responsible for administering the programs. In the case of ALUS, I received no response from the agencies and groups responsible for administration. In the case of property tax credits, many of the programs have been shut down for several years and contacts for those responsible for the program are not available. Furthermore, many programs did not receive full evaluation of the program after its elimination. Thus, I was unsuccessful in conducting key informant interviews.

3.1.2 Document Source Analysis

For a better understanding of each case, this paper collected and examined reports from government agencies involved in regulating and implementing farmland preservation policies, interest groups monitoring government policies, proponents of innovative research policies, farmland property owners, and academics.

3.1.3 European Land Use Policies in the North American Context

The struggle between development and land preservation is not a unique situation to Canada and the United States. Other industrialized countries, more specifically Western Europe, have been dealing with this problem before it became an issue in North America. Facing constraints such as high population density and lack of quality soil, land use policies have played a major role in urban planning of many Western European countries. Despite these constraints, Britain and Netherlands have achieved an impressive record of land preservation. The mechanisms and tools used in these countries have also been applied in North America. At first glance, many attribute their success of retaining farmland to their geographic and demographic characteristics. However, what differs between the two continents is their planning structure and overall attitudes towards conservation. In order to implement national policies and institutions that restrict land-use, the government must receive considerable public support. The British and Dutch are highly sensitive culturally and politically to land-use and urban planning. This degree of sensitivity has redefined their policies from farmland preservation to countryside preservation.

Planning policies are deeply rooted across all levels of government, the public, and developers in Britain. Unlike the bottom up approach in North America, national policies play an integral part in the planning of both countryside and cities. This is partly due to their unitary government system, which diminishes the power of regional governments compared to the federal systems of North America. Planning institutions in Britain consist of local authorities and the Secretary of State for the Environment (Alterman, R. 1997). The Secretary of State for the Environment wields tremendous power in local planning and appeals decisions. Local authorities are given national guidelines to follow, which integrate all development with countryside preservation. Furthermore, as Alterman (1997) notes, British planners put less emphasis on the need to preserve the farmland for agricultural production. Instead, the focus is on preserving the countryside, which provides the country with amenities such as cultural identity, aesthetic views, and environmental goods and services.

In Netherlands, there is no particular legislation aimed at preserving farmlands (Alterman, R. 1997). Instead, it uses planning laws, policies, and institutions. Unlike the British model of centralized planning, the Dutch model closely integrates local, regional, and national policy. It also consists of a national policy that guides local authorities. Rather than using its power, the national government prefers to deal matter through giving advice and negotiations.

Although Western European countries have shown a high level of success and is often viewed as the benchmark in land preservation, it is difficult to directly apply their cases to the North American context. Differences in government structure, cultural ideologies, geography, demographics, and institutions make a direct comparison between the two continents very difficult. These factors have given rise to national policies and directives that enable better organizational efforts. Culturally and politically, Canadian agricultural land policies have traditionally targeted farmland preservation and direct farmland amenities (economic goods produced by farms). While European cases cannot be applied to this study due to their

differences, evaluation policy alternatives and recommendations takes these lessons learned into consideration.

3.2 Framework of Analysis

To evaluate and analyze the outcomes, this paper has constructed a set of criteria to examine each case. These criteria are:

3.2.1 Ability to Price EG&S

To create a market for ecological goods and services, a pricing mechanism is required. A market for EG&S gives landowners a wider choice of land use and enables them to make decisions on the margin. Pricing of EG&S is therefore a very important criterion for selecting cases for analysis.

To properly price a range of services, the policy should meet the following 2 conditions:

1. Identification of the amenities that the farmlands provide.
2. Inform the potential participants about the program and its features.

In many cases across North America, the focus of farmland preservation is solely on agricultural production or concentration on a single amenity rather than the full range. This does not preclude the policies implemented from being effective. These policies are still capable of bridging the gap between private and social value, however they fail to capture all the amenities that are derived from agricultural lands. The best policy therefore must explicitly state all the amenities it is protecting in order to properly price them.

3.2.2 Type of Mechanism

The importance of the policy mechanism in farmland preservation is manifold. First, the mechanism used must be acceptable among stakeholders. The existing command and control nature of the Agricultural Land Reserve has directly removed property development rights from

landowners within the zone and further intrusive policies will be highly objectionable. Secondly, the mechanism must be affordable and practical to the administrator. If the cost of administration and monitoring outweighs the benefits of conservation, then the program cannot be justified.

3.2.3 Level of Government Support

Canada's treatment of land use planning has elements that are similar to those in the UK and US. While land use planning is dominated at the centre in the UK, Americans have decentralised this duty to municipal governments across the country (Alterman, 1997). In Canada, land use-planning falls under the jurisdiction of the provincial government. The provincial government is involved in all aspects of farmland policy. Therefore, each case studied involves the participation of the provincial/state government in conjunction with the municipal governments. Both government levels are expected to take responsibility for financing and administering the program. In most of the cases observed, the program targets selected municipalities with financial and administration support of the provincial/state government.

3.2.4 Farmland Retention

When the values of farmlands take all the ecological goods and services into account, it often leads to the prevention of land from converting into other uses. Farmland retention is measured by two criteria:

- 1. Number of farmland acres or hectares preserved.**
- 2. Length of Cover**
- 3. How many ecological goods and services are valued or covered.**

This correlates with the criteria in section 3.2.1. If the pricing of EG&S includes all the goods and services that the land produces, then the lands with the highest quality will be those preserved. In most cases, a land parcel must meet minimum EG&S production and other standard requirements to receive payments for retention.

4: Case Studies

This section examines the findings from case studies on Montgomery County (Maryland, USA), Rural Municipality of Blanshard (Manitoba, Canada), and various counties with a Property Tax Credit system. Each of these case studies are selected because they introduce policies that identify amenities provided by farmlands and bridge the gap between market and social values of properties.

Table 2 Summary of Case Study Policies

Case Study	Primary Policy Investigated	Method of Payment
Montgomery County (Maryland, USA)	Transfer of Development Rights	From purchaser of development rights to landowner.
Rural Municipality of Blanshard (Manitoba, Canada)	Alternative Land Use Services	Direct payment from government agency to landowner.
Various counties in Alberta Saskatchewan, Manitoba, Ontario	Property Tax Credit	Through tax exemption or tax returns by the municipal government.

4.1 Montgomery County, Maryland, United States

4.1.1 Brief Background

From 1950 to 1960, the population of Montgomery County grew from 160,000 to 340,000. Alarmed by the amount of productive farmland lost due to this rapid growth, county council introduced a policy entitled: On Wedge and Corridors (American Farmland Trust, 2007). The goal was to separate areas of development (corridors) from rural areas (wedges). This was the first county public document identifying and recognizing amenities provided by farmland. In

an attempt to enhance On Wedge and Corridors, the county adopted the Rural Zone in 1973. The Rural Zone covered one third of the county and regulated zoning density to a minimum of one dwelling unit for each 5 acres. This policy resulted in an adverse effect. With people earning more money, demand for larger houses in low-density area increased. Throughout the rest of the 1970s, Montgomery County averaged a loss of 3,000 acres per year (American Farmland Trust, 2007). Due to the inability of the policy to prevent land conversion, a task force was created to find new initiatives to slowdown the loss of land. The Rural Zone differed from the ALR since it allowed non-agricultural use of the land. Rather than banning all other types of development, it decreased minimum zoning density allowed in the hopes of raising the cost of residential development.

4.1.2 Framework and Program Procedures

What came out of the task force was the implementation of the Transfer of Development Right (TDR) program. There are two basic steps to setting up a TDR program. First a 'sending area' must be established and development rights created. Zoning density in this area is to be lowered and restricted by the county. In 1980, the county designated 89,000 acres of land to its Agricultural Reserve and rezoned this area into the Rural Density Transfer (RDT) zone. The RDT decreased zoning ability from one unit of housing per five acres to one unit per 25 acres (Maryland National Capital Park and Planning Commission, 2008). The sending area has now expanded to 93,000 acres. In the initial phase of the program, landowners were given a one-time exemption. All lots under the minimum requirement of 25 acres prior to the RDT zoning were allowed to build according to prior zoning regulation. No time limit was given to this phase, but after the construction of one home, all further development must comply with the new RDT zoning regulation.

To compensate landowners for the restrictive zoning, a Transfer of Development Rights was implemented. The TDR program allows landowners in RDT zone to sell and transfer

development rights to another zone designated for development. Developers can purchase development rights are then allowed to increase density development in designated areas. This requires the establishment of a 'receiving area' where land is allowed higher and additional density development. Originally, planning of receiving areas was designated by each community's master plan.² In 1987, Maryland Court of Appeals ruled that designation of receiving sites should be added to the county's zoning code (Montgomery County Zoning Ordinance, 2008). Although this program specifies the ecological goods and services it intends to target, it protects ecological goods and services through the conservation of farmland, open spaces, and natural areas. The program functions similarly to a cap-and-trade market used in programs such as the carbon market where producers pay for emission of CO₂. By down zoning in areas with open spaces, farmland, and natural areas, the TDR effectively puts a cap on the development in the sending areas. By allowing exchanges of development rights, the program permanently extinguishes future development capabilities on the land. There is no need to specifically identify all the amenities the program intends to target. The entire sending area is conserved once zoning regulations are implemented.

As part of the transfer process, landowners in the RDT zone were awarded one development right for every five acres of land. TDR credits are awarded regardless of the physical characteristics of the land and its potential ability for development. When a potential buyer wishes to purchase a TDR from a landowner, he or she must accomplish the following steps. First, they must file a preliminary subdivision plans to the Montgomery County Planning Board. These plans include preliminary plan drawings regarding the property on the receiving site. Once the preliminary plans are approved, the applicant can then proceed to file a site plan. This plan must contain the number of dwelling units including TDRs and the number of

² Montgomery Planning divides the county into different communities for the purpose of better planning. Each community requires a Master Plan for a more comprehensive view of land-use trends and future development.

affordable housing units (Montgomery County Planning Board, 1986). The site plan ensures that the increased density does not overwhelm and cause problems to adjacent properties. Following the approval of the site plan, the applicant can then submit a Record Plat of Subdivision for final approval and Easement Document and Deeds of Transfer. The easement document ensures that future residential development in sending area is limited and the deed of transfer shows ownership of development right to developer. When the applicant receives final approval from the planning board, the Record Plat is recorded and an Extinguishment Document is issued that certifies that the TDR has been used in a receiving area and cannot be transferred again.

A fundamental characteristic of the TDR program is its use of the market mechanism. Under this mechanism, incentives are required for attracting participants to the program. Montgomery County has used several tools to promote incentives to ensure the functioning of the TDR program. Among one of those tools is the down zoning created with the establishment of the Agricultural Reserve / Rural Density Transfer. Although participation by property owners in the sending areas is in theory voluntary, the rezoning of the Agricultural Reserve has in essence shaped this into a mandatory program. By changing minimum density from one unit per five acres to 25, the county made development in the RDT zone more expensive and less attractive to developers. As a result, landowners in the regulated zone lost property value. To regain potential capital lost caused by this restrictive regulation, landowners can participate in the TDR program and sell their development rights. They can also keep the developing rights and sell at a later date or use them to increase density development in the receiving areas.

