

**ECOLOGICAL FISCAL REFORM
AND
AGRICULTURAL LANDSCAPES**

**A REPORT TO THE
NRTEE Ecological Fiscal Reform Program (EFR)**

**Prepared by the
Agricultural Landscapes Working Group**

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SUMMARY REPORT – EFR AND AGRICULTURAL LANDSCAPES

EFR might be applied within agricultural landscapes to provide better incentives for ecologically sound land management and pollution control. The long-term outcome is to enhance the ecological integrity of agricultural landscapes—where healthy water, healthy soil, and biodiversity is maintained. This outcome requires cooperation of private landowners. The objective of this case study is to determine the feasibility of redirecting some of the governments' (federal, provincial and municipal) taxation and expenditure programs affecting farmers across Canada to meet conservation needs and accelerate/encourage pollution reduction from farmlands.

Incentives may be required, since private owners cannot be expected to pay the full cost of creating and maintaining social goods such as ecological services. However, farming practices also must also be carried out in a sustainable fashion, requiring private investments and changes in operating procedures that must be worked into the costs of production. Designing the right package of incentives is the challenge. Actual experience is quite varied, as demonstrated by cases in the USA, Europe, New Zealand, and in various farming regions of Canada. And the realities are complex. Political and administrative philosophies can dictate choices of instruments. There are many types of agricultural landscapes, many different aspirations on the part of farmers, and a wide variety of ecological needs. And, importantly, many options are available.

In this case study, three approaches for applying elements of EFR for conservation within agricultural regions were examined in detail. They illustrate complementary approaches, building on the notion that it is quite likely to be suites of instruments that ultimately will be applied for EFR. The first two examples, development of *Environmental Farm Plans* (EFP) and *Municipal Property Tax Credits* (MPTC) for conservation lands, draw upon existing initiatives started quite recently as regional pilot programs with potential for national application. The third case is an economic analysis that could be used for the design of a variety of *Conservation Cover Programs* (CCP). This example, for the first time in Canada, rigorously investigates the net social benefits of expanding the extent of conservation cover based on watershed level information.

The EFP case is an example of an *expenditure program designed for awareness raising and education* at the level of individual farmers and groups of producers, leading to behavioural change with respect to environmental health and protection at the farm level. The MPTC example is a *tax credit for on-farm conservation activities*. The CCP case could serve as the analytical basis for *designing support/subsidies for conservation and environmental inputs and conservation cover programs*. Conservation cover program examples include protection of riparian areas, wetland protection/restoration, and the transfer of cultivated lands with high ecological value to vegetative cover that is not used for agriculture (also called “set-asides”), as well as more generic initiatives for reducing annual cropping.

Environmental Farm Plans (EFP)

Starting in the early 1990's farm organizations and governments began devising new methods of helping farmers become more aware of their impact on the environment. The most comprehensively developed EFP programs are in Ontario and Quebec. Each model is quite distinctive, revolving around Environmental Farm Plan workbooks and peer review processes in Ontario, and agri-environmental advisory clubs that have been formed in Quebec. Currently there are seven different versions of EFPs in Canada, along with several new ones in the making. EFPs build on voluntary action and link education and action of value to health, safety and environmental concerns both on-farm and off-farm. Environmental farm planning helps farmers

determine environmental risks and liabilities as well as strengths and assets that can affect their operations and both on-farm and off-farm environmental conditions. From this analysis farmers can flag areas of concern and identify opportunities for improvement. Environmental farm planning also makes farmers more aware about regulations that may apply to their farm.

The Quebec and Ontario programs each use incentives quite differently. The private benefits of program content of both are delivered through participation, and a cash transfer or fee. In Ontario, there is a cash transfer of \$1500 *to participants*. The transfer is paid out to farmers after initiation of their farm plans, to help cover costs of implementation. Quebec's farm 'clubs' charge members a \$500 annual fee in exchange for information and individual assistance (25 hours) that has a market value of far more than \$500. The difference in cash incentives (a \$1500 payment versus a \$500 fee) may reflect the difference in the valuation of the private benefits provided by the program. Ontario producers face no regulatory requirement to produce an EFP or comply with specific environmental management requirements. As a result, the private benefits of the program accrue from the value of the information provided in reducing costs of production and in community relations. In Quebec, as noted, farmers receive technical assistance. This may particularly benefit cattle growers who face regulations for manure management.

A number of factors influence program uptake; the most important include the following: producer-driven *voluntary initiative*; *confidentiality* to ensure farmers feel that they will not be put to competitive disadvantage with other farmers or exposed them to government fines or other regulatory action; *incentives* sufficient to secure farmer interest; recognition of *due diligence* that might aid in future loan acquisitions; recognition that *profitability* may be enhanced through actual on-farm environmental improvements; recognition of potential for improved *market access/branding* through adoption of environmentally safe practices; *educational benefits* through access to information regarding new and innovative farm technologies and practices.

An EFP is a means of addressing environmental awareness-raising and capacity-building within the farm community. But it has potential to go beyond these important needs. Unfortunately, a key gap in these programs is the lack of systematic monitoring of environmental impacts, for example, is water quality actually improved? A University of Guelph farmer survey found risks to the health of the farm family, risks to soil health, and risks to water health as the main environmental issues addressed by farmers (in that order). The \$1500 incentive produced a very substantial private investment.

Environmental farm plans can be unique to each type of farm operation and the distinct geography of farms across Canada. There is considerable latitude in design. They can be tied to other incentive approaches such as awards and peer interaction. And, they may backstop other incentive-based or regulatory programs. Support seems to be strongest for voluntary programs that are driven by farmer organizations and provincial considerations. While the greatest interest has been within central and eastern provinces, there is potential for a national program that takes into account these points. In June 2001, Canada's agricultural ministers agreed to “work towards a comprehensive plan for accelerated environmental action, fully covering all Canadian farms.” This decision provides a significant opportunity for EFPs nationally.

Municipal Property Tax Credit (MPTC) For On-Farm Conservation Areas

A MPTC can encourage various conservation land uses. A variety of examples exist, especially in the USA. For this case study a pilot project in Manitoba is examined. The incentive effects of property taxes depend on whether mill rates vary by land use characteristics, on whether property

owners know how the rates vary, and any other specific features of the property tax system. If the assessed value assumes the land is being used for production and the tax rate is uniform across all types of land uses, there is a clear incentive to use the land for agricultural products (crops, livestock production). Any unused land, i.e., land set aside for conservation (assuming a strict conservation interpretation of no agricultural use), will generate no revenues for the farmer, but will incur the property tax. A profit-maximizing/cost-minimizing farmer will then only set aside land for conservation if development for agriculture generates net private losses.

If a rural municipality (RM) offers a *tax credit*, resulting in a reduction in property taxes for each acre/hectare of land set aside for conservation, the incentive is now much stronger to set aside land of low market value for conservation. The tax credit is a negative tax and as such provides a reward for the landowner for conservation. However, the incentive will be strongest for lands that have the lowest opportunity cost—those with the lowest value in production.

A three-year pilot study covering two rural municipalities in Manitoba provides a \$1 per acre municipal tax credit for landowners who adopt specified environmentally sustainable land-use practices. Financial funding for the project comes from Ducks Unlimited Canada, the Prairie Farm Rehabilitation Administration, and the Northwest Soil Management Association, and the two municipalities provide support in-kind. Participation is voluntary. Land is eligible for the tax credit if it is used for conservation-minded initiatives that include tame forage, native grassland, wetlands, riparian buffer zones (trees or grass within 100 metres of a waterway), and annual cropland with a minimum of 40 percent straw cover.

The size of the tax credit was based on two factors: \$1 per acre represented the average property tax paid in Manitoba for wetlands and bush, and it was felt that any smaller amount would not provide a strong enough incentive to get farmers to sign up for the program. The tax credit is clearly not sufficient to compensate owners for the total ecological services provided by their land, but it provides a small amount of compensation for allowing society to benefit from conservation. The sponsors of the program also emphasize its educational value—illustrating to farmers the need for conservation practices on their lands and that society does value them.