While the rezoning of the Agricultural Reserve drove the supply of TDRs, the county applied another tool to affect the demand for TDRs. To encourage developers to buy TDRs, Montgomery County established a two-tier density limit system in the receiving areas. A developer whose project does not contain the use of a TDR is constrained by the standard

maximum density limit. If a developer wishes to augment the density level permeable, it has two options:

- Purchase development rights through TDRs (Montgomery County Zoning Ordinance);
- Provision of moderately priced dwelling units (MPDU) (Montgomery County Code)

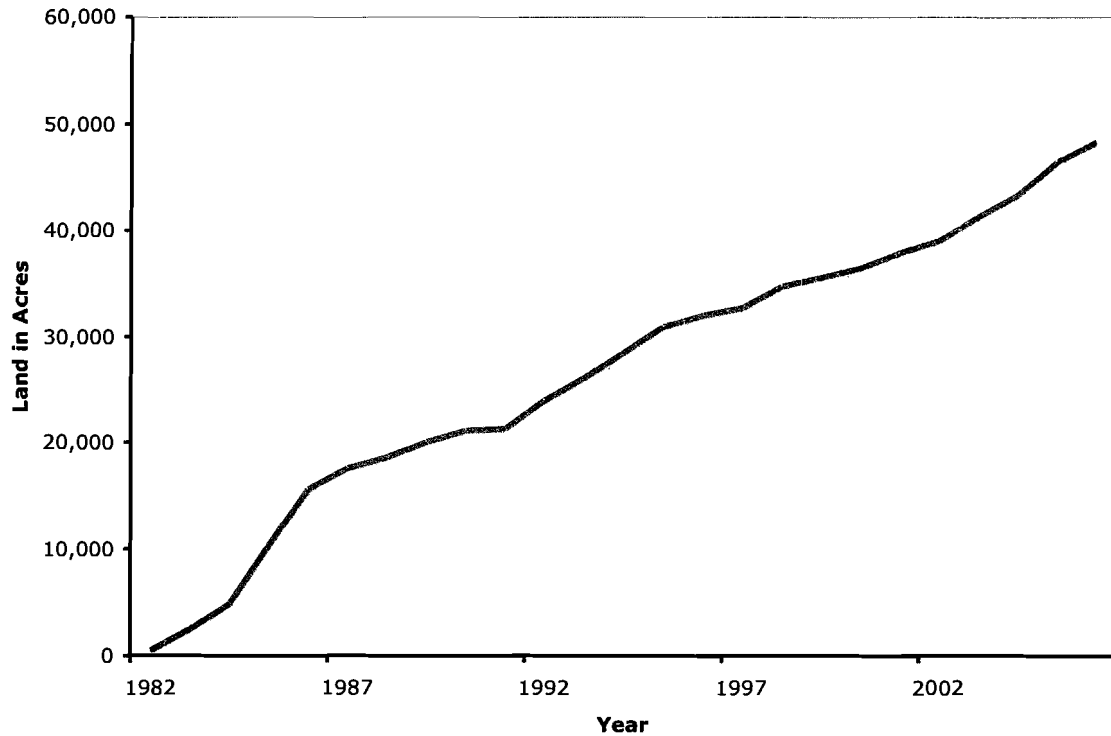
Aside from purchasing TDRs, developers can increase density from the maximum allowed under the standard method of development through the provision of MPDUs. By restricting access to additional density allowed to two methods, limited options force developers to use TDRs if they wish to maximize profits from developing a property. The density allocations used in the sending and receiving areas serve as a mechanism to balance the supply and demand of TDRs.

4.1.3 Rate of Success

The results of the program pay little attention specifically to ecological goods and services. Much of the focus from TDR has been on land conservation and preservation. As of the fiscal year of 2006, 48,345 acres had been preserved through the use of TDRs (American Farmland Trust, 2007). Preserved land from TDRs constitutes 52 percent of all farmland in the RDT zone and over 75 percent of all preserved farmland in the county. If the county were to acquire the same amount of land for easement purposes, it would have cost the government roughly \$68 million (Walls & McConnell, 2007)³. The following figure shows the accumulated farmland preserved from the beginning of its implementation:

³ Cost of easement was estimated by using average TDR prices.

Figure 2 Accumulated Farmland Preserved from TDR

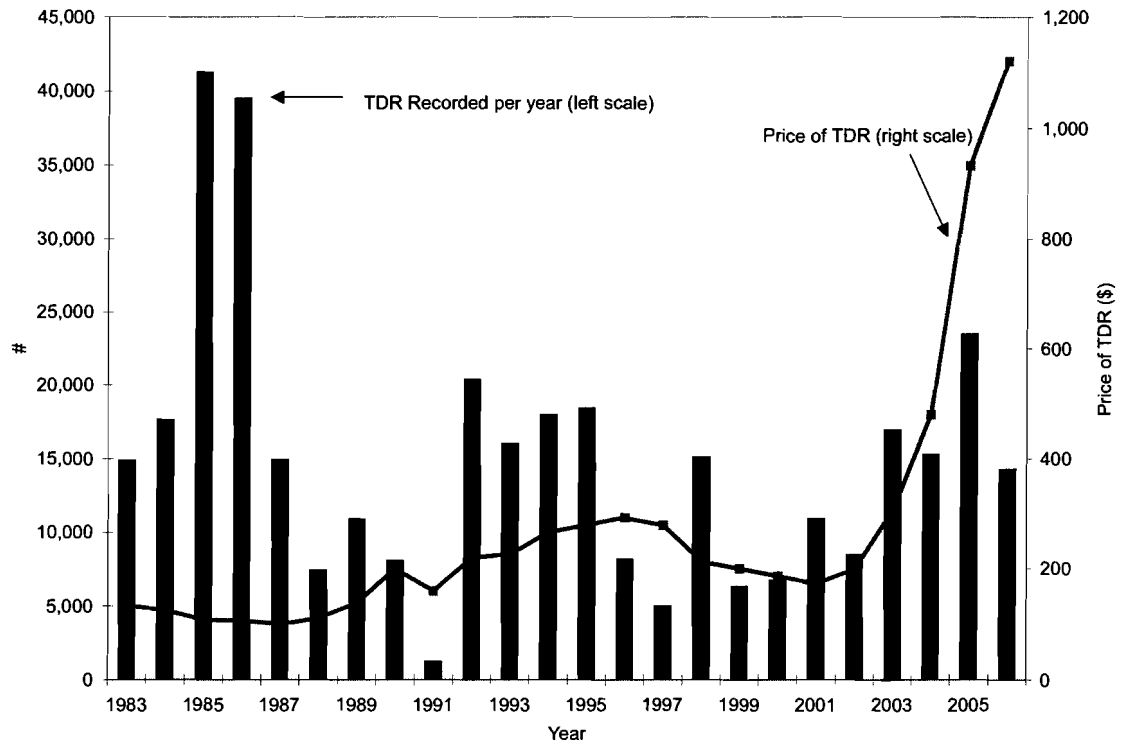


Data Source: Montgomery County Department of Economic Development (2006)

Accumulated farmland preserved from the graph above was calculated through the number of TDRs recorded.⁴ A landowner can choose to keep the development right or sell it to a buyer at market price. The municipal government of Montgomery County does not operate the sale and purchase of TDRs for its farmers and developers. Private TDR real estate agents conduct the business of transactions. As such, prices are determined at market value. The following figure shows the annual average TDR price and the number of TDRs recorded:

⁴ Once a TDR is severed from its land, the easement of the land is recorded.

Figure 3 Annual TDRs recorded vs average TDR price



Data Source: Montgomery County Department of Economic Development (2006)

As the figure above shows, average price of TDRs fluctuate annually. Prices fell sharply in 1991, 1996, and 1997 as a result of decreased in construction and demand of TDR (Walls & McConnell, 2007). However, prices of TDR skyrocketed in the beginning of the new Millenium as the community of Clarksburg began to develop. A sudden increase in receiving area along with increase in demand for housing drove higher demand for TDRs.

4.1.4 Challenges and Future Initiatives

Despite its initial success, Montgomery County faces new challenges as the program matures. One of the most difficult aspects of this program is the ability to balance supply and demand of TDRs. As of 2007, receiving areas were capable of absorbing 15,986 TDRs. Of that capacity, 6,115 TDRs have been used for new development and 4,615 have been listed as

“diminished”⁵ (Maryland National Capital Park and Planning Commission, 2008). This means that if left at the current rate, receiving areas can only absorb a maximum of 5,256 TDRs. With approximately 5,000 TDRs remaining, the ratio of sending to receiving area is roughly 1:1. On the surface, this ratio might seem ideal. However, past experience shows that the average utilization rate of TDRs in receiving area ranges from 40-60%. Developers do not always develop higher density units on land in receiving areas. As a result, receiving areas are wastefully developed. According to Maryland National Capital Park and Planning Commission, an additional 3,397 receiving area capacity is needed to fully absorb the remaining TDRs available. Without increasing the number of receiving areas, current areas designated will not have the capacity to absorb the remaining TDR credits available in the market.

The M-NCPPC is highly aware of the lack of receiving areas and has projects attempting to tackle the issue. The first project is the current development of Clarksburg (a planning area in Montgomery County) and it is expected to create a capacity of 1,300 TDRs. With a historical utilization rate of 65% in Clarksburg, it is estimated that this development will actually use up 842 TDRs. If the preliminary plan materializes, then the remaining TDRs available will be reduced to roughly 4,177 (Maryland National Capital Park and Planning Commission, 2008). There are also four proposed plans underway in the areas of Twinbrook, White Flint, Germantown, and West Gaithersburg. A total of 3,300 area TDRs could be added to receiving area capacity within the next year. Depending on approvals and success rates, the proposed developments could potentially absorb the remaining TDRs. Furthermore, the M-NCPPC has proposed the elimination of the “Two Thirds” requirement to encourage higher TDR utilization rate. Currently, if a developer wishes to increase the density of a development, it must use two thirds of the maximum allowable TDRs under Zoning Ordinance. As a result, developers simply

⁵ Receiving areas capacity can be diminished by development without the use of TDRs, development with less than required number of TDRs, new environmental regulations, or a change in landscape.

choose not to increase density when developing in receiving areas. Removing this requirement can potentially decrease the rate at which receiving area capacity is diminishing.

A second obstacle that Montgomery County faces is the creation of a “Super TDR” market. Over the course of the program, two types of TDRs have been created. The first type of TDR is sold to receiving areas to intensify density. The second type of TDR is often labelled as a “Super TDR” and can be reserved for on site development in sending area. For example, when five TDRs are severed from a 25 acres land, four TDRs must be transferred to receiving areas and the remaining one conveys the building ability of 1 dwelling unit per 25 acres. Rather than building for farming purposes, some landowners chose to build large estates that are far too expensive for future farmers. As well, since there are no sitting requirements, the landowner can build in the middle of the property and therefore ruin farming potential. It is estimated that these TDRs can sell for approximately \$200,000 to \$500,000. Many of these “Super TDRs” have yet to be sold, but if the opportunity occurs, there can be an influx of large estates in the RDT zone (Walls & McConnell, 2007).

Montgomery County is currently exploring different ways to resolve the issue of the “Super TDR”. In its 2005 TDR Status Report, the Planning Board recommended County Council for zoning amendments that would reduce development potential in the RDT zone. Another proposal would involve the use of mandatory clustering in sending areas. However, many officials believe that this will not have the support of landowners, as it signifies further land use restriction. The county has also explored the option of establishing a secondary market for “Super TDRs” and sending their development rights to other regions.

4.2 Rural Municipality of Blanshard, Manitoba

4.2.1 Brief Background

The ALUS pilot project was started based on the view that the provision of ecological goods and services (EGS) should be rewarded. The goal of ALUS is ensure a socially and economically sustainable future through sharing the cost of protecting environmental goods. In 1999, Keystone Agricultural Producers (KAP) released the paper “Alternative Land Use Services” which describes a potential mechanism to enhance EGS. KAP gained support from other land conservation agencies and discussion began on a pilot project. In 2004, the Rural Municipality (RM) of Blanshard in Manitoba was selected as a potential location. The municipality pledged its support and provided finances to help operate the program.

Since the concept of ALUS is relatively new in North America, a pilot project is necessary in order to better understand the effectiveness and reception of the program. The RM of Blanshard was selected because of its geographic location, demographic size, and land characteristics. Situated in western Manitoba, it is located within close proximity of the partners involved and an ideal location to deliver the program. By having the program located close to its partners, the program can take advantage of their resources and cut down on administrative and monitoring costs. With a population size of 686 people and 113 farms, the municipality is easy to manage and evaluate for a pilot project (Census of Agriculture, 2001). The municipality also contains 95% of Broughton’s Creek watershed. Finally, the residents and the municipal government of Blanshard were highly enthusiastic about ALUS and were committed to supporting the project.

4.2.2 Framework and Program Procedures

The concept of ALUS is to compensate landowners who conserve and protect environmental assets on privately owned land. The project is operated and financed by multiple

levels of government and non-governmental agencies. The federal and provincial government provide funding for ALUS through the Agricultural Policy Framework. Other funding groups include the RM of Blanshard, Delta Waterfowl Foundation, and other international conservation groups. The Little Saskatchewan River Conservation District is responsible for managing and delivering the services of the program. Since Manitoba Crop Insurance Corporation already has extensive reach in Blanshard with the provision of its own services; it is responsible for the administration aspect of the project. The evaluation process is conducted by Delta Waterfowl and hired consulting firms when the pilot terminates after three years. The RM of Blanshard promotes the project to its residents and helps guide them to the proper agencies. The project also set up advisory committees to hear inputs from other conservation groups, farmers, landowners, and local interest groups.

If a landowner is interested in participating in ALUS and receiving payments for land stewardship, he or she can apply through Manitoba Agricultural Services Corporation. An ALUS coordinator will then assist the producer in determining the eligibility of the land and the size of payment. Depending on the type of ecological service that the landowner produces and the action he or she takes towards stewardship, payment for the services varies. The following table shows the structure of pricing the amenities:

Table 3 ALUS Payment Scheme

Type of Service	Condition of Payment	Price per acre	Land Eligible in acres
Wetland Services	Maintain or enhance wetlands with grazing permitted.	\$5	6,018
	Maintain or enhance wetlands with grazing permitted with no burning, draining, filling, or clearing.	\$7.50	
	Leave area in its natural state with no agricultural use with no burning, draining, filling, or clearing.	\$15	
Riparian Services	Maintain or enhance riparian areas with grazing permitted.	\$5	5,886
	Maintain or enhance riparian areas with haying or mowing permitted.	\$7.50	
	Maintain or enhance riparian areas with no agricultural use and left in natural state with no burning, breaking, or clearing.	\$15	
Natural Area Services	Maintain or enhance wooded and grassland areas with grazing permitted.	\$5	4,215
	Maintain or enhance grassland and wooded areas with haying permitted and a woodlot management plan.	\$7.50	
	Maintain or enhance grassland and wooded areas with no agricultural use and with no breaking, burning, or clearing. (Prescribed burning allowed for grassland)	\$15	
Fragile Land Services	Keep ecologically sensitive lands under perennial cover with grazing permitted.	\$5	9,154
	Keep ecologically sensitive lands under perennial cover with no burning or breaking, but haying permitted.	\$15	
	Keep ecologically sensitive lands under perennial cover with no agricultural use, and burning or breaking.	\$25	

Data source: Keystone Agricultural Producers, ALUS, 2006

The values provided by the payment scheme are not determined arbitrarily. Discussions were held with various wildlife agencies, agricultural experts, and landowners to better understand the values of renting and input costs for cropland. As well, payments also took into consideration Manitoba Habitat Heritage Corporation (MHHC) conservation easement, land productivity data from MASC, cost estimates by agri-business, local land rental rates, and property tax rates.

There are several issues that ALUS took into consideration when drafting the payment scheme. Firstly, in order to ensure that payments are effective, it must avoid duplicating the efforts of other programs. The Agricultural Policy Framework (APF) signed between the federal and provincial/territorial governments encompasses several environmental programs. Rather than following the APF, ALUS complements and addresses issues that APF does not. Programs under the APF deal with risk management and mitigation of existing programs. It does not address the primary goal of ALUS, which is the conservation and protection of natural assets. Secondly, payments agreed upon must be based on a long-term horizon. To realize the full potential of ecological conservation, land easement must be locked in a multiyear agreement. Since the pilot lasts three years, the agreement length is equal to the lifespan of the pilot. A landowner can add more areas into the agreement in year two. Breach of the contract will be subjected to penalties.

4.2.3 Rate of Success

Launched in 2005, results from the pilot have yet to be published. Delta Waterfowl and its associates are still currently evaluating the impact of the program. Therefore, this paper will rely on projections made prior to the start of the program. Land eligibility was already mapped out prior to the start of the pilot through the use of GIS and different databases on land characteristics. A total of 25,273 acres were estimated to be eligible for compensation. However, this number is not guaranteed because not all eligible landowners will participate in the project. An integral part of this pilot project is to understand the effects prices have on landowners' decision to participate in the program. Since payments differ based on the action of the landowner, it will also be interesting to find at what level of will a landowner move beyond protecting to enhancing environmental assets. In 2006, KAP reported that over 70% of the eligible landowners enrolled in the program, which represents over 20,000 acres of land.

With eligibility of land determined prior to the start of the pilot, an accurate budget can be estimated. The project is estimated to cost \$536,949 for the first year, \$634,459 each for year

2 and 3, and \$97,510 for the evaluation process in year 4. This brings to a total expected cost of \$1,903,377 over the span of four years. The actual cost is expected to fluctuate depending on the participation rate.

In 2007, Tyrchniewicz Consulting conducted a cost-benefit analysis of ALUS in Canada on behalf of Delta Waterfowl. However, based on data from other jurisdictions with similar policies, we can hypothesize the impacts of ALUS. The report highlights the potential impact ALUS has on land values and cost savings to the public. Basing its analysis on other jurisdictions, the report found that land values for agricultural production would decrease on ecologically sensitive land that is converted to a permanent cover. This is due to the fact that agriculture production is prohibited under the easement condition. The result contrasts with the goal of ALUS, which is to raise the value of easement above the returns on agricultural production. However, the total of agricultural value of land would not be lost under ALUS because the program allows grazing and haying at a reduced payment. It is crucial that conservation payments are at least equal to the returns from agricultural production. Farming activities on marginal land are often subsidized by federal or provincial agricultural policies. These subsidies must be eliminated to avoid artificial inflation of profits from agricultural production on marginal land.

The Manitoba Crop Insurance Corporation provides protection for farmers by insuring the crop that is produced. This has led, as the report notes, to an expansion of cultivation in wetland and natural areas. Since ALUS will reduce or prevent production in these areas, less insurance will be needed. Furthermore, the report estimates that reduced insurance could result in a savings of \$3.50/acre to farmers and \$6.00/acre to the government. Protection of ecological goods and services can also have an impact in the cost of municipal infrastructure. The focus of wetland protection by ALUS can improve water quality and reduce the need of building

infrastructure that provides such services⁶.

4.2.4 Future Initiatives and Challenges

The results collected after Year 3 of the pilot will serve to determine the future shape of ALUS and its potential implementation across Canada. Through data collection and surveys, researchers would like to better understand the program rationale, delivery and design, and its impact. The program rationale seeks to understand the reason behind a landowner's choice in participating (or not participating) in the project. As a pilot project, the delivery of the service and the design of the program is still a work in progress. Researchers will use the results of the pilot to determine the efficiency of the program and continue to improve the processing of ALUS. The project also seeks to understand the socio-economical impacts it had on the residents of Blanshard (participants and non participants) and ecological changes as a result of the program,

While the results from RM of Blanshard are being collected and analyzed, expansion of ALUS has already begun. In 2007, Northfolk, Ontario launched an ALUS program similar to that of Blanshard's. The pilot is to last 3 years with a post evaluation period and will cost \$2 million. There have also been talks and tasks forced established in the provinces of Saskatchewan and Alberta studying potential municipalities for future ALUS pilot projects. In 2008, Prince Edward Island became the first province to implement the program province wide. The pilot will run from April 2008 to 2009 at which time the success of the program will be evaluated. As results of pilots across Canada get evaluated over time, the groups involved in ALUS hope to better understand its impacts and shape a program that can be implemented across Canada.

⁶ Wetlands provide the following services that can help reduce municipal infrastructure costs: natural filters that improve water quality, source of fresh water, removal of toxic compounds, recharge water supplies, and flood control (Olewiler, N. 2004).

4.3 Property Tax Credit (various counties in Alberta, Saskatchewan, Manitoba, Ontario)

4.3.1 Brief Background

For decades, property taxes have been used as a method to alter landowners' behaviour on their land. The municipal government collects property taxes and it is their primary source of revenue. The revenue raised is used to provide the community with services such as schools, roads, sewage, water, and other infrastructures. Property taxes are determined by two key factors 1) the mill rate and, 2) the assessed value of the property. Each municipal government sets their tax rate (also known as mill rate) according to their revenue needs. This rate is then applied to the assessed value of the property. Private lands are assessed based on the fair market value of the land and any improvements made to the land. The assessment of properties depending on the province can be conducted by the municipal government or by a central agency set up by the provincial government (Collins, J. 1992). Multiplying the mill rate with the assessed value of the property, and then dividing the result by 1000, we get the total amount of property tax owed by a landowner.

In many jurisdictions across North America, a differential tax system is applied to farmland. Land classified as residential use is subjected to market value whereas land classified as farmland is assessed through the production value of the land. Assessed farmland value is significantly lower than that of residential land and as a result, lands designated for agricultural use are subjected to a lower property tax. As Van De Velde (2000) notes, this policy along with other government subsidization programs such as income stabilization and Gross Revenue Insurance Program have encouraged farmers to expand production into marginal cropping land. Under normal conditions, landowners will farm the land until marginal revenue equals to marginal cost of farming. Costs of farming include expenditures on buildings and equipment, labour, property taxes, and other costs activities related to operations. However, since benefits

from agriculture production are artificially increased by government policies, landowners have the incentives to exploit marginal land that would have otherwise yielded negative returns. These programs were often funded on the basis of seeded acreage and encourage farming practices that are harmful to the environment. Due to financial constraint and international trade agreements, some of these programs have been reformed or discontinued. For example, the Canadian Wheat Board no longer place a quota system based on cultivated acreage, but rather in grain volume (Van De Velde, C.M. 2000).

The property tax system can provide incentives to farmers to recognize the public benefits accrued from conservation of natural areas. Currently, most jurisdictions do not provide a differential property tax system or a tax credit for land set aside for conservation. Any land that is not used for agriculture is classified as residential use and will be subjected to higher property taxes. Through property tax incentives, policy makers can encourage landowners to consider conservation as an alternative land use.

4.3.2 Framework and Program Procedures

Over the past two decades, several municipalities across Canada have experimented with the use of a property tax credit system to encourage setting land aside for conservation. A tax credit is simply a negative tax that rewards the landowner for conservation. This method is attractive because it can have a large impact while maintaining low administration cost (Van De Velde, C.M. 2000). The following table shows the different programs experimented in Canada:

Table 4 Programs using Property Tax Incentives

Program	Eligibility	Description
Manitoba Pilot (Strathcona and Mountain North)	<ul style="list-style-type: none"> • Landowner must follow practices that maintain sufficient cover to protect the land from erosion and provide habitat for wildlife. • Eligible land: tame forage, native grassland, wetlands, riparian buffer zones, and a minimum of 40% residue cover on cropland in the spring. 	<ul style="list-style-type: none"> • Type of program: Tax Credit • \$1/acre for specified adoption practices • Pilot launched in 1999 and lasted 3 years
Conservation Land Tax Incentive Program (CLTIP) and the Managed Forest Tax Incentive Program (MFTIP)- Ontario	<ul style="list-style-type: none"> • Must manage land following the criteria set out by the program. • CLTIP eligible land: wetland, area of natural and scientific interest, habitat of endangered species, Land designated as escarpment natural area in the Niagara Escarpment Plan, and Community conservation lands. • MFTIP eligible land: woodland • Minimum of ½ acre in size. 	<ul style="list-style-type: none"> • Type of program: Tax Exemption • Created in 1986, the CLTIP is part of the Ontario Municipal Tax Assessment Act. • Land eligible for CLTIP is entitled to 100% property tax exemption. • Land eligible for MFTIP is taxed at 25% of residential rate.
RM of Weyburn (Saskatchewan)	<ul style="list-style-type: none"> • Eligible land and activities: shelterbelts, green manure, forage planting, wildlife habitat, grassed waterway, and upkeep of residences (yards). 	<ul style="list-style-type: none"> • Type of program: Tax Rebate • Pilot launched in 1993 and ended in 1996. • Rate of rebate varies depending on type of land and activity. • Rebates offered up to the value of the taxes paid on the quarter section.
RM of Rocky View (Alberta)	<ul style="list-style-type: none"> • Must carry out sustainable farming practices on at least 80 acres on the quarter section. • Accepted practices: the retention of 45% residue on cropland, seeding forage on marginal land, and establishing shelterbelts. 	<ul style="list-style-type: none"> • Type of program: Tax Credit • Program launched in 1993 and ended in 1998. • Tax incentives of \$150 per quarter section.