Landowners must apply to the program each spring, specifying the lands that they consider eligible. RM staff members help the landowners prepare their applications. Satellite imaging confirms land uses in the appropriate conservation category for each applicant. Ground inspection for a small percentage of each RM's area helps to ensure compliance. Tax credits to those in compliance are paid at the time taxes become due in the fall. In 2000 the program protected some 31% of the land base, including 6,538 acres of wetlands, 15,116 acres of land under conservation tillage, and 39,334 acres of tame forage, native prairie and riparian zones. The average tax credit pay-out was \$261, with individual farmers receiving between \$1 and \$1,628. An evaluation of the program via mail survey indicated that 86% of participants agreed the program was worthwhile and 88% agreed the property tax system was effective compensation. The total cost of the program in 1999 was \$75,787 of which approximately \$61,000 represented the tax credits, with the balance for modest administrative costs (satellite analysis, advertising and communications, labour, travel, processing, and evaluation of the program.)

If one wants to assess the 'value' of the program, the focus should be on the present value of the *social benefits and costs*—those incurred by society as a result of the program. *Social benefits* of using an MPTC are believed to include: *improvements in environmental quality* such as: preservation of soil quality/reduction in erosion, improvements in water quality for drinking water and recreation, reduced flooding, increase in and maintenance of wetlands, protecting air

quality (carbon sequestration), preservation of riparian ecosystems with associated benefits, biodiversity conservation, wildlife habitat enhancement for aquatic and terrestrial species, and energy conservation; and *reduced public expenditures on environmental infrastructure* such as less silt removal needed from waterways, lower water treatment costs, reduced flood control expenditures, lower erosion, culvert, and crossing repairs, and less drain clogging.

These benefits have not been quantified, but it is not unrealistic to assume that the savings in public expenditures could amount to at least \$1 per acre, i.e., the program 'pays for itself' in cost savings to the municipalities. Improvements in environmental quality may also, over time, lead to higher productivity on lands in production due to, for example, less erosion. This could raise land values, and in turn, generate more property tax revenue that can be allocated for public goods and services. The MPTC over time might even lead to a more diversified local economy through more recreational opportunities on conserved lands, more tourism, different crop mixes, and so on. The well being of residents may rise.

Social costs could include foregone revenues (and hence, goods and services produced) by the municipalities that participate in the MPTC program, incremental administrative costs of the program (above the 'normal' operation of property tax collection), and costs of assessing the program's effectiveness in meeting environmental targets.

The next issue is at what level of jurisdiction should the social benefits and costs of a MPTC program be measured—the municipality, province, or nation? Normally, one would focus on the jurisdiction doing the decision-making, in this case, the municipality. But this is problematic for the MPTC because the environmental benefits may extend far beyond the boundaries of the municipality. Thus some costs of the programs may be borne by governments or agencies outside of the jurisdiction, with a calculation should be done at three levels.

What contributes to a program's success? Some lessons learned from the Manitoba initiative are: (1) *support is required from a broad spectrum of affected parties*, including local government; (2) *a voluntary program*; (3) *tax credits that can reduce a landowner's property taxes below zero* are more appealing; (4) *annually review*, permitting reversible land use and return of cash to the farmer in each year of participation; (5) *a relatively small minimum acreage required* for participation; (6) *administrative simplicity*—programs with fewer and less complex eligibility requirements will be more successful; (7) *public awareness and political climate should be right*, with no sense that the program is an unwarranted subsidy, but simply a payment that recognizes the social benefits from conservation that occurs on private lands; (8) *a design that is not likely to initiate any international trade actions*; (9) *adapted to local conditions* and more flexible than “one-size-fits-all programs”; and (10) *a “stand alone” program* that does not require landowners to participate in other programs, but can be readily integrated with other conservation programs.

Based on a review of several MPTCs in North America, the challenges include: (1) *sustainable program funding* since the tax credit affects municipal revenues; (2) *low participation rates/lack of awareness of the program* arising from factors such as size of acreage covered, insufficient advertising/communication, eligibility requirements that are too costly and complex for the landowner to comply with, and program design not well targeted at clear environmental objectives; (3) *difficulty in measuring MPTC environmental benefits*; (4) *whether the MPTC is even necessary*—if landowners would have undertaken action without the incentive of a tax credit; (5) *setting the tax credit* at an appropriate rate—too low will fail to get participation, too high gives the landowner unnecessary rents; and (6) *integration with other programs: how to avoid double dipping*. If more than one program operates in a region simultaneously, the

challenge is to ensure that the landowner is not collecting two payments for exactly the same activities unless this is the goal (perhaps resulting from different funding sources).

In summary, the MPTC is an incentive-based policy that merits continuation and extension of pilot programs as one of a potential suite of EFRs designed to improve environmental quality. A MPTC creates a market-like value for conservation activities valued by society but not traded in traditional markets. The landowner faces the “price” (tax credit) per unit of land if specified conservation activities are undertaken and equates this price to the land's marginal returns in any other use. While typically a modest incentive, it gets across the idea of valuing non-market environmental benefits to landowners. Programs with clear eligibility requirements, low compliance costs, and flexibility in land allocated through small minimum acreage are more likely to succeed in having respectable participation rates. In turn, these are more likely to deliver environmental benefits. Key challenges are funding the tax credit and measuring the net benefits from the programs to ensure that they are successful in improving environmental quality.

Conservation Cover Program (CCP)

In the past year, Ducks Unlimited Canada has proposed a national conservation cover incentive program CCP. Targeted lands would have a number of conservation values, such as those exhibited in riparian zones or wetland areas. A CCP provides for the removal of these lands from agricultural use either permanently or for a period of years. Economic incentives to encourage this land conversion provide a policy instrument that facilitates a public investment into private land use decisions to ensure that the agricultural landscape provides a range of goods and services valued by society. These external environmental benefits may include a number of factors associated with improved water quality, including decreased treatment costs; lower dredging costs to remove sediment from water conveyance and storage infrastructure; and increased recreational opportunities including fishing and swimming. Other external benefits may include greater wildlife use, biodiversity, stewardship for species at risk, aesthetic values, increased carbon sequestration and decreased net greenhouse gas (GHG) emissions, and mitigation of flooding. External costs of the conservation cover program may include the extra costs associated with delivering land conversion incentives and compensation required for incremental crop depredation by wildlife.

It is assumed that if the landowner decides to convert a parcel of land to conservation cover, the private benefits, including the economic incentive provided by the institution responsible for delivering the program, are greater than the private costs associated with the conversion. Therefore, quantifying only the external benefits and costs associated with the land conversion will facilitate calculation of the net external benefits (or costs) of the program. The three river basins/watersheds selected for the study are: the Upper Assiniboine River Basin of Saskatchewan and Manitoba; the Grand River Watershed located near Guelph, Ontario; and the Mill River Watershed, in western P.E.I. These units were selected because they represent agricultural landscapes within different regions, and because reasonable data exist for each one.

While some data problems remain, there is a consistent pattern that demonstrates a very substantial net external benefit from a conservation cover program. In the case of the Grand River the best estimate was net external benefits of \$195/ ha/ year (range \$79 to \$342). The Upper Assiniboine River demonstrated net external benefits in the range of \$29 to \$106, with a best estimate of \$65/ha/year. Information on the Mill River falls in between (range \$69 to \$236, with a best estimate of \$142/ha/year). In the case of the Upper Assiniboine River it has been possible to determine optimal program impacts using a supply response based on known lease

rates. Table 1 shows both the calculated values for the external benefits and the calculated optimal program impacts for the Assiniboine River. Information on the other watersheds is provided in the main report.

The external benefits in this and the Grand River case both show a similar pattern. The largest external benefits arise from a combination of carbon sequestration and Greenhouse Gas Emission reduction. But the next largest benefit is saved government payments because land is taken out of agricultural production. In the Grand River case the figure is even higher (\$46.00 compared to \$12). Also in the Grand River, there are additional benefits such as phosphorus reduction (\$23.50), recreational fishing (\$26) and high non-consumptive wildlife use value. These all contribute to the higher net external benefit for a CCP in this river which flows through areas of relatively high human population density.

Table 1. Estimates of external benefits of a conservation cover program in the Upper Assiniboine River Basin in eastern Saskatchewan and western Manitoba.