4.3.3 Rate of Success

Of the four property tax incentive programs, only the Conservation Land Tax Incentive Program and the Managed Forest Tax Incentive Program from Ontario are still in operation today. The other programs were terminated upon the end date of the pilot. In some cases, no new programs were implemented to replace the pilot. Often, termination of the programs was due to low participation rate and lack of political commitment. Without political commitment, no initiatives were made to restart a program. According to a survey conducted by Van De Velde (2000), a majority of landowners from the Manitoba Property Tax Credit program expressed that direct payments for conservation activities are preferred over tax payments. The table below charts the program results and description from the survey mentioned above:

Table 5 Results of Property Tax Incentive Programs

Program	Results	Description of Results
Manitoba Pilot (Strathcona and Mountain North)	<ul style="list-style-type: none"> By the end of the pilot in 2001, 86,122 acres of land enrolled in the program, which accounts for 37% of the total land base. Total tax credit value in 3 years: \$199,047 	<ul style="list-style-type: none"> Landowners expressed positive attitudes towards monetary compensation for conservation. Many landowners thought \$1/acre was inadequate and that \$2-\$10 acre was needed to cover for the cost of maintenance and the forgone profit from production.
Conservation Land Tax Incentive Program (CLTIP) and the Managed Forest Tax Incentive Program (MFTIP) - Ontario	<ul style="list-style-type: none"> Over 20,000 enrolment (30% participation rate)* Over 390,000 acres covered* 	<ul style="list-style-type: none"> Program well promoted Amount of tax exemption is perceived as substantial, especially as property values are rising
RM of Weyburn (Saskatchewan)	<ul style="list-style-type: none"> Approximately 1,850 acres of land enrolled in the program. Constitutes 1% of total Weyburn land base. 	<ul style="list-style-type: none"> Municipal staff thought the program was very good value for the time and money invested. Effective from administrative point of view. Program discontinued from lack of interest.
RM of Rocky View (Alberta)	<ul style="list-style-type: none"> By year 3, program had 130 applicants and was full subscribed. When fully subscribed, had an enrolment of 17,000 acres. 	<ul style="list-style-type: none"> Effective from administrative point of view. Easy to implement. Well received by landowners.

* Although program is still running, results are from beginning of program to 1999

The results showed that overall; landowners perceive tax breaks as a good incentive to conserve land. Aside from Weyburn, there seems to be a high participation rate of the program. From an administrative point of view, the programs were manageable and very little extra costs were needed. The major obstacle to continuing the programs is a lack of financing. In the case of Rocky View, the federal and provincial government successfully funded the program for the first four years of the program from 1993-1996. When the funding responsibility fell solely to the municipal government, the money was quickly limited to \$5000 per year.

4.3.4 Future Initiatives and Challenges

Many of the programs were discontinued due to poor publicity, which in return generated modest participation rates and political support (Van De Velde, 2000). These programs were generally well received in the initial phase of the pilot. However, a lack long-term commitment from the municipal government caused participants to lose interests. Ontario is the only province that maintains support for its program. This can be due to the fact that there is a higher commitment from the Ontario government to conserve. Throughout the 1980s, Ontario was losing farmland at an alarming rate while the government passively addressed the issue. Due to its land productivity, market values in Ontario are also higher, which gives tax breaks more importance. If a program was to remain sustainable, it has to solve the financing issue. As Rocky View proved, a municipal government cannot handle the full cost of the program. Municipal governments need to do a better job promoting the program beyond the local population. In the long run, the population in and outside of the local jurisdiction will enjoy the benefits provided by the conservation of land. Without federal or provincial funding, the benefits will not be realized.

The success rate was also difficult to assess since no formal evaluation was conducted of the tax incentive programs upon their terminations. The results from section 4.3.3 are derived from the interviews conducted by Van De Velde (2000). As the author notes, her assessments were based on informal and anecdotal interviews with municipal staff and administrators, who subjectively viewed the program as a success in terms of administrative and implementation ease. Supporters of the program such as taxpayers, politicians, landowners, and organizations who provided technical and financial assistance found the achievements adequate. Without formal evaluation, results of the program remain inconclusive. To better understand the impacts of the program, evaluation must move beyond the administration point of view. Future programs will need to measure the ecological and socio-economic impacts for a more complete evaluation.

4.4 Summary of Findings

After analyzing each case independently, it is necessary to gather all the information learned and directly compare the three cases. This gives a better understanding of the strengths and weaknesses of each case when stacked up against another. The results are not meant to show which case is superior, but rather the factors that drive a case to success or failure. The following table summarizes the criteria measures identified in section 3.2 for each case study:

Table 6 Summary of Findings

	Transfer development rights	Alternative Land Use Services	Property Tax Credit
Identification of EG&S	Through easement of land	Targets specific EG&S	Targets specific EG&S
Inform Participants	Heavily promoted by municipal and state government.	Heavily promoted by the municipal government and the different agencies involved.	Most programs lacked promotion.
Level of Government Support	State and Municipal Government	Federal/Provincial and municipal government	Provincial and Municipal Government
Length of Cover	Permanent	Duration of contract (3 years)	Year to year

Drawing from the results of the three case studies, there seems to be two types of threats on ecological goods and services. The first threat is conversion to development for residential, commercial, and industrial usage. Many ecosystems are located within farm properties and conversion of land permanently destroys them. The second threat is from agricultural production. Not all farming activities degrade ecosystems, but currently some agricultural policies encourage farming on marginal cropland. The overexpansion of agricultural production encroaches on land that might have been conserved without production policies.

There are some commonalities and lessons learned that are useful when applying any policy regarding land preservation. Firstly, policy of this nature has wide implications and will attract attention from a diverse group of stakeholders. If a program is to succeed and sustain beyond the pilot phase, it must gain the commitment of politicians from all participating government levels. In a survey conducted by Van De Velde (2000), she found that the failure of many property tax credit programs' sustainability derives from lack of political commitment. With federal/provincial governments' financial support committed only to a short-term period and municipal governments' unwillingness to take over the program in the long run, participation levels dropped quickly after the first few years. Programs that garnered political commitment from the different levels of government were able to sustain. The state of Maryland continues to support and share operation of the TDR program with Montgomery County, even after 29 years. Not only does Ontario have the only surviving property tax credit program, but also the government added the MFTIP 12 years after the initial establishment of the CLTIP.

Programs that are well publicized and promoted also appear to achieve a higher participation rate. As Van De Velde (2000) noted, programs that failed to meet this criteria attracted moderate and less than desired level of participation. In Montgomery, staff from both the municipal government and state government held several public meetings with all stakeholders to inform them of the program. There are also a wide variety of information and publications available to the public. The ALUS program in the RM of Blanshard was highly promoted by not only governments, but also interest groups such as KAP and Delta Waterfowl Foundation. These promotion campaigns are partly responsible for the high initial participation in both programs.

Participation rates do not solely depend on promotion campaigns, they also require attractive prices in return for loss profit. Participants of the property tax credit programs were disappointed with the level of payments and lost interest shortly after the establishment of the

programs. Montgomery's TDR is the longest surviving program studied (over 3 decades old) and it is also the only program that uses a market mechanism to determine the price. This has resulted in more attractive incentives and led to higher participation rate. The other programs rely on educated estimates to determine an acceptable price level. Yet, TDR is not completely immune to pricing issues. During much of the late 1990s, very few TDRs were transferred in Montgomery County as a result of low prices offered on the market. However, the recent development of a municipality in the county (Clarksburg) has increased the price of TDRs and as a result, participation level increased. As noted in section 4.3.3, property tax credit programs that succeeded had incentives that satisfied participants, whereas programs that failed did not meet their price demands.

5: Policy Options

In this section, policy options derived from case finding in section 4 are presented. It is important to note, the alternatives suggested in options 2-4 are to be implemented along with the status quo and not as a replacement of the ALR. It is also important to note that these policies are not mutually exclusive and that policy makers should not select one over another, as some of these policies have the potential to complement each other. However, in order to better understand each policy, individual analysis is required.

5.1 Option 1: Retain the Status Quo

As section 2.2.1 notes, the ALR has grown from its initial size of 4,716,516 hectares to 4,759,682 hectares. Despite this policy, land conversion rate of rural land to urban use in Metro-Vancouver from 1971-1976 was 7.9 percent per year (Environment Canada. 1996). Land lost to development in the south of the province is replaced in the north where it is less vulnerable to development pressure. This policy also does not address the loss of ecosystems, which is diminishing at an alarming rate. However, the ALR enjoys public support especially from urban residents. Therefore, this research does not suggest the removal of the status quo and acknowledges that retaining the current policy is a viable option.

5.2 Option 2: Transfer Development Rights

- **Goal:**
 - Use of zoning restrictions in designated areas to protect ecological goods and services provided by farmland.
 - Create a sustainable market for the protection of EG&S.

- **Policy Mechanisms:**
 - Find land or zone that need protection and designate it as the “sending” area(s). Change and restrict the zoning density regulation in this area so that development will be discouraged. The use of TDR can target land of specific characteristic (such as wetlands, forests, and riparian areas).
 - Designate receiving area(s) where zoning regulation will allow for higher density development with the purchase of TDR credits. Policy makers need to ensure that the purchase of TDR is one of the limited if not the only option available to developers who wish to develop with a higher density permit.
 - Allocate the number of TDR credits to landowners in sending areas. The number of TDR credit given to each landowner will depend on the size of their property and will be expressed in per acre form. For example, Montgomery County allocated 1 TDR credit for every 5 acres land. The designation of TDR credit will depend on the decreased density regulation from the down zoning.
 - Determine the number of TDR credits required for the construction of an additional dwelling unit in the receiving area.
 - Explore and determine the appropriate transaction mechanism for the jurisdiction.
 - Conduct educational campaign teaching residents in both receiving and sending areas what TDRs are. The framework is highly complex and will require many educational methods from workshops to pamphlets to reach to all residents.
 - Help and allow the establishment of private brokerage firms. Brokers can facilitate the transactions of TDR credits, similar to the role of real estate agents. Although this will increase the cost of transaction, it will ease the flow of information between the buyer and the seller, and thus decrease time spent by both parties on acquiring the information.

- **Major Stakeholders:**
 - **Residents in Sending Areas:** Down zoning regulation will lead to a loss in property value for residents in sending areas.
 - **Residents in Sending Areas:** Increasing density development can affect their property value and their standard of living.
 - **Agricultural Land Commission:** is already in charge of overseeing the restricted land zone (ALR) across British Columbia. They have the expertise, information, and connection to help set up the sending area. This work can either be shared with the ALC or can be delegated to the ALC.
 - **Ministry of Agriculture and Lands:** oversees the Strategic Land Policy and Legislation Branch and plays an important role cross government land use policies.
 - **Property Developers**

- **Time Line:**
 - **Short-Term/Immediate (year 1-5):** Determine the appropriate sending and receiving areas for the TDRs
 - **Long-Term (beyond year 5):** Monitor the capacity ratio of receiving areas to sending areas. If capacity is diminishing, must adjust price and receiving areas to ensure a healthy transaction of TDRs.

- **Measures of Successful Implementation:**
 - Since the acreage of land preserved is determined from the start of the program, it is important to determine whether or not property owners are being compensated. The number of TDR credits sold on the market and used by developers can measure landowner's perception of the compensation system.
 - The average annual price of a TDR can indicate if the receiving to sending area ratio is too small or too large.
 - Diminishing capacity can be measured by loss of receiving area and remaining TDR credits (floating and unsold).