External Benefits (costs) \$/ha/yr	High	Best Estimate	Low
Saved Government Payments	19.25	12.83	6.42
Saved Crop Insurance Premiums	5.27	3.51	1.76
Water Quality – Sediment	9.34	4.62	1.34
Water Based Recreation	1.37	0.91	0.46
Wind Erosion	4.01	2.67	1.34
Change in GHG emissions	14.07	9.38	4.69
Carbon sequestration	29.40	19.60	9.80
Wildlife – consumptive use	19.11	10.71	5.36
Wildlife – non-consumptive use	6.45	4.16	2.08
<i>Gross Benefits</i>	<i>108.25</i>	<i>68.39</i>	<i>33.23</i>
Program Administration costs	(1.04)	(2.08)	(3.12)
Depredation compensation	(0.32)	(0.64)	(0.96)
<i>Net external Benefits</i>	<i>106.89</i>	<i>65.67</i>	<i>29.15</i>
Supply response			
Ha per \$35/ha payment	25,000	12,000	6,000
Optimal Program Impacts			
Area in program (ha)	76,350	22,515	4,996
Gross External benefits	\$8,264,888	\$1,539,830	\$166,002
Program costs	\$8,240,465	\$1,525,420	\$161,205
Administration costs	\$79,404	\$46,832	\$15,588
Payments to producers	\$8,161,052	\$1,478,588	\$145,617
Cost to producers	\$4,080,526	\$739,294	\$72,808
Gain to producers	\$4,080,526	\$739,294	\$72,808
Overall gain	\$4,080,526	\$739,294	\$72,808

The major contribution of this study is the substantial level and quality of information compiled. An economic analysis like this has not been done before. Moreover, the economic analysis is not “back-of-the-envelope” guesses. The figures are rigorously developed from the best available economic and ecological information. They make a compelling case that a conservation cover program would provide a very good return to society in a variety of watershed settings representing different environmental and regional conditions across Canada. The figures

compiled for each case represent an “average” watershed situation—a baseline condition. Through further fine-tuning, it would be possible to examine the benefits for particular kinds of conservation cover programs, for example, of riparian zones. This fine-tuning would require more information on the specific impacts of riverside and watershed cover of various types on factors such as sediment trapping by riparian vegetation, or nutrient removal, enhanced fish production, etc. In each instance such information would have to be translated into economic impacts.

The three watersheds were chosen to represent different agricultural regions and thereby different climates, farming operations and farming practices. The information clearly could be refined over time, and the analysis to date has revealed a variety of data gaps. In its own right this shortcoming can add value, for it highlights research needs. There would be high returns to our knowledge by compiling additional and better information around these three rivers, rather than repeating the exercise at a superficial level in other basins.

Challenges and Opportunities—The Way Forward

There seems little doubt that EFR initiatives can be successfully implemented and help society to safeguard and provide ecological services in such landscapes. Success depends on engaging a substantial portion of the farmers within a region. It will no doubt be necessary to adjust incentives, to consider the impact of issues such as cross-compliance, and to build a level of understanding about what exactly is to be achieved. Compelling strengths of the examples studied are that they are voluntary and have the potential to save society and governments money. The examples demonstrate that each level of government can take a role in EFR for agricultural landscapes. This is attractive for the use of suites of instruments. But not every level of government needs to be involved in each case.

The available range of instruments provides many options and opportunities to assemble suites of instruments that are mutually supportive, that expand the opportunity for voluntary stewardship action, and that help lend substance to the notion of eventual “green branding” of Canadian agriculture. Definitely there must be a progression from building awareness and knowledge, to implementation, and to adequate assessment of outcomes, especially improved environmental conditions in agricultural watersheds and landscapes. The value of environmental farm plans is that they can act as a precursor for action—providing the baseline knowledge and “kick-start” for small initiatives at the individual farm level. The municipal property tax credit shows that even a modest incentive can be helpful for encouraging and reinforcing conservation behavior. Thus the EFP and MPTC are very complementary since the former would help to identify for the landowner which lands would be best to set aside, and municipalities might wish to extend a MPTC to those with an EFP. Clearly economic analysis of net external benefits could be used not only for CCP design but also for a range of other purposes, including the monitoring of which lands are most valuable for conservation easements or for determining the most appropriate lands to qualify for incentives such as the MPTC.

The study has noted a number of key factors influencing program uptake. Certainly one very important matter is to remember that one size will not fit all. Provincial inputs and philosophies, flexibility of designs based on inputs of specific agricultural sectors and regional groups, simplicity in operation and administrative rules (even if it may mean less capacity for targeting at the initial stage), and modest administrative costs are all hallmarks for a successful program. There is a need to examine how best to tailor EFR to specific regions, especially when several initiatives are layered, possibly on present command and control regulatory approaches such as zoning. A “one-window” approach may be helpful for farm producers faced with a variety of

programs and regulatory concerns. It is not clear what level of uptake constitutes success. The notion of continuous improvement will be helped as the participant base expands.

Strategic investment in science and program assessment is required to support the various EFR initiatives. And it is difficult to sort out the value of individual programs when several are contributing to changes. Science must be linked in many instances to economic analysis. This is most clearly demonstrated in the watershed net external benefit analysis. There are years of work ahead, especially for targeted activities such as riparian zone conservation initiatives. However, this should not prevent the development and implementation of incentive programs, if, from the outset, a commitment is made to evaluate program effectiveness through rigorous scientific monitoring. It is likely to be a relatively inexpensive way for society to obtain information about the environmental conditions and ecological dynamics of agricultural landscapes.

The goals of EFR in agricultural landscapes need to be focused on the positive net benefits/externalities for society in terms of enhancing and maintaining ecological integrity. Private benefits may also accrue, but it is not necessary for society to pay for them. In the design of programs, revenue neutrality may be a goal, keeping in mind that they may be effectively revenue neutral if the conservation activities result in lower costs to government for mitigation of environmental degradation. The important point is to be able to demonstrate as clearly as possible that the results do truly reflect a cost-effective positive level of social benefit. The expression of benefits must be clearly understood by a range of people and organizations, including producers, stakeholders and decision-makers. Failure to do so will threaten otherwise well-planned initiatives. Often this will mean partnerships that can both generate and use knowledge in an adaptive fashion—learning by doing, as outlined above.

EFR for agricultural landscapes will be implemented only to the extent that demand exists to drive programs forward, sometimes in the face of barriers that favour the *status quo*. At least some of the demand will be generated through global accords such as climate change, where there is interest in carbon sequestration, and voluntary initiatives such as greener production certification at national or international levels. Unless net societal benefits are clearly articulated and can be verified by monitoring of outcomes, the full value of EFR approaches, which do provide farmers with flexible options, is not likely to be achieved

The following recommendations are proposed for follow-up action to this report:

- (1) the NRTEE should continue its exploration of EFR, with a focus on increasing understanding of the potential applications to the agricultural sector, and by providing specific recommendations to governments (federal and provincial) that would assist in the design and implementation of such initiatives;
- (2) federal departments, led by AAFC, develop a plan for “green branding” of Canadian agriculture nationally and internationally that fully incorporates EFR, including voluntary initiatives that can be implemented through farmer stewardship;
- (3) meet the June 2001 ministerial commitment to accelerate the pace of improving environmental practices on-farm by expanding programs based on EFR, for example, via environmental farm plans, municipal property tax credits and conservation cover initiatives;

- (4) develop specific high-priority conservation cover and environmental initiatives based upon the watershed ecological-economic analysis presented in this report, for example, designing a program for improving water quality associated with farm runoff;
- (5) expand federal and provincial commitment to the gathering and sharing of information on the effectiveness of EFR initiatives, indicators of success, and to development of mechanisms for using this information in the design of complementary EFR initiatives employing suites of instruments; and
- (6) farmer organizations prepare to become more involved in the promotion, design and implementation of EFR initiatives, with a focus on becoming active partners in the development of regionally and sectorally focused approaches.

CHAPTER 1. ECOLOGICAL FISCAL REFORM AND AGRICULTURAL LANDSCAPES

BACKGROUND

The Ecological Fiscal Reform (EFR) program of the National Round Table on the Environment and the Economy (NRTEE) was established in 2000. Ecological Fiscal Reform is defined as *a coordinated and conscious strategy that redirects a government's taxation and expenditure programs to support sustainable development*. The NRTEE established a program in 2000 with the goal of exploring the principles, methods, challenges and opportunities of EFR. It is anticipated that this program might lead to specific recommendations to the Minister of Finance or to others in federal or provincial governments. The main purpose, however, is to gain insight into the feasibility of applying such incentives for sustainable development.

An EFR Expert Advisory Group has examined progress on this issue in Europe, the USA, and Canada (see background papers prepared for the NRTEE: Barg et al., 2000a, b, 2001; Kai Schlegelmilch, 2000; M. Anielski, 2000; Olewiler, 2000). The current report, one of three case studies¹ selected by the Advisory Group, illustrates various situations for improving conservation and ecological integrity within Canadian agricultural landscapes. This report was prepared by a Working Group on EFR and Agricultural Landscapes (the W.G.) comprised of individuals from federal and provincial government departments, farmer groups, local government, non-governmental organizations, NRTEE staff and advisors (see Annex 1 for members). The focus on whole landscapes recognizes that watersheds or other large land and water units are the appropriate scale for achieving conservation and ecological objectives.

Achieving such objectives, including protection of wildlife habitat and ecological services, requires cooperation of private landowners. Human health and aesthetic issues are also of major concern. For example, in the community of Walkerton, Ontario, site of Canada's drinking water disaster, the water supply was polluted by run-off from animal stocks on a nearby farming area. EFR might be applied within agricultural landscapes to provide better incentives for ecologically sound land management and pollution control. Impressive environmental gains on Canadian farmlands have taken place, but much more remains to be done. The long-term outcome desired is to enhance the ecological integrity of agricultural landscapes—healthy water, healthy soil, and biodiversity maintained.

Incentives to private landowners are needed, since they cannot be expected to pay the full cost of creating and maintaining social goods such as ecological services. However, farming practices also must also be carried out in a sustainable fashion, requiring investments that must be worked into the costs of production. The design of appropriate

¹ The three case studies investigate three quite distinctive areas for EFR within Canada: conservation and ecological integrity within agricultural landscapes; reducing environmental quality problems associated with transportation systems by controlling emissions from diesel fuel; and exploring the use of EFR to get certain chemicals such as CEPA Track 2 substances out of the environment.

incentives to maintain or improve the level of ecological integrity of the farm landscape is a major challenge. The incentives must be of interest to farmers and to the public, and must operate within a framework acceptable to politicians and administrators concerned about both domestic and international views. EFR is considered in its broadest sense including taxes and subsidies, program expenditures, and awareness-raising or other types of activities that will change fundamental behavior.

Approaches to incentives are quite varied, as demonstrated by experience in the USA, Europe, New Zealand, and in various farming regions of Canada. The realities are complex. There are many types of agricultural landscapes, many different aspirations on the part of farmers, and a wide variety of ecological needs. There is no “one-size fits all” solution. Equally, there are many options that might be applied. Some other countries are well ahead of Canada. Examples of incentive instruments that have been used for conservation purposes in farming areas are shown in Box 1.

Box 1. Some Potential EFR Instruments in Agricultural Landscape Conservation.

Tax-Related

Tax credits for conservation activities.
Environmental tax credits.
Reduction or elimination of capital gains tax on conservation land donations.
Reduction of municipal property taxes on land allocated to conservation
Tax status of conservation trusts.
Reduction of taxes for conservation covenants, easements.

Subsidies/Program Expenditure

Subsidy for conservation inputs (e.g. buffer zones; restoration of wetlands)
Permanent cover program.
Subsidy removal for pesticide and fertilizer use, land opening and land drainage.
Program support to develop micro-mapping, GIS and GPS-based “precision farming”
Environmental assessment.
Program support for “multifunctionality”.
“Transfer payments” designed for specific conservation needs (patterned after NAWMP).
Rural community-based conservation support programs (i.e. not for individual farms).
Awareness-raising/education program expenditures.

Other Market-based Instruments

Tradeable permits.
Ecological “branding” (standards-based labeling or certification, compulsory or voluntary) of agricultural products.
Fees and charges.
Deposit refund systems.
Information systems.

OBJECTIVE AND METHODS

Objective

The objective of the Agricultural Landscape's Working Group's activities is to determine the feasibility of redirecting governmental (federal, provincial and municipal) taxation and expenditure programs affecting farmers across Canada to meet conservation needs and pollution reduction from farmlands.

The analysis is intended to:

- Consider which fiscal instruments, or suites of instruments, can best influence land use and management decisions.
- Build a preliminary information base on successes and experience in Canada and elsewhere.
- Examine challenges and opportunities for implementation of regimes incorporating fiscal instruments.
- Provide an integrated management focus so that areas such as riparian zones and wetlands will be considered for special attention.

While the W.G. believes this type of analysis should be extended to other situations, for example, areas primarily in forest cover, northern landscapes, and coastal zone management, such analysis is beyond the scope of this Working Group's mandate. Similarly, although it is possible to apply EFR to address some suburbanization issues related to rural land and water, this is not a prime focus here.

Methods

The case study followed three lines of inquiry:

- Examination of existing efforts within North America, Europe and other areas such as New Zealand, with some points summarized in the present report.
- Identification of analytical needs, including economic analysis and modeling reviews and other studies required to make the case for EFR in terms that are relevant to decision-makers at federal and other levels of government.
- Study three approaches in detail, drawing upon Canadian initiatives and data. These three cases are summarized in this report's text, with the full studies available in Annex 2.

The three detailed studies were chosen in part to illustrate complementary approaches, building on the notion that it is quite likely to be suites of instruments that ultimately will be applied for EFR.

The first two cases, development of *Environmental Farm Plans* (EFP) and *Municipal Property Tax Credits* (MPTC) for conservation lands, draw upon existing initiatives started quite recently and so far not applied across the country. The third case is an economic analysis that could be used for the design of a variety of *Conservation Cover Programs* (CCP). This case, perhaps for the first time in North America or Europe, rigorously investigates at the watershed level the likely net social benefits of conservation cover.

The cases illustrate only a fraction of the incentive instruments shown in Box 1. The EFP case is an example of an *expenditure program designed for awareness raising and education* at the level of individual farmers and groups of producers, leading to behavioural change with respect to environmental health and protection at the farm level. The MPTC example is a *tax credit for on-farm conservation activities*. The CCP case could serve as the analytical basis *for designing support/subsidies for conservation and environmental inputs and conservation cover programs*. Cover program examples include protection of riparian areas, wetland protection/restoration, and more generic initiatives for reducing annual cropping.

The study was carried out by W.G. members during the period March-September 2001, with much cooperation from various individuals and organizations. Because time and financial resources were limited, information gaps remain. The study provides indicative directions for design of future initiatives and information needs.

CHAPTER 2. FARMLAND ENVIRONMENTAL INCENTIVES IN THEORY AND PRACTICE

PUBLIC GOODS, PRIVATE COSTS AND ECOLOGICAL INTEGRITY

Private management of agricultural land resources confers two generic types of benefits:

- Private benefits that accrue to the owners of the land in the form of any products produced from the land (agriculture, forestry, household crops, household consumption and recreation), and
- Social benefits that result from the land as a natural resource (e.g., water purification, habitat for wildlife and plants, carbon sequestration, land stabilization) and the activities the landowner takes to conserve the land and its ecological characteristics.

Agricultural land owners can also generate social costs in the form of pollution from animal wastes, fertilizer, herbicide and pesticide runoff, and farm practices that contribute to erosion, habitat and wetland destruction and so on.

Thus a spectrum of private to public benefits result from actions affecting the natural environment taken by an agricultural landowner. *From society's viewpoint, the objective is to maximize the net social benefits from the land.* But it must take into account the set of property rights of the landowner (e.g., protection from confiscation without compensation, right to make decisions on how to use the land subject to any existing regulation on land use such as zoning, restrictive covenants). And it must consider what motivates the farmer to take positive environmental action. The dilemma in achieving this objective is noted in Box 2.

Box 2. Farmers as Society's Environmental Stewards.

The Globe and Mail's agricultural reporter has captured the dilemma of compensation for farmers providing social benefits (David Roberts, 16 March 2001 Globe and Mail):

"It's true we must consider that farming is not just an economic activity, it is a lifestyle, and a social institution. All Canadians are beneficiaries. When Montrealers take a summer drive through the picturesque Quebec countryside, do they not enjoy a public good? When Winnipeggers drive through the rich wheat belt of the Souris Valley, admiring the flaxen sea that stretches for miles, is this not a public good? So here's the rub: Why should farmers provide this public good at their own private expense?"