5.3 Option 3: Alternative Land Use Services

- **Goal:**
 - ALUS provides incentive and voluntary based policies to conserve natural capital and EG&S.
 - Counteract the pressure of agricultural production on cropland from subsidies provided by the federal and provincial governments.

- **Policy Mechanisms:**
 - Define the appropriate ecological goods and services that are to be protected in the particular region. Some ecological goods and services such as ecological sensitive lands are more costly to maintain by landowners and will require a higher payment to attract.
 - It is important to recognize that not all agricultural practices are harmful towards conservation. Therefore a payment structure that recognizes and limits practices such as grazing or haying will encourage a higher participation rate.
 - With the help of the Ministry of Lands and Agriculture and municipal government, inform landowners on the opportunity to partake in the program.

- **Major Stakeholders:**
 - **Farmland Owners:** are the targets of this pilot. Their level of participation and acceptance will determine the future of the program beyond the pilot phase.
 - **Ministry of Agriculture and Lands:** have the technical and the technological expertise to administer and operate the program. The ministry already performs and gathers valuable data that are essential to monitor the program.
 - **Conservation Agencies:** such as KAP and Delta Waterfowl Foundation have already assisted in the setup and operation of ALUS around several communities in Canada. Their experience and expertise are vital to the program from start to finish.
 - **Municipal Government:** Support from the municipal government can help promote the pilot, as they have the easiest access to the farmers.

- **Time Line:**
 - **Year 1-3:** Years of operation and the maximum length of contracts.

- **Year 4:** Formal evaluation period
- **Measures of Successful Implementation:**
 - After the year 3 of the program, a survey will be sent out during the evaluation period. This survey would like to determine:
 - 1. Program Rationale:**
 - Who were the participants?
 - Why did someone participate (or not) in the program?
 - Other social or informational obstacles barring from participation
 - 2. Program Impact**
 - Overall reception of the pilot by participants and non-participants.
 - Higher awareness of conservation programs and farm production.
 - The number of enrolment can measure the success of the pilot in protecting and restoring environmental assets. The effectiveness of the program and its pricing can be seen by the compliance rate and views from the administrators.

5.4 Option 4: Property Tax Credit

- **Goal:**
 - To provide an incentive and voluntary approach to conserving ecological goods and services through the use of the property tax system.
 - Balance current property tax system, which encourages expansion of farming production into marginal cropland.

- **Policy Mechanisms:**
 - Define the desired ecological goods and services that are to be protected in the particular region.
 - Inform landowners on the available tax credit with the help of BC Assessment and the municipal government. BC Assessment already conducts surveys on properties for landowners and can inform eligible landowners on the availability of the program. This is the most cost effective way to inform the targeted landowners.

- **Major Stakeholders:**
 - **BC Assessment:** already conducts surveys on all properties across British Columbia. They also assess properties and decide which category they fall under. The role of approving and monitoring properties can be performed at little extra cost with BC Assessment.
 - **Municipal Government:** Property taxes fall under the jurisdiction of the municipal government. It is their major source of funding and therefore any program that returns property taxes must consult with the municipal government.
 - **Ministry of Agriculture and Lands:** have the technical and the technological expertise to help monitor the program. Their GIS database is a very valuable source of information.
 - **Federal and/or Provincial Government:** Since property taxes are such a major source of funding for municipal government, they cannot afford to absorb this loss in revenue. For this program to be sustainable, one or both of these governments must share the cost.
 - **Landowners**

- **Time Line:**
 - Immediate campaign to inform landowners about the availability of the program.
 - Ongoing monitoring on the results and evaluating of the program.

- **Measures of Successful Implementation:**
 - Number of enrolment in the property tax credit program and the size of land protected. The effectiveness of the program and its pricing can be seen by the compliance rate.
 - Survey to understand landowners' perception of the program. It is equally important to understand why a landowner chose not to participate in the program as participants.

6: Evaluation of Policy Options

6.1 Evaluation Criteria

Criteria are used to judge and compare the different alternatives proposed in section 5. I have based my criteria from literature studies and other policy papers on similar topics. The criteria are selected for this specific study. The following table outlines the criteria definition and its accompanying measurements.

Table 7 Criteria and Measures

Criterion	Definition	Measures
Valuation of EG&S	The pricing of ecological goods and services of the alternative should reflect on the cost of conservation practices by landowners. If payments for conservation are lower than the returns on other land usage, landowners will have no incentive to participate in the program.	<ul style="list-style-type: none"> • Participation level of the program can indicate perception of prices. • The type of pricing mechanism indicates the ability of the policy to react to the supply and demand of land.
Project Cost	The alternative looks at the overall cost of the program and takes into consideration the short and long term. Short term includes infrastructure and set up costs. Long-term costs include cost of monitoring the program, administration cost, and funding of EGS.	<ul style="list-style-type: none"> • Amount of infrastructure needed. • Cost of EG&S payments and who pays for them. • Cost of administration and monitoring.
Manageability	The alternative should be manageable for an administrator. It should achieve its goals without taking too much time from the administrators' other jobs. The design of the program should be comprehensible to administrators.	<ul style="list-style-type: none"> • Ability to succeed with limited financial and human resources. • Number of new tasks required for administrators. • Can program take advantage of existing resources or requires new training?
Land Use Efficiency	The alternative should increase land use options and help landowners make better decisions based on the margins.	<ul style="list-style-type: none"> • Number and level of restrictions from the alternative on land use. • Number of land use options increased to landowners. • Participation level.
Stakeholder Acceptability	The alternative must receive support from both the public and the politicians. Without support, the alternative proposed will not be implemented.	<ul style="list-style-type: none"> • Participation level of the program by landowners. • Number of applications to have property removed from ALR can measure development pressure. • Cost and time-spent on rent-seeking activities by all stakeholders. • Cost of development.

6.1.1 Criteria Explanation and Justification

The criteria selected are drawn from similar studies by academics and government agencies. The government of British Columbia operates under a budget constraint and political reality. A policy to address the lack of EG&S markets in British Columbia should:

- Address conflict of interests among different stakeholders. Contain mechanisms to address inefficient land use decisions made by landowners as a result of lack of market for EG&S, current farmland tax policies, and agricultural production subsidies.
- Acknowledge limited capital and human resources. Promote sustainable practices and improve on the probability of the policy's survival in the long run.

Pilots often have a short lifespan and are designed for the purpose of evaluation. The alternative should nonetheless be forward thinking and have long-term goals. Otherwise, the resources and time spent on the pilot would be wasted.

6.1.2 Omitted Criteria

One notable criterion I excluded in section 6.1 is vulnerability of land preserved. Vulnerability of land refers to the probability that the land will be converted for development purposes. The primary reason for this omission is that vulnerability is more dependent on the site selected rather than the mechanisms themselves. This does not validate policy makers from ignoring vulnerability of the lands as an important issue that must be dealt with. Berck and Newburn et al. et al. (2005) have devised a method where cost-effectiveness and vulnerability of land are balanced in the selection of site. Generally, land that is more vulnerable to development conversion is located closer to urban fringes and therefore is costlier to preserve. On the other hand, land that is less expensive to preserve face less development pressure and might not need protection. According to the authors, site selection should balance between cost of purchasing the land and the land's vulnerability. They propose the use of an expected-benefit-cost strategy that can better target site selection, and will minimize the expected loss in benefits per unit cost and efficiently allocate resources to conservation.

6.1.3 Measures Explanation and Justification

Valuation of EG&S: Measures for this criterion indicate whether the policy contains a valuation mechanism of EG&S that reflects on the cost of enhancing conservation. Setting the price correctly is important to acquire a desirable participation level from landowners. If payments are perceived to be lower than the total cost of conservation, then landowners will choose other land use options to maximize private returns of the land.

Project Costs: This measure is separated into two parts 1) short-term and 2) long-term. Short-term costs involve the up-front cost of setting up the program and the infrastructure that the government has to invest in. High up-front costs are more visible and more likely to meet political and public resistance. Long-term costs concern with maintenance, operation, and costs. High long-term costs lower the probability of the program's survival. This is critical because governments have a limited budget and case studies have shown policies that highly depend on long-term government funding are more likely to be discontinued. If a policy can shift funding from pure government funding to a cost sharing plan or market mechanism, then the program has a higher probability of survival.

Manageability: This measure reflects on the complexity of the program and the ability of administrators and monitors to manage the program while also dealing with other work. If a policy is too complex, it might confuse administrators and frustrate their work. It will also take away time from their other responsibilities.

Land Use Efficiency: Measures for this criterion reflect on the policy's ability to increase the number of land use options to landowners and improve efficient land use decisions. If a policy contains too many restrictions, landowners will not be able to make proper decisions based on the margin. By providing as many options as possible, the final land use decision will be the most efficient one.

Stakeholders Acceptability: This criterion reflects on the views of the major stakeholders in regards to the alternatives offered. Each program will have a different impact on the stakeholders who have competing interests. It is critical to gather the support from the major stakeholders otherwise the alternative will not be supported by politicians and the government.

6.2 Evaluation

In this section, I analyze each policy option base on the criteria set in section 6.1. The reader should note that these evaluations are not tested empirically, but are rather estimates on how well the potential policies can address the issue of EG&S valuation in British Columbia. Furthermore, it is important to note that potential policies need not to be mutually exclusive. The implementation of one policy should not discourage policy makers from exploring the use of another. These policies are used simultaneously in other jurisdictions to enhance the results. For example, while Montgomery County established a TDR, the state of Maryland employs the use of a PDR with some functions similar to ALUS. They work simultaneously to serve the same purpose. The analysis is through the lens of the provincial government and therefore their interests take priority. The following table summarizes the evaluation of the policy options. A rating of “high” is more desirable under all criterions.

Table 8 Evaluation of Policy Options

Criterion	Status Quo	Alternative #1: Transfer Development Rights	Alternative #2: Alternative Land Use Services	Alternative #3: Property Tax Credit
Valuation of EG&S	Does not price EG&S Low	Market mechanism High	Prices are pre-determined. Medium	Prices are pre-determined Medium
Project Cost	Short-term: \$0 extra added cost. High	Short-term: Large set up costs Low	Short-term: Low set-up costs and will be use existing resources. Medium	Short-term: Low set-up costs and will be use existing resources. Medium
	Long-term: Infrastructure costs to replace EG&S. Low	Long-term: Funding shifted to developers and consumers. High	Long-term: Continuous funding of the EG&S payments. Medium	Long-term: Continuous funding of the EG&S payments. Medium
Manageability	No extra resources needed. High	Complex in monitoring. Low	Easy to integrate with existing resources. High	Easy to integrate with existing resources. High
Land Use Efficiency	Ag-use only with other uses controlled by ALC. Low	Development dictated by sending and receiving areas. Medium	Land use decision-making includes EG&S. High	Land use decision-making includes EG&S. High
Stakeholders Acceptability	Landowners: Loss of property development rights. Medium	Landowners: Compensation through TDR High	Landowners: Compensated through ALUS payments. High	Landowners: Compensated through tax credits. High
	Urban areas: Do not pay for benefits. High	Urban areas: Higher density development. Medium	Urban areas: Pay for benefits through taxes. High	Urban areas: Pay for benefits through taxes. High
	Developers: Lost ability to develop land in the ALR. Medium	Developers: Dense development in receiving areas. High	Developers: Does not change ability to develop in ALR land. N/A	Developers: Does not change ability to develop in ALR land. N/A

6.2.1 Evaluation of Retaining Status Quo

Valuation of EG&S: In terms of valuation of EG&S, the status quo is ranked low, as it lacks a mechanism that reflects the value of farmlands beyond its agricultural production value. The current system allows the ALC to addition and removal of farmland from the ALR. Overall, there has been a net gain in lands retained from the ALR. However, as the Suzuki Foundation notes (Campbell, 2005), the majority of land added occurred in less valuable land in Northern BC, while Lower Mainland; Vancouver Island; and Okanagan have seen a net loss in land protected. Without an incentive base policy, development will continue to follow the existing pattern as population growth in the Fraser Valley occurs.

Short-term Project Cost: There is no anticipated extra short-term cost from continuing current policies and therefore status quo is ranked high in this criterion. The necessary infrastructures are already in place for the program to function and will require no further direct monetary costs.

Long-term Project Cost: The status quo is given a ranking of low in this criterion. While this alternative does not incur direct monetary cost from government funding, there will be indirect cost resulting from loss and degradation of the environment. The environment produces goods and services that are consumed and benefited by the public. These goods and services are essential to the public and must be consumed with or without the aid of the environment. Substituting natural production of these goods and services will require infrastructure costs. If degraded or destroyed, the true cost to society will be the replacement cost of the goods and services provided by the environment and as section 2.1 illustrates, the economic impact can be quite significant. On the surface, the ALR has added more land to the program than it has removed for conversion. However most of the additions occurred in northern regions of the province where development pressure is low, while removal occurred in the South which

contains some of Canada's best agricultural lands, sensitive wetlands, forests, and other natural areas.

Manageability: Continuing the existing policy will bring no additional difficulty to the administrative staff. There will be no increased responsibility required to maintain the current system. The status quo ranks high because it has been in operation for the last 30 years and stakeholders have gotten used to working within the ALR.

Land Use Efficiency: The status quo ranks low in this criterion because the ALR restricts land usage only to agricultural production. This eliminates other land usages that might have otherwise been more efficient to landowners and society. Furthermore, by not providing a market for the conservation of ecological goods and services, this alternative does not increase the number of options for landowners. Current property tax system and agriculture production policies distort landowners' decisions and expand farming onto marginal cropland. Land that might have been in its natural state is farmed to take advantage of benefits provided by current policies.

Stakeholder Acceptability: The ranking of this criterion varies among the different stakeholders in farmland preservation programs. Acceptability is generally high with rural and urban residents living on fringe areas. Residents in suburban or urban areas near the ALR benefit from the positive externalities derived from farmlands, but they do not have to pay for them (Halich, 1999). As Halich points out; the majority who support preservation programs are environmentalists and suburbanites in farmland communities. They are highly vocal regarding the protection of the environment and their "way of life". Beyond the agricultural production farmlands provide, many residents on the fringe also value the scenic views, open space, and general rural lifestyle that farmlands generate (Pfeffer and Lapping, 1994). These values were the primary reasons they moved into these areas. The status quo protects the values they seek in farmland protection while minimizing their share of the burden.

Despite the Agricultural Land Commission's best efforts, landowners, developers, and municipal governments continuously apply for ALR land removals. This partially reflects their attitudes towards the ALR and the policies imposed upon them that restrict their future options. Between 1975-2006, in the City of Kelowna approximately 3,670 hectares of land have applied for removal from the ALR. This represents 37% of all original ALR land in Kelowna (Ministry of Agriculture and Lands & Agricultural Land Commission. 2008). Between 2002-2005, the ALC approved 70.5 percent of the hectares proposed for exclusion. Among the jurisdictions for exclusion were Abbotsford with 178.5 ha, Kootenay with 267 ha, and Courtenay with 140 ha (Green, Ryan. 2006). In the case of the Kootenay's removal, the ALC states on its final justification the application was approved partially because the landowners were less willing to make the land available for grazing than for development. This statement was applied to justify the developer's claim that the land was no longer prime for agricultural production. The purpose of this example is not an attempt to criticize or judge the performance of the ALC. Rather, it illustrates that the current rent-seeking activities undertaken by the multiple types of stakeholders echo their unwillingness to fully accept the status quo. Halich (1999) found that most farmers do not oppose preservation of their land, but are against the provision of benefits to the entire community while absorbing all of the expenses.

6.2.2 Evaluation of Transfer Development Rights

Valuation of EG&S: TDR ranks high in this criterion because it is by nature a market-based program with exchanges of development rights occurring between private landowners and developers. There are many factors influencing the price and outcome of TDR program such as TDR allocation, ratio of sending to receiving areas, and capacity of receiving areas. Yet, the primary factor for TDR remains the fundamental housing and land markets in the area (Walls & McConnell, 2007). The price of a TDR reflects on landowners' willingness to accept payment for the loss of development rights. The use of TDR compensates landowners for loss of

development rights and decreases their incentive to engage in rent-seeking activities. Increased density zoning in receiving areas also help alleviate rent-seeking behaviour on the part of developers, as they can generate higher profits through denser development by purchasing TDR credits.

Short-term Project Cost: The majority of the project cost incurs at the onset of the program and therefore the TDR ranks low for this criterion. Up-front costs include setting up the market for TDR credits, infrastructure to monitor and maintain program, and large promotion campaign to inform stakeholders of the program (Tavares, 2003). This will require relatively large additional human and capital resources to set up. A sophisticated and highly skilled planning agency is required to forecast development demand and define the density permitted with and without the use of a TDR (Barrows and Prenguber, 1975). Furthermore, receiving areas will need to accommodate increased and denser population as a result of re-zoning. The community will face increased cost in the upgrade and construction of new public goods and services. Potentially this cost can be higher than developing in farmlands, since development in denser areas is more difficult in nature.

Long-term Project Cost: The program will require constant monitoring and record keeping by the government. Government agencies such as Ministry of Agriculture and Lands and BC Assessment already conduct similar activities for other purposes. Both of those agencies currently surveys and monitors activities in farmlands. Since private brokerage firms are used, the costs of operating the program are be absorbed by buyers and sellers. With much of the long-term cost flowing though existing agencies and government resources, this criterion ranks high.

The advantage of a TDR program is that it places a small burden of the cost to the public. Once in place, the government's only responsible it the monitoring and administering of the program. As mentioned in the Long-term Project Cost, this can be achieved at a relatively low cost (Tavares, 2003). Because of the market-type mechanism, the government is not responsible

for the funding of easement purchase, but rather developers who pay to have the right to denser development in receiving areas.

Manageability: Due to its complexity, TDR ranks medium in this criterion. Firstly, the monitoring and administering of this program requires highly skilled staff across all government agencies involved. Secondly, for the program to be functional, the ratio of TDR credits to receiving ratio must always be balanced (Barrows and Prenguber, 1975). This is by no means an easy task as administrators face many factors leading to the diminishing capacity of receiving areas. Administrators also have to ensure that the prices of TDRs are attractive enough to encourage a high level of participation. Maintaining desirable prices can be challenging since they follow the fundamentals of the housing market, and there is little administrators can do to influence this sector (Walls & McConnell, 2007).

Land Use Efficiency: This alternative is given a ranking of medium with respect to land use efficiency. Rather than dictating specific land usage, TDR restricts land density development allowable in sending areas. The goal is to discourage residential, commercial, and industrial development in this area. The primary land usage target is farming, with conservation of open spaces briefly mentioned. By increasing density development in receiving areas, this policy acknowledges population growth by providing alternative development method.

Stakeholder Acceptability: The ranking of this criterion varies among the different groups of stakeholders. In three separate reports conducted by Athens-Clarke County (Dorfman et al. 2005), Snohomish County (Snohomish Planning Department & Services Planning Division. 2002) and Central Puget Sound (Washington State Department of Community, Trade and Economic Development. 2008), consultants found that both developers and residents in potential sending areas expressed interests in a TDR program. However, all three reports found that developers have a lower willingness to pay for a TDR credit than landowners' willingness to accept. Using market data and interviews, the Snohomish report (2002) estimated that farmland

owners value a TDR at a price of over \$25,000 while developers are willing to pay \$10,000-\$12,500 for the ability to build an extra unit in a receiving site. Despite the difference in valuation of the TDR, proper balancing of credits to receiving land ratio can help satisfy both developers and landowners.

The biggest challenge facing this alternative comes from current residents in the proposed receiving area (Tavares2003). Residents in receiving areas see denser development as a lowering of their quality of life. Through conversations with cities and consultants of TDR developers across the US, the Central Puget Sound report (2008) found that clear communication of benefits from density development could generate higher acceptability level from residents of receiving areas. Arlington, Washington was a prime example where policy makers properly informed their citizens of the amenities provided by preservation of farmland surrounding the city. These benefits include amenities generated by the protect land to increase in infrastructure investment in receiving areas.

6.2.3 Evaluation of Alternative Land Use Services

Valuation of EG&S: In terms of valuation of EG&S, this alternative is given a ranking of medium. Prices for ALUS are set prior to the start of the pilot and do not change according market conditions. The values for ecological services are determined through a series of discussion with different wildlife and conservation agencies, landowners regarding the value of their crop output, and agricultural staff. The prices offered by ALUS relate to easement payments given by Manitoba Habitat Heritage Corporation, land productivity data provided by Manitoba Crop Insurance Corporation, cost estimates and net gains established by agri-business, local land rental rates, and local property tax rates (Keystone Agricultural Producers et al. 2004).

Short-term Project Cost: Alternative Land Use Services is given a rank of medium for short-term project cost. The program receives contribution from several government agencies

and conservation groups. Along with their technical expertise, these agencies also share their resources (human and capital), access to farmers, and database. This alternative will incur very little set-up cost since many agencies and interest groups already have the resources needed for operation.

Long-term Project Cost: This alternative is given a ranking of medium in regards to long-term project cost. Of the \$1.6-\$1.8 mil budget given to the RM of Blanshard over 3 years, \$400,000 per year was spent paying landowners for easement and \$65,000 per year was spent on monitoring and evaluating of the program. This budget was given to a municipality with a population size of 686 people (2001 figures) and 113 farms. In a jurisdiction with higher population and higher demand for land, funding for this alternative will be significantly greater than the case of RM of Blanshard. Since the pricing of amenities include local rental rates, land productivity, and local property taxes, ALUS payments in British Columbia and especially Fraser Valley will have to be much higher to attract landowners to participate in the program. The existence of the ALR can potentially provide a downward pressure on price since its zoning regulation has already taken development rights away from landowners and ALUS might be the only compensation available.

This alternative requires contributions from municipal and federal/provincial governments. Since agricultural production is expected to decrease as a result of ALUS, there will be less demand for crop insurance payments. The federal/provincial government can shift some of this gain to partially finance this program.

Manageability: This alternative is ranked high with respect to manageability. Government agencies and conservation groups currently perform most of the services needed to manage ALUS. The program will use these resources to reach landowners and with the help of the municipal government can easily promote the program. BC Assessment currently surveys

properties and monitor their activities for tax purposes. Monitoring of the program can be extended to BC Assessment without much difficulty.

Land Use Efficiency: This alternative ranks high with respect to land use efficiency. Direct payments for conservation practices create a price for ecological goods and services. Landowners are not restricted on their land usage and will make their decisions based on maximization of private returns. A market for ecological goods and services expands land usage options. Landowners can make efficient decisions between agriculture production or conservation of EG&S.

Stakeholder Acceptability: This criterion ranks high among landowners and suburban/urbanites. The RM of Blanshard shows that there is significant support for ALUS from both landowners and the municipality in general. Over 70% of eligible land in Blanshard voluntarily enrolled in the program, protecting more than 20,000 acres of land. Part of this success can be attributed to the flexibility of the payment scheme, which allows specified farming practices by accepting a lower payment rate. The residents of Blanshard also support the program because the municipality is not entirely responsible for the cost of providing public goods and services to the rest of Canada. Funding of the program is shared among the municipal government, the APF, and conservation groups.

6.2.4 Evaluation of Property Tax Credit

Valuation of EG&S: This alternative is given a ranking of medium in terms of valuation of EG&S. Prices offered by the property tax credit are set prior to the start of the pilot. Payments to landowners are subjected to a budget constraint. Therefore it is difficult for prices to fluctuate to meet market conditions. Also, the program must carefully forecast participation rate. If participation level is higher than predicted, funding will not meet the demand for payments.

Short-term Project Cost: Property Tax Credit is ranked medium in regards to short-term project cost. The alternative requires very little new infrastructure, as it is able to use existing resources provided by provincial and municipal governments. Operation, administration, and monitoring activities can be spread out to existing agencies or government departments. There is no need to create new departments or agencies, but instead expand upon current resources. Infrastructure and set-up costs are thus minimal.