They should be supported not by a short-term fix, which is really not a fix at all, but they should be paid instead as keepers of the land. The bottom line is that it is time for some farmers to be compensated for doing something other than farming. They might then, be inclined to take marginal land out of production...Farmers should have the opportunity to turn this land back to nature, to non-food uses, to permanent pasture, to animal habitat...This way farmers would be paid to become stewards of this great legacy, the land, for the rest of us."

The landowner's objective is to maximize private net benefits. The landowner will base his or her land-use decisions primarily on the market values of the goods and services that can be captured from the land. Herein lies the potential conflict for public policy: the landowner will "under-produce" social benefits from the land because market prices do not adequately reflect social benefits and thus the landowner cannot capture for itself the returns from any investment in and production of activities that generate social benefits. The landowner will also "over-produce" ecologically damaging activities if these activities contribute to private gains (e.g., more agricultural output) for the landowner.

Society, through its governments, seeks ways to constrain or modify the actions of private landowners to help reduce social costs and increase social benefits, i.e., to attempt to maximize net social benefits. There are two main ways governments can affect the decisions of private landowners:

- Introduce regulations that constrain landowners' choices and require them to perform activities that help increase net social benefits. Economists typically call this approach *command-and-control* regulation. Examples include zoning, riparian offsets, water use controls, and a variety of other regulations covering farm practices. The regulations may be expensive to administer and may be so specific that they provide little opportunity for innovative practices, or flexibility for the farmer.
- Alternatively, but functioning within a market-oriented regulatory framework, incentives can be introduced through the fiscal system in the form of taxes, tax credits, discharge permits, expenditure programs and other instruments listed in Box 1 that compensate landowners for conservation practices. *Incentive-based fiscal policies* are designed to change the relative prices facing landowners, making it more expensive to engage in activities that damage ecosystems, and reducing the costs of investing in land uses and activities that enhance social benefits. These fiscal instruments can be compulsory (e.g. taxes and permits) or voluntary (e.g. the option to take a tax credit).

In the past, Canadian governments have depended predominantly on command-and-control policies. These have been successful in achieving some protection of ecological values for society, but most Canadians feel that more could be done.

The time is ripe to investigate a larger role for incentive-based fiscal instruments for a variety of reasons:

- Our ability to reconcile production and ecological protection values of agricultural areas is under increasing pressure since society demands more of both. Agriculture is developing higher production per unit of land area—even when prices are in decline. Society seeks to maintain biological diversity, environmental quality, and the sustainability of fundamental resources such as soil and water.
- Increasingly there is recognition that setting aside isolated “islands” of natural ecosystems such as parks is not enough to maintain ecological integrity. We need to spend much more effort on also maintaining and improving the ecological condition of large landscapes such as agricultural regions. This realization is not new, but it is being pursued with increasing vigor and urgency at a time when

farmers, and, indeed, whole systems of agriculture are under great pressure due to declining commodity prices and other factors.

- It has been necessary to pump emergency funding into the farm economy in recent years. There is a general concern that operating in a crisis mode, as has been the case for much of the past decade, is not a lasting solution to farmers' problems. Nor is the solution likely to be found in a return to larger subsidies, which often enough have had detrimental environmental and social effects in the past. The opportunity is for development of an improved system of incentives for farmers to undertake conservation activities of general benefit to our society and ecosystems while improving their own financial situation.
- Some notable incentive-based successes exist, such as the North American Waterfowl Management Plan (NAWMP).
- Internationally, consumers and environmental organizations are more discerning about environmental consequences of food production. This is leading to certification and voluntary labeling that has become influential in opening or cutting off markets for Canadian food products.

The opportunity is for development of an improved system of incentives for farmers to undertake conservation activities of general benefit to our society. While there may be direct financial and environmental benefits to the farmer, it is the broader public goods that are of interest in this study.

CRITERIA FOR EFR POLICIES AND THEIR APPLICATIONS ON AGRICULTURAL LANDSCAPES

Criteria for New Policies

Speaking generally on EFR, Mintz (2000) has noted that

"before deciding what policy is to be designed, be it tradable permits, environmental taxes, tax incentives, subsidies or user fees, we must determine which instrument is the most appropriate one to use. In order to do so, nine criteria should be examined closely: effectiveness, efficiency, income distributional effects, regional distributional effects, international competitiveness, innovation, flexibility, political buy-in, and cooperation between governments."

This long list is indicative of a major issue facing those developing incentive approaches. There will be a menu of possibilities, and suites of instruments to be considered. But many criteria may have to be satisfied before decision-makers are willing to change from the *status quo*.

There are other policy considerations applicable to environment and agriculture. Latacz-Lohmann (2001) has noted several important criteria: economic efficiency of environmental policies; cost-effectiveness; incentives for entrepreneurship (including seeking out new methods for cost-cutting, encouraging willingness to take risks for the provision of countryside goods, or to coordinate across holdings to achieve results at a higher scale of landscape); enforceability; distributive and procedural fairness;

compatibility with other policies such as trade (to avoid high cost to the trade system) or agricultural support policies; and political acceptance.

OECD has concerns that apply to any new policies in the agricultural sector:

- *Transparent*: having easily identifiable policy objectives, costs, benefits and beneficiaries.
- *Targeted*: to specific outcomes and as far as possible decoupled.
- *Tailored*: providing transfers no greater than necessary to achieve clearly identified outcomes.
- *Flexible*: reflecting the diversity of agricultural situations, able to respond to changing objectives and applicable to the time period needed for the specific outcome achieved.
- *Equitable*: taking into account the effects of the distribution of support between sectors, farmers and regions.

Any new policy may have to demonstrate that it has:

- Potential to influence decisions of landowners, land managers, farm industry and municipalities or other levels of government
- Specific revenue considerations (neutrality, cost to government, perceived benefit to farmers, etc.)
- Demonstrated improvement of ecological integrity.
- Sufficient social and economic benefits.
- Little potential to create an international trade dispute.

Many of these considerations may in fact be difficult to “prove” before pilot projects are initiated, or before several years of full-scale implementation experience are available.

Design Considerations

The following design criteria might be considered in the use of individual instruments (see Box 1) or clusters of instruments for EFR and the Agricultural Landscape:

- Is a single instrument or a combination of incentives likely to be optimal or workable?
- Novel instrument or solid experience already available elsewhere?
- Capacity to assess performance? Will use of the instrument positively influence sustainability?²
- Revenue implications (e.g., neutrality).
- Equity/fairness implications.

² Tyrchniewicz and Wilson (1994) in cooperation with a stakeholder group developed a robust set of criteria applicable to sustainable agriculture (which, in their definition, includes a strong emphasis of conservation of the rural landscape). They cluster their nine “principles” into three categories: *Stewardship* – conservation, management and rehabilitation; *Economic Viability* – market viability, cost internalization, scientific and technological innovation, and trade policy; *Social Concerns* – societal considerations, global responsibility. Under each principle specific criteria have been defined to assist in the review of particular existing or proposed policies and instruments from the standpoint of sustainability.

- Competitiveness and trade implications.
- Legal and constitutional issues.
- Likely acceptability at political, administrative, conservation and farmer levels.
- Geographic and Sectoral Considerations
 - Regional differences (western, central and eastern) or based on ecozones.
 - Main types of farm habitat and activities under consideration.
 - Scale issues (e.g., large industrial farming, large ranches, smaller operations and mixed farms).
 - One size fits all vs. tailored programs.
- Pilot initiatives.

This list was of considerable value in examining existing experience and the detailed case studies.

Overall, there is a need to consider how incremental change on the part of institutions is in its own way an important part of the suite of instruments. In particular, there is a need to consider adaptive management approaches that might introduce flexibility and experimentation for organizational learning (Gunderson et al., 1995).

Modeling and Frameworks for Monitoring

There are no major conceptual problems in how to approach EFR data needs in an agricultural setting. Economic models tend to be of the “bread and butter” varieties. For example, in the case of a cover program, it is a marginal cost benefit model that is used to evaluate net social benefits (see Chapter 3 for details). The model defines a socially optimal allocation of land to agriculture and conservation cover that is dependent upon the price society is willing to pay for conservation compared to market value for agricultural use.