Long-term Project Cost: This alternative ranks medium in terms of long-term project cost. The program requires operation, administration, and monitoring activities. However much of it can be done at a minimal cost. The major issue surrounding long-term project cost is the need to continuously fund the payments to landowners. The program lasts as long as the different levels of government agree to fund the program.

Property tax credit requires contributions from municipal and federal/provincial governments. Like ALUS, property tax credit will discourage agricultural production into marginal croplands. This in turn will help alleviate government subsidization of agricultural production program such as crop insurance. It is possible then to shift funding from such programs towards payments for property tax credits.

Manageability: Property tax credit is ranked high in terms of manageability. The province and its municipalities currently provide a differential property tax system for farmlands with agricultural production. Thus, the staffs dealing with the property taxes system in agencies across the municipal and provincial government are already well acquainted with farmlands and their boundaries. The Ministry of Agriculture and Lands and BC Assessment have extensive GIS data on farmlands and their characteristics. They continuously survey and monitor farming activities of landowners and their land usage. Extending the property tax system to provide credits for conservation of specified land will simply increase bureaucratic and paperwork. It will

not create major confusion among government agencies and prevent them from performing current tasks.

Land Use Efficiency: Property tax credit is ranked high in regards to equity. Property tax credits eliminate the distortion against ecological goods and services from current property tax systems. Currently, BC employs a differential property tax system that targets the different land usage and the services they require. Land categorized as farmlands are subjected to a lower property tax burden and many believe that it is a sufficient compensation. Farm properties face both residential and farmland assessment. Where agricultural production occurs, the land is taxed according to the farmland category. The rest of the land is taxed as residential status like any other residential homes. Furthermore the current system only separates land usage between agriculture and residential. Other usage such as woodlots and forests are subjected to high residential tax rates while they require very little public utility services. A property tax credit can expand the use of the property tax system to help landowners make more efficient land use decisions based on the margins.

Stakeholder Acceptability: This alternative is given a high ranking on acceptability among landowners. In a survey conducted by Van De Velde (2000) the majority of the participants responded positively on the Environmental Tax Credit program in Manitoba. They also thought that the monetary compensation was not adequate, but the property tax system was an effective mechanism for compensating landowners for carrying out conservation practices. The survey also found that the main reason some landowners did not participate in the program is because of lack of awareness. The results of this survey mirror the sentiments of landowners in other jurisdictions that have or had a property tax credit system. In general, landowners have positive attitudes towards conservation practices and compensation through the property tax system. However, past programs lacked funding and payments did not sufficiently meet the cost of providing conservation born by landowners.

6.3 Tradeoffs and Analysis

From the analysis of case studies and policy evaluation, the alternatives offered can be separated into two categories of policy target: threats from land conversion and threats from agricultural production. The table below categorizes the alternatives according to their policy target and lists their tradeoffs:

Table 9 Policy Alternatives Tradeoffs

Policy Target	Policy Alternatives	Tradeoffs
Conversion of land to residential, commercial, and industrial development	Transfer of Development Rights	Benefits: <ul style="list-style-type: none"> • Provides permanent easement. • Use of market price mechanism. • Does not rely on government purchasing development rights.
		Disadvantages: <ul style="list-style-type: none"> • Requires extensive research and training before establishing. • Highly complex and difficult to manage. • Must continuously balance TDR credit-receiving area capacity to ensure participation.
Threat from agricultural production	Alternative Land Use Services and Property Tax Credit	Benefits: <ul style="list-style-type: none"> • Low set up costs and easy to manage. • Can be quickly established.
		Disadvantages: <ul style="list-style-type: none"> • Requires continuous funding of conservation payments. • Pricing can be arbitrary and can cause low participation level.

Transfer of Development Rights: The use of a TDR might attract policy makers because of its low long-term costs. The program does not rely on government funding to purchase development rights from landowners. Land is placed under permanent easement when

it is designated as a sending area and landowners regain loss from potential development through the sale of development rights to developers. Because of the voluntary nature of the exchange, the price under which landowners are willing to sell their development rights reflects on the loss of potential development on their land.

To encourage participation of the program, administrators must continuously balance the number of TDR credits with a sufficient size of receiving area to maintain an attractive TDR price level. This balancing act can be quite complex and creates uncertainty to both sellers and buyers of TDRs. Receiving areas can experience diminishing capacity when developers choose to develop in the area using the standard density base rather than the higher density permitted through the purchase of TDRs. Not only is administering the program complex and increases the responsibilities of government agencies, but it requires major upfront cost to establish the appropriate monitoring mechanisms. This includes a sophisticated database to record and keep track of deeds and TDR credits transferred. Furthermore, the program requires massive promotional campaigns, training of administrators, and research analysis on feasibility.

ALUS and Property Tax Credit: Rather than targeting permanent land easement, both ALUS and Property Tax Credit concern agricultural production on marginal cropland. They do not permanently take away development rights and allow landowners to opt out of the program at the end of their contracted terms. The programs also do not require massive start up costs. Current agencies such as BC Assessment, Ministry of Agriculture and Lands, and conservation groups already provide the necessary tools to reach landowners and monitor agricultural activities on farmlands. However, they both require long-term financial commitment from the government to support the funding of annual payments to landowners for conservation practices. Despite similar characteristics of the two programs, Van De Velde's study (2000) found that landowners on average prefer direct payments for conservation practices as opposed to property tax credits.

6.4 Applicability to British Columbia

6.4.1 Transfer of Development Rights

The complexity involved in establishing a transfer of development rights program makes it difficult to adapt provincially without the necessary political commitment. Applying a TDR program on such large scale requires the allocation of sending and receiving areas to municipalities across the province. Not all municipalities have the capacity to hold both sending and receiving areas. Sending and receiving areas might not always be located within the same municipality. This division creates uncertainty among municipalities and the level of communication, cooperation, and commitment necessary is too high for support of a provincial TDR program.

If policy maker wish to implement a TDR program in British Columbia, a feasibility study is required. A feasibility study includes the following:

- **Impacts on Ecological Goods and Services:** Current studies generally focus on the market mechanism of TDR and its ability to preserve land. Little is known regarding its impact on ecological goods and services. Further studies of TDR on environmental impacts can help design a policy that better targets EG&S.
- **Value of TDR to Buyers and Sellers:** Having an estimate of the value of a TDR to buyers and sellers is valuable information to designating sending and receiving areas. The price level of a TDR affects participation of the program and administrators can correct the gap between willingness to sell and willingness to pay through balancing the ratio of TDR credits to receiving areas.
- **Identify Sending and Receiving Areas:** The study must identify potential land to designate as sending and receiving areas. The ratio of sending to receiving areas sets the price of a TDR and determines the supply and demand of the credits. The TDR market should also be large enough that developers cannot simply shift development to another region nearby.

- **Development Capacity of Receiving Areas:** A receiving area faces diminishing development capacity over time. It is important to determine the diminishing capacity in order to properly allocate the number of receiving areas.
- **Transaction Mechanism:** The choice of transaction mechanism can have a major impact on the results of the program. Some programs have a low transaction rate because the mechanism did not meet the needs of both buyers and sellers. A mechanism must be practical to administer, cost-effective, and reflect on local context.
- **Zoning Issues:** The legitimacy of the TDR program will highly depend on the zoning ability of both sending and receiving areas. If land outside of the ALR is identified as a potential sending area, then down zoning the land is mandatory to encourage participation. For receiving areas, it is imperative that TDR is one of the few if not the only option developers have to denser development. If developers have cheaper alternatives to develop at a denser rate, TDRs would be ineffective.
- **Current Economic Condition:** The current economic condition has a major impact on the housing market and short-term growth of Lower Fraser Valley. In its 2009 housing market outlook, the Canadian Mortgage and Housing Corporation demand for homes has been weakening despite the growing population. Housing construction in BC is expected to total 22,800 units in 2009 and this figure is to decline by 9 percent in 2010. Immediate implementation will increase the cost of construction to developers in the face of a slowing housing market. The feasibility study should further investigate in the housing market of BC in order to better time the program with future expansion.

6.4.2 Property Tax Credit

As shown in section 6.3, the characteristics and effects of a property tax credit is highly similar to those of direct cash payment. In the survey conducted by Van De Velde (2000), landowners stated their preference of cash payment over tax returns as a method of paying for conservation practices. Despite this preference, the government of British Columbia can seriously consider modifying property tax assessment on land with desirable ecological goods and services. Assessing land with EG&S at the same rate as farmland eliminates the bias towards agricultural production. The decision to conserve or farm marginal land is then based on profits from agricultural production rather than the gains of tax benefits. This modification simply

erases the distortion created by farmland tax assessment but does not price ecological goods and services. Without pricing and a market, EG&S continues to be ignored as an input in land use decisions.

6.4.3 Alternative Land Use Services

Alternative Land Use Services can be a useful complementary policy to the Agricultural Land Reserve. It is an incentive based policy that targets the threat of agricultural production on marginal cropland. The program provides direct payment for the conservation of specified ecological goods and services. While not all farming activities produce harmful effects on natural areas, current agricultural policies distort private returns on production. ALUS can reduce this distortion by creating a payment for EG&S. This also expands landowners' list of options regarding potential land use decisions. By providing another alternative, landowners are able to make better decisions based on the margins.

Project Description: Landowners can apply for the ALUS program through the Ministry of Agriculture and Lands where a project coordinator will determine the eligible acres and design the agreement with landowners. The Ministry of Agriculture and Lands provides financial protection against crop losses through its division of Production Insurance. Production Insurance already has extensive reach with farmers and experience with payment mechanisms. The pilot phase of the project should last 3 years. Since evaluation is one of the key components of the pilot, the duration of the program must be long enough to see changes. Participating landowners must follow the terms of their contract for the full duration of the pilot. Land cannot be removed from the program, but can be added after the first year of the program. The evaluation process requires that participants be locked into the program for the full duration of the pilot.

Project Location: The location selected for this pilot is the eastern coastal lowland of Vancouver Island. It comprises approximately 90% of Vancouver Island's population and also

the majority of the farmlands (Ministry of Environment, 1997). Eastern coastal lowland of Vancouver Island is made of Nanaimo, Comox, and Cowichan. This area is selected because there is sophisticated data on its ecosystem from the Sensitive Ecosystem Inventory (SEI) project by the Ministry of Environment. The SEI was conducted on eastern Vancouver Island because of its diverse ecosystem, importance to the island's population, and threat from development pressure. The project identified a set of ecological goods and services and created a database through the use of Geographic Information Systems (GIS).

Ecological Goods and Services & Pricing: The ALUS program provides payment to a set of ecological goods and services identified by the SEI project. The SEI categorizes the following ecosystems:

- Coastal bluff
- Sparsely vegetated
- Terrestrial herbaceous
- Wetland
- Woodland
- Riparian
- Older Forests

Coastal bluff, sparsely vegetated, and terrestrial herbaceous are ecosystems termed specifically for the region and the SEI project. These three categories are highly sensitive, rare, and easily disturbed by human activities. The result of the study shows that 32,510 hectares remain for the ecosystems identified. This is approximately 8% of the land area studied. The rest of the landscapes have been modified for urban and rural development.

The program sets the price for payments for the conservation of each ecosystem. To minimize the arbitrariness of the process and to better reflect the price with the cost of conservation, program administrators can seek consultation with a wide range of stakeholders such as: BC Assessment, conservation groups, agricultural experts, and landowners. The process

is not perfect, but by being as transparent as possible, administrators can improve the pricing process. A flexible payment schedule is also recommended to administrators. The program should allow targeted and least harmful farming methods on the land in order to maximize participation level. Not all farming activities degrade and destroy ecosystems. However, prohibiting all farming activities as a condition might draw a lower than desired level of participation from landowners. Allowing specified farming practices at a lower payment level increases landowners' options of land use.

Monitoring and Evaluation: As a pilot project, the monitoring and evaluation of the program's social, economic, and environmental impacts are highly important for the potential expansion of the program. This process can be divided between the Ministry of Environment and the Ministry of Agriculture and Lands. If policy makers wish to expand ALUS in the future, they need to understand the program rationale, design and delivery, and its impacts. The Ministry of Agriculture and Lands, who already have extensive networks with farmers and landowners, can survey social and economical impacts of the program. The evaluation process needs to identify participants and non-participants' rationale, socio-economical background, and their behaviour. This helps administrators to lower barriers to access and attract a higher participation level in future programs. Evaluation can also help understand and improve the design and delivery mechanisms of the program. The Ministry of Environment can use its sophisticated database and experience to monitor the environmental impacts of the program. The program can also draw expertise from universities and conservation groups.

7: Conclusion

Through case studies and literature reviews, this study demonstrates the tradeoffs between the policies analyzed to bridge the gap between private and social benefits in the valuation of agricultural lands. Literature reviews have shown that farmland should be valued beyond market prices and should include the amenities and ecological goods and services it provides. The case studies and literature reviews identify policies undertaken in different jurisdiction tackling a similar problem that British Columbia is currently facing. These policies are highly different than the ones undertaken in British Columbia and generate interesting potential additional tools for the province to consider.

Evaluating cases in multiple jurisdictions, this study has identified three policy alternatives British Columbia can consider alongside the status quo. The alternatives presented were the following: (i) retaining the status quo, (ii) transfer of development rights, (iii) alternative land use services, and (iv) property tax credit. Aside from the status quo, the policy alternatives were chosen because of their ability to identify the ecological goods and services generated by farmland and incorporate them in the land value. Any alternative selected will be an addition to the status quo, as this study does not recommend on the elimination of the ALR.

The policy evaluation and tradeoffs analysis reveal that the transfer of development right alternative is the most effective at permanent land preservation. Once a farmland property is placed under the sending area, it can only receive compensation through the sale TDRs. In contrast to the status quo, a property cannot be removed from the sending area despite lobbying efforts. The TDR program addresses lack of payments to landowners for the restriction of land-use in the ALR. It also provides a permanent easement and prevents residential/commercial/industrial development pressure from approaching ALR land. This

alternative lowers rent-seeking activities since landowners are compensated for their loss of development rights and developers are given the option to increase profits through denser development in receiving areas. However, TDR does not address the harm farming activities have on marginal cropland. It is also highly complex and difficult to manage. Balancing TDR credits to receiving areas capacity ratio requires heavy human resources.

The alternatives offered are not mutually exclusive and they target different aspect of land conservation. ALUS and property tax credits are payments to farmers for the provision of conservation practices to targeted natural areas. The payment schedule is on an annual basis and landowners are contracted to a specific length of time. These two programs are easy to implement and in the case of Britain, quite successful. However, they require a large continuous sum of funding from the government.

There is a significant long-term cost as a result of inaction. Current wetlands, riparian areas, forests, and other natural areas provide goods and services to the public that will have to be substituted if they are degraded or destroyed. Replacement of the goods and services will require large municipal infrastructure costs and this option is not always possible given the limited ability of technology. The results of this study recommend the government of British Columbia to consider a pilot ALUS project on the eastern coastal lowland of Vancouver Island. An outline of the pilot is listed in section 6.4.3 describing the location of the study, the ecological goods and services targeted, and monitoring and evaluation process. ALUS can be a complementary tool to the existing ALR, which does not address the threat of agricultural production on EG&S. Because ALUS can take advantage of existing government resources, starting the pilot can be quick and low cost. This study also recommends reformation of the current property tax system to include non-cultivated land with ecological goods and services under the same assessment as farmlands. An equal treatment can deter distorted decision making on land use.

Appendices

Appendix A: Ecological Goods and Service

Table 10 List of Ecosystems and Economic Impacts

	Services Provided	Economic Impact from Loss of Services
Wetlands	<ul style="list-style-type: none"> • Provision of natural filters that improves water quality. • Recharge groundwater • Control Floods • Potential to remove and store greenhouse gases • Provide natural habitat for wildlife species 	<ul style="list-style-type: none"> • Increased water treatment costs • Irrigation water shortage • Increased insurance costs due to flooding • Decreased property value from lost of aesthetic beauty • Increase healthcare costs from illness • Decreased revenues from recreational activities
Grasslands	<ul style="list-style-type: none"> • Maintain soil stability and prevent soil erosion • Reduce sediments, nutrients, and pesticides in water systems • Remove and store greenhouse gases • Provides drinking water • Provides habitat for numerous plants and at risks animal species • Provides pest control services 	<ul style="list-style-type: none"> • Increased water treatment costs • Increased costs for agriculture production • Water shortages • Increase healthcare costs from illness • Decreased revenues from recreational activities • Decreased property value from lost of aesthetic beauty
Atmosphere	<ul style="list-style-type: none"> • Provides layer of insulation for the planet • Protection from UV rays • Provides high quality outdoor air • Necessary for proper ecosystem functioning 	<ul style="list-style-type: none"> • Increased water treatment costs • Increased costs for agriculture production • Decreased revenue from forestry • Increase healthcare costs from illness • Decreased revenues from recreational activities
Freshwater	<ul style="list-style-type: none"> • Supports ecosystem • Provides habitats for species of plants and animals 	<ul style="list-style-type: none"> • Irrigation water shortage • Increased costs for water • Increased costs of sewage and water treatment • Decreased swimming and fishing opportunities • Decreased property values • Decreased quality of drinking water and food • Increase healthcare costs from illness

<p>Riparian Areas</p>	<ul style="list-style-type: none"> • Filters and reduces surface water runoffs from surrounding uplands, thus trapping sediment and sediment-associated pollutants • Increases infiltration of water into soil and helps replenish groundwater • Build stream banks which reduces erosion • Provides habitats for species of plants and animals • Stores floodwater and slow streams flows during periods of flooding • Support wetlands, streams and lakes for fish 	<ul style="list-style-type: none"> • Increased water treatment costs • Increase healthcare costs from illness • Decreased revenues from recreational activities • Decreased property value from lost of aesthetic beauty • Increased insurance costs from flooding • Increased costs for dredging sediment from waterways • Decreased swimming and fishing opportunities
<p>Lakes and Rivers</p>	<ul style="list-style-type: none"> • Source of freshwater • Replenish groundwater supplies • Provides habitats for numerous species of plants and animals • Flood control • Important component of water cycle • Moderate local climate 	<ul style="list-style-type: none"> • Increase healthcare costs from illness • Increased water treatment costs • Irrigation water shortage • Increased costs for dredging sediment from waterways • Decreased property value from lost of aesthetic beauty • Decreased recreational opportunities
<p>Forests</p>	<ul style="list-style-type: none"> • Production of oxygen and reduction of greenhouse gases • Pump water back into the atmosphere through transpiration • Maintain soil stability and prevent soil erosion • Provide habitat for 2/3 of Canada's plants, animals, and micro-organism 	<ul style="list-style-type: none"> • Increase healthcare costs from illness • Increased water treatment costs • Decreased property value from lost of aesthetic beauty • Decreased recreational opportunities and revenues
<p>Soil</p>	<ul style="list-style-type: none"> • Reduction of greenhouse gases • Contributes to biodiversity • Moderates the effects of water • Stores and delivers nutrients to plants and crops • Decomposes dead organic matter and wastes 	<ul style="list-style-type: none"> • Increased costs of fertility in agriculture production • Decreased quality of drinking water and food • Increased water treatment costs • Increase healthcare costs from illness • Increased costs to manage watercourses and estuaries

Appendix B: Policy Evaluation

Table 11 Full Table of Policy Evaluation

Criterion	Status Quo	Alternative #1: Transfer Development Rights	Alternative #2: Alternative Land Use Services	Alternative #3: Property Tax Credit
Valuation of EG&S	Does not price EG&S Low	TDRs prices are determined by the market through the sales and purchases of the credits. Landowners sell TDR when price reflects the loss of land development. High	Prices are pre-determined and can only change on an annual basis. Prices do not fully reflect on market supply and demand. Despite consultation with stakeholders, prices are determined somewhat arbitrarily. Medium	Prices are pre-determined and can only change on an annual basis. Prices do not fully reflect on market supply and demand. Despite consultation with stakeholders, prices are determined somewhat arbitrarily. Medium
Project Cost	Short-term: \$0 extra added cost. High	Short-term: Large set up costs and education campaign to the public. Low	Short-term: Moderate promotion costs. Low set-up costs since operation and administration will be using existing resources. Medium	Short-term: Moderate promotion costs. Low set-up costs since operation and administration will be using existing resources. Medium
	Long-term: No extra funding required. However municipal governments must invest in infrastructure to that produce similar goods and services provided by the environment. Low	Long-term: Cost of monitoring the program is moderate. Much of the operating costs can be shifted to the private sector. Funding EG&S payments are born by buyers of TDR and new homes. High	Long-term: Continuous funding of the EG&S by the provincial and municipal government. Monitoring and administration costs are minimal since many government agencies already cover similar activities. Medium	Long-term: Continuous funding of the EG&S by the provincial and municipal government. Monitoring and administration costs are minimal since many government agencies already cover similar activities. Medium

<p>Manageability</p>	<p>No extra bureaucratic involvement added.</p> <p>High</p>	<p>Requires extensive monitoring activity on credit transactions, capacity of receiving areas, and balancing credits with receiving areas. Program is complex and will take time to get used to.</p> <p>Low</p>	<p>Current government agencies and conservation groups can undertake administration and monitoring tasks without difficulty. Data and GIS already gathered by government agencies.</p> <p>High</p>	<p>Easy to integrate with existing government resources and conservation agencies. BC Assessment already surveys the land and monitors landowners' usage. Ministry of Agriculture and Lands already acquire GIS data on farmlands.</p> <p>High</p>
<p>Land Use Efficiency</p>	<p>Restricts landowners to use their land for agriculture production purposes. Other usages are not taken into consideration.</p> <p>Low</p>	<p>Restricts dense development in sending areas, but receiving areas can increase density development.</p> <p>Medium</p>	<p>Provides a market for EG&S and allows landowners to choose most efficient land usage.</p> <p>High</p>	<p>Provides a market for EG&S and allows landowners to choose most efficient land usage.</p> <p>High</p>
<p>Stakeholders Acceptability</p>	<p>Landowners: Loss of property development rights and potential future income. Landowners have been accustomed to this system.</p> <p>Medium</p>	<p>Landowners: Compensation through the transfer of development rights. Depending on the price of TDRs, landowners can recover much of their development rights.</p> <p>High</p>	<p>Landowners: Will be compensated by direct payments for participating in program. Payments are minimal due to restricted financial constraints. Development rights are not extinguished and landowners can opt out at the end of the contract.</p> <p>High</p>	<p>Landowners: Will be compensated by tax credits for participating in program. Payments are minimal due to restricted financial constraints. Development rights are not extinguished and landowners can simply not re-apply.</p> <p>High</p>

	<p>Suburban and Urbanites: Enjoying benefits provided by ALR without having to compensate landowners.</p> <p>High</p>	<p>Suburban and Urbanites: Higher density development in receiving areas can negatively impact residents' standard of living and property prices. Increase in cost of homes due to TDR purchases by developers.</p> <p>Medium</p>	<p>Suburban and Urbanites: Finance compensation payments through taxes. However, cost will be relatively low.</p> <p>High</p>	<p>Suburban and Urbanites: Will face an increase in property taxes due to loss revenue by municipal government or loss in services. However, residents in suburbs and urban areas are receiving a higher share of services than taxes paid.</p> <p>High</p>
	<p>Developers: Lost ability to develop land in the ALR.</p> <p>Medium</p>	<p>Developers: Can increase profit by augmenting density development in receiving areas. However cost of development higher due to the cost of purchasing TDRs.</p> <p>High</p>	<p>Developers: Does not change ability to develop in ALR land.</p> <p>N/A</p>	<p>Developers: Does not change ability to develop in ALR land.</p> <p>N/A</p>

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