In the case of municipal tax credits the economic model is of a profit-maximizing farmer faced with the choice of how much land to put into production, given that his or her marginal costs of production will rise with greater land in production since not all land will be as easily worked. Lands of inferior production capacity will presumably not be put into production use. But taxes and tax credits, can influence how much is set aside. A tax credit (a negative tax) provides an even greater incentive for setting aside these less economically productive lands—the lands with the lowest opportunity cost. Theory suggests that farmers will allocate land between production and conservation up to the point where the value of the marginal product in production equals the unit subsidy—the foregone revenue by not converting the land to conservation activities. And the tax credit will have no impact on removal of the highest value production lands.

These illustrations, and others that might be discussed suggest that an abundance of theory exists to support EFR analysis. The problems come with issues such as determining the magnitude of incentive (e.g., of payments to farmers) that is sufficient to shift behavior, factors such as the level of awareness and understanding of the actual

value of incentives, the link between economic theory and actual environmental results (e.g., the level of environmental improvement achieved through wetlands set aside on farms), determination of trade neutrality, and, of course, revenue implications for governments. Each of these points may require economic and economic-ecological modeling and data collection.

Careful monitoring during the life of any incentive program is therefore important. It is possible that, as circumstances and societal demands change, as programs are ramped up from pilot-scale to full levels of implementation, and as more refined information on ecological results emerge, it may be desirable to make changes in the suite of instruments, alter eligibility criteria to improve targeting, and to sunset programs. This flexibility is desirable but does require adequate knowledge to make wise choices.

Implementing EFR: International and Canadian Experience

USA Experience

The strong US government commitment to private sector initiatives has led to considerable success with EFR on the part of private foundations, not-for-profit organizations such as The Nature Conservancy (TNC), and for-profit firms. The opportunity to make generous donations of land, set in place conservation easements, etc., and develop full management schemes to support conservation is certainly supported by the tax structure, which generously recognizes expenses, fosters the development of private foundations and giving, and permits land to be put to conservation use without capital gains taxation. The results have been quite spectacular in terms of the extent to which lands are protected through private initiative, and the level of sophistication involved in developing knowledge and strategies for acquisition and management. Very detailed inventories are maintained by TNC, which, along with organizations like the WWF-USA and Ducks Unlimited, has taken a leadership role in attempting to understand scientific needs at the regional ecozone level and used this information for design of effective stewardship initiatives.

The federal government has set in place several innovative programs that are well recognized for the incentive value they have provided. These are conducted through the US Dept. of Agriculture (USDA). The most prominent example is the Conservation Reserve Program (CRP) and a recent refinement, the Conservation Reserve Enhancement Program (CREP). Another is the Wetlands Reserve Program (WRP). Others are the Farmland Protection Program (FPP), and the Wildlife Habitat Incentives Program (WHIP), the Conservation Farm Option (CFO), and the Conservation of Private Grazing Land Initiative (CPGL).

The CRP provides funding for farmers to voluntarily retire environmentally sensitive cropland for 10 to 15 years, with USDA's Commodity Credit Corporation providing annual payments and sharing costs of establishing conservation practices. Through this program millions of acres of wildlife habitat (up to 36.4 million acres is authorized by Congress) have been provided, with an investment in the billions. For example, payments

in September/October 2000 totaled US\$ 1.4 billion for 293,857 farms. The average payment/farm was US\$ 4,833 and US\$ 45.17 per acre. CRP awards land retirement contracts on the basis of competitive bids in order to avoid problems of overcompensation and to ensure the maximum purchase of environmental benefits.

CREP differs from CRP by addressing specific geographic areas and specific high priority environmental concerns, with performance monitoring in meeting the objectives. It is also designed to be more flexible according to local needs. An example of the objective-driven nature of CREP is protection of Chesapeake Bay water quality by reducing nutrient loading.

Box 3. Lessons Learned from the US Conservation Reserve Program

Robert Stephenson, Director, Conservation and Environmental Programs provided a short list of lessons learned from the CRP and related experience. This list includes the following points:

- Local tax bases may be affected if too much land is taken out of protection. Congress specifies that a maximum of 25% of a county's cropland can be included.
- There is provision for "emergency" use of lands, for example, in the case of droughts. But for some states (e.g. Texas and the Dakotas) as much as 8 out of 10 years have been declared emergency years. Better definition of "emergency" is needed in the context of CRP.
- In early contracts many farmers were overpaid since there was intense focus on getting land into conservation use. The auction system helps to sort out this problem.
- An Environmental Benefits Index was developed to assess applications. Initially details were not disclosed to farmers since it was felt that the situation might otherwise be manipulated by the producers. Now it is recognized that this is a wrong view. Indeed the opposite is the case. With full disclosure, farmers recognize the broader range of ecological benefits and strive to achieve them.
- It is still problematic to address "intangible" environmental benefits.
- The growing level of state government involvement (via CREP) is helpful in building regionally responsive activities, since not all activities work equally well nationally.
- The program is now so large that it is possible to have low-profile pilot testing embedded within it.
- Never purchase lands; always develop agreements on a rental basis. This avoids the issue of government as landowner. It creates the need for compliance to contract plans for each farm and therefore the need for inspectors.
- The massive level of interest (demand) on the part of participants has sometimes been unanticipated (e.g. in the case of the wetlands reserve program).
- As initial contracts come up for renewal there is the issue of continuity of protection but also an opportunity to assess performance and need. Those who did not score well on one or the other count may be dropped.

The WRP is designed for entry by entering into one of three options: permanent easements, 30-year easements, or restoration cost-sharing for a minimum 10-year period. The maximum compensation is paid for permanent easements. Landowners are expected to pay part of the costs, but their share can be offset by contributions of non-USDA agencies or private conservation organizations. The optimum arrangements are for a mix of upland and wetland. The landowner controls access to the land and can lease the land

for recreational uses, and may request additional activities that are compatible with the wetland's protection and enhancement.

The CRP and related initiatives form one of the most tested and large-scale conservation incentive programs in the world. Out of this experience come a number of key lessons (see Box 3). Cover programs are pertinent to Canadian interests, with an existing Permanent Cover Program in place for more than a decade and proposals for a national Conservation Cover Program.

Other OECD Countries

The OECD has carried out a number of studies (OECD, 1997, 1998) focused on “agri-environmental” policy. These have been done in the general context of tracking and understanding the impacts of agricultural support programs, currently on the rise again to a level of US\$ 361 billion, or \$327 per person across the OECD member countries. The studies are also related to the growing OECD interest concerning sustainable development. Policy analysis information being gathered includes the range of measures (taxes and subsidies, regulations, cooperative initiatives, and sector-wide matters such as labeling and advice) plus associated budget costs, and operational characteristics. A study is underway on the environmental impact of support to agriculture. It will analyze the subsidy element in the transfers associated with agri-environmental measures and the remuneration element for public goods or externalities.

Two interesting case studies presented at the 1996 Helsinki Conference (OECD, 1997) contrast how differently various OECD countries and country groups address EFR in the context of agricultural landscapes. The first case is New Zealand (MAF Policy, 1997), which now has the lowest level of subsidy support for agriculture and in the early 1990s consolidated its natural resource management legislation to “refuse antecedent policies, with the overriding purpose of promoting the sustainable management of natural and physical resources.” Unlike some other countries, New Zealand has not replaced input subsidies with new conservation support packages. Indeed the country has even reduced disaster assistance with the objective of requiring individual farmers to manage their land in consideration of risks such as drought.

The impacts of eliminating agricultural subsidies led to several environmental effects:

- Conversion of natural forest to agriculture and development of marginal lands virtually ceased.
- Forestry plantings increased.
- Livestock numbers declined, with less pressure on land and water resources and a decline in greenhouse gases (methane).
- Use of fertilizers and other agricultural chemicals decreased (although amounts are increasing again).

The conclusion is that “All these changes lessen the likelihood of farming systems causing the degradation of marginal lands and off-site contamination of water resources.”

More generally it is noted by MAF Policy (1997) that:

New Zealand has taken the approach that it is necessary to remove distorting price signals and address environmental “bads” before considering whether agriculture provides environmental “goods” that require government assistance. To have done otherwise, i.e. to compensate farmers for perceived environmental “goods” without addressing the “bads” would have risked entrenching current systems that were causing environmental damage, and would have just been another way to subsidise farming. Without policy reform, payments for “environmental benefits” may merely serve to encourage the continuation of overly intensive or otherwise environmentally damaging production systems.

There is little evidence of market failure in the provision of environmental “goods” by New Zealand agriculture. In New Zealand, most biodiversity resides in natural ecosystems, both terrestrial and aquatic. While agriculture can provide landscape amenities and *in-situ* preservation of biodiversity, including biodiversity of agricultural species, these “goods” are by-products of agricultural systems and are still being provided despite the withdrawal of government assistance. If anything, government assistance to agriculture was having a negative effect on the supply of biodiversity and other environmental goods, and the first step was to remove such distortions.

The situation within the European Union stands in sharp contrast to the New Zealand case. Priebe (1997) describes the EU’s Agri-Environment Regulation (EEC 2078/92) in a situation where producer support payments currently reach a level of about 50% of receipts. It is noted that, within the EU and elsewhere in Europe, much of the “natural” biodiversity is the result of centuries of farming activity, and could be lost if farming ceases. Through the 1992 reform of the Common Agricultural Policy (CAP) agriculture was to be made more compatible with environmental needs. It is viewed that the level of commitment required for maintaining the rural environment and landscape is expensive and it should not be expected that farmers can do this for free. The term used to describe this situation is *multifunctionality*.³ Thus agri-environment programs operate on the basis of contracts with farmers under four general categories: low-intensity farming systems; landscape; set-aside and maintenance of abandoned land; training and demonstration projects.

Of these categories, two are of particular interest in the context of EFR. Maintaining traditional landscapes including features such as hedgerows and terracing, which might be removed in more modern farming approaches aimed at profit maximization, is viewed as a key objective, especially by countries such as the UK and Sweden. Set-asides can include designation of wetlands or forests or other areas that result in a net environmental gain. But in some cases, the best biodiversity conservation practice will involve continuation of extensive agriculture, for example low-intensity grazing. Such programs are found in Denmark and Greece.

³ Multifunctionality describes the European view that farmers are more than producers of food and fibre; they also protect the rural environment and landscapes, and they generate a variety of rural economic opportunities. The Manitoba Habitat Heritage Corporation (2000) explored various aspects of multifunctionality in relation to North American perspectives.

Farmers enter agri-environmental programs voluntarily, with obligations of 5 to 20 years, the longer period being for set-asides. The principle of subsidiarity is followed, allowing for a diverse approach to programming. Calculation of “premia” paid to the farmers is based on costs incurred and income foregone, minus any additional income generated from participation in the program. Additional incentive payments may be authorized to overcome transaction costs, to cover risk, or other costs that dissuade farmers from joining. Farmers who fall below the standard of farming practice acceptable in the region are not eligible for this public funding, nor can farmers be paid to stop polluting. The total cost is shared between Community funds (50 to 75%) and Member State budgets (50 to 25%).

Many farmers are reluctant to take up this environmental assistance, perhaps for three main reasons according to EU studies:

- Premia may be insufficient.
 - Farmers are reluctant to bind themselves into contracts—even those as short as five years.
 - Awareness-raising is needed to transform farmers from their desire to maximize output from the land (no doubt spurred on by generous traditional subsidy programs).
- The latter point is part of the reason for placing emphasis on both training and pilot projects.

In conclusion, Priebe (1997) sketches out a situation in which the role of farmers “as protectors of the environment and guardians of the countryside” is now established policy of the Community. Farmers are intended to be “rural entrepreneurs” providing services to the local community, including the provision of environmental goods. Finally, Priebe notes that “The unique environmental heritage of Europe, the result of centuries of sustainable farming, would be severely threatened by continued intensification or by abandonment.” Hence the focus on the farmer as the source of the solution.

EFR Rural Land Initiatives in Canada

Baseline Situation

Canadian farmers have to integrate many inputs and programs in order to remain viable. These include income support and farm insurance programs directly related to the area of land farmed. Many of these have changed in the past decade, and there is continuing uncertainty in the face of various trade and domestic policy challenges. The removal of many subsidies is now having its major impact as people seek alternatives in the face of declining prices and rising subsidies elsewhere. The farm community of Canada has more or less been spared the major environment and trade campaigns in Europe and elsewhere which have driven changes in forest practices in Canada. Yet it remains vulnerable to assertions about the environmental sustainability of farming practices, and to new challenges such as those related to adoption of biotechnology.

The understanding of conservation impacts of agricultural expenditure programs has probably increased as these programs have undergone revision. The policy screening tool

developed by Tyrchniewicz and Wilson (1994) indicated that the Western Grain Transportation Act worked against sustainability while the Permanent Cover Program and NAWMP produced positive effects. In the 1996 federal government response to the 8th Report of the Standing Committee on Environment and Sustainable Development (<http://www.fin.gc.ca/resp/resple.html>) it was noted that:

Earlier in the government's mandate, Agriculture and Agri-Food Canada (AAFC) released environmental assessments on three of its major programs: the Gross Revenue Insurance Program (GRIP), the Net Income Stabilization Account (NISA) and Crop Insurance. These programs were found to have no significant effects on environmental resources. This work has increased AAFC's ability to measure the impacts of farming on the environment. As a result, new agricultural safety net programs are expected to favour the environment more than previous programs.

The success of certain activities such as the Permanent Cover Program, NAWMP and some other conservation activities have certainly captured the attention of many farmers. For example, the Permanent Cover Program, which was actively pursued during the early 1990s was well accepted and retired many areas of fragile land in the prairies and Ontario. A feature in Ontario was that individual producers could establish their own level of compensation for returning these lands to more natural conditions by engaging in a bidding process. The price was established on the productive value of the land to the farmer and the costs of returning it to natural conditions (planting of trees, shrubs and grasses.)

Some agencies such as PFRA have long promoted conservation objectives, and many conservation watershed activities involving farmers and provincial governments can be found in various parts of the country. Most of these are based on expenditure programs rather than economic incentive approaches.

Private sector activities, especially via not-for-profit organizations like Ducks Unlimited and The Nature Conservancy of Canada, are driving many innovative partnerships involving governments, private sector and conservation interests, and farmers. These are patterned, to a considerable extent, on much larger-scale initiatives in the USA, and, in the case of wetlands and waterfowl, involve major transfer of funds northward.

NAWMP

Few would argue about the success of NAWMP (North American Waterfowl Management Plan), either in terms of the production increases in waterfowl that have occurred, or in terms of the transfer of funds from the user populations (particularly US hunters) to the rural areas where the wetlands are. While Canadian contributions from 1986 to 2000, have amounted to C\$267 million, transfers from the US have amounted to C\$334 million. The habitat conserved amounts to 2.4 million acres, mainly prairie wetlands. Also, NAWMP is an outstanding example of what can be accomplished via partnerships—internationally; between governments and private sector organizations; and with local communities, conservation organizations and individual landowners. Changed outcomes were possible in a remarkably short time span, and the groundwork is in place

for the long-term. Box 4 summarizes attributes of NAWMP as a financial incentive instrument.

Box 4. NAWMP as a Financial Incentive Instrument.

Wilson, A. and A. Tyrchniewicz (1995) provide an independent assessment of how NAWMP contributes to sustainable development, using a policy analysis tool developed at IISD. Several points about the functioning of the financial incentive instrument (purchase and lease of land for waterfowl habitat) are of interest:

- The instrument is a tool that conserves a rural landscape productive for both agriculture and wildlife, including rehabilitation of some of the most agriculturally degraded sites.
- The incentive instrument has enabled a large number of organizations and individuals to form a joint effort and stewardship role.
- The application of the financial incentive has been in an economically efficient manner that encourages producers to participate on the basis of net returns, with responsiveness to the market since the return is greater than alternative uses. Indeed, with tourism and other value-added activities, the return is likely to grow over time, and directly aligned with U.S.-Canada trade.
- The instrument replaces externalities associated with grain production with more ecologically compatible externalities.
- Application of the instrument has encouraged science and technology innovation related to forage cover, predator control, nesting, and land and water management.
- There appears to be little if any real impact on fairness and equity in income distribution. But income is being transferred from well-to-do hunters to grain producers who may be in less favourable financial circumstances.
- The instrument probably enhances intergenerational equity through improved land management and wildlife proliferation.

What might be examined in the future is how NAWMP's impact might be extended, either to complement NAWMP by adding other elements of EFR in order to address wetland and riparian protection more effectively, or by taking the model provided by NAWMP and using it in the context of other migratory species such as songbirds (NABCI), monarch butterflies, or by linking the concept of transfer payment support to conservation biology-driven corridor initiatives such as CPAW's *Yellowstone to Yukon* program.

Taxation of Ecological Land Donations

The NRTEE developed recommendations for the 1995 federal budget that highlighted the need for an improved approach to ecological gifts. The recommendations built on a solid background of work by the conservation community (e.g. Denhez, 1992). In that budget some progress was made towards addressing past inequities. The 20% annual limit for use of a tax receipt for ecological gifts to municipalities and charities was increased to 100%. The June 1996 amendments to the *Income Tax Act* established ecological gifts as a new category of charitable donation. This category includes: ecologically sensitive lands, covenants, easements and servitudes. For example, donation of a conservation easement is valued on the basis of the difference between the land's value with the conservation easement and the best land use value without the easement. In 1998 a further amendment added Crown agencies (such as the Manitoba Habitat Heritage Corporation, the Ontario

Heritage Corporation and various Lands, Natural Resources and Conservation, Parks and Environment Ministries) to the list of recipient organizations.

Yet the situation was far from perfect, especially in comparison to the USA. For the deemed capital gains still inhibited gifts (Attridge, 1999). The NRTEE recommended that the capital gains tax on gifts of ecologically sensitive lands be cut in half from the 75% level plus several other options that would act as incentives for increasing the number of such donations⁴. As of February 2000 the federal government has reduced from 2/3 to 1/3 the income inclusion rate on capital gains related to ecological donations. The cost of doing so is estimated to be about \$5 million per year.

As noted in the discussion on previous NRTEE work related to creating a satisfactory tax regime for land donations, more remains to be accomplished. What would be an ideal situation, and can we draw upon experience elsewhere, for example, in the USA, to develop this theme further? This is clearly an area where organizations such as The Nature Conservancy in the USA have considerable experience.

The subject has already been given considerable airing in a background paper of Ian Attridge (1999) prepared for the NRTEE. Attridge noted several possibilities in addition to the recommendation for a reduction in capital gains tax that was successful in the 2000 federal budget:

- Allow an enhanced claim for adjusted cost base that would recognize the public benefits and private stewardship effort and investment provided on the property. This might be established using a point system as done in Washington State that attempts to correlate enhanced ecological values with the enhanced tax benefits.
- Create a roll-over provision, as for family farm property, whereby capital gains would not be assessed against qualified ecological gifts, but would become due in whole or in part should the property be disposed to non-qualified entities.
- Create a lifetime capital gains exemption of \$500,000 for donations of ecological gifts, or expand the criteria for the qualified farm property exemption in order to ensure that not only rural owners of farms receive tax recognition.
- Specify that the donation tax credit available will be “grossed up” beyond current levels in order to create flexibility and recognize ecological values and stewardship contributions.
- Provide that a gift of ecological lands does not constitute a disposition for tax liability purposes, or place gifts of ecological lands in a separate category so that they are not considered capital property and thus are not subject to capital gains.

Attridge’s perspective is that:

Donation of ecological gifts obviously constitutes a charitable act. But they are much more than that. In essence, they are an investment in the private provision of public goods, in sustainability and in our collective future. Without retention of such ecological pillars in our landscape, the functions upon which communities and economies depend

⁴ Up to 1999 some 90 gifts of land amounting to 10,280 ha had been made in 8 provinces, totaling over 25 million dollars.

will become eroded beyond ecological and economic repair. In many cases there is no practical or cost effective substitution for the benefits they provide. Efforts to secure this investment thus should not be evaluated solely upon what is a fair return to the donor but also on what is necessary to provide basic ecological infrastructure for our country.

The theme of ecological land donations is also, of course, an item of interest to provincial administrations that are active in setting up facilitating arrangements, and perhaps can provide further incentives. Provinces will play an important role in establishing criteria for acceptable donations and in the assessment of stewardship and ecological values.

The Nature Conservancy of Canada (1998) has estimated that complete elimination of capital gains taxation on these donations would result in the federal government foregoing a capital gains tax revenue of about \$11.25 million per year, but would produce land protection benefits on the order of \$40 million annually, based on a total of one million ha protected over a 30 year period through private conservancy, half through ownership transfer and half through conservation easement.

The point is that, while the NRTEE and conservation groups have had a useful impact on setting change in motion, transforming the incentive system into one that creates a sea change in terms of private land owner participation will depend upon more robust arrangements than have so far been put in place, and likely will require combinations of measures acting together.

Branding/Labeling for Sustainability

There is growing interest in the development of criteria, sometimes including certification processes, for goods that are produced in an ecologically and socially sustainable fashion. The approach may be voluntary for individual producers, but if a competitive edge is gained, many participants can be expected. Indeed over time, what starts out as a voluntary approach may well be incorporated more formally into trading relationships, especially in relation to certain export markets such as Europe. It appears that within the federal government there is an interest in “branding” the whole of Canada’s agricultural sector as sustainable in terms of its environmental impact.

The development of a case for the use of this particular instrument could be quite difficult, coming at a time when the subject of labeling for GM foods is currently being hotly debated in Canada and elsewhere. But there are some interesting reasons for tackling the topic. First, it is an instrument that might be quite complementary to other economically-oriented instruments. And it is an approach that is highly compatible with market-driven approaches. Secondly, there has been a growing volume of experience in forests and in other sectors, driven by organizations such as the ISO, CSA and WWF (Forest Stewardship Council, Marine Stewardship Council). There are some specific efforts within the agricultural sector, for example, the Swedish Seal of Quality. Thirdly, the cross-compliance aspect between agriculture and environment initiatives has not been very systematically explored. The labeling approach might be a communications mechanism for doing so.

Finally, in the trade world where phrases like “organically produced”, “sustainably produced”, “supporting conservation”, “heritage variety” are evocative but generally poorly understood in terms of their actual effectiveness in bringing about a satisfactory relationship between environment and economy, there is a long-term opportunity to educate and to develop objective criteria for stewardship performance.

Branding across a whole sector presents a huge, long-term challenge, requiring the development of a consensus, then definition of criteria and gradual progress. Perhaps the experience within Canada's forest sector is the best current model.

Provincial Explorations

The initiatives described above work with considerable input from Canadian provinces, which also, of course, have their own stewardship initiatives, sometimes in cooperation with municipal governments. There are examples throughout the country: covenants for protecting riparian habitat in B.C.'s Lower Mainland; conservation easements in Saskatchewan; a pilot project for conservation tax credits on rural municipal land taxes in Manitoba; activities involving nature trusts in Nova Scotia and P.E.I., and certainly a substantial commitment towards an enhanced role for private-public partnerships in provinces such as Alberta and Ontario. Quebec has explored how economic instruments may be used in relation to private land owners (Barla and Saphores, 1997). There is a rich base of experience from US state-level government that is also highly relevant. (see papers by P.E. Salkin et al., 2001 and Wolff, 2001).

Conclusions

EFR is well-supported by economic theory that is straight-forward to apply. The need is for good data to support the models, and that has sometimes been difficult to come by. Behavior of farmers faced with a variety of incentives may be hard to predict accurately, even when economic models suggest strong motivation should exist. Thus it may be desirable to complement economic analysis with other types of monitoring, for example, to determine whether the nature of the incentive is well communicated and understood.

Ecological-economic analysis will be required in order to determine the sustainability impacts of any program, and to definitively link environmental improvements to the economic investment. Some programs, such as the US cover programs started without much consideration of this type of analysis, and therefore did not target high value conservation lands at first. In fact, the American public did not get a very good bargain at the beginning. Now initiatives are much more effective in achieving conservation goals, while demand on the part of farmers still outstrips available funding.

Public policy criteria that may be demanded of any new EFR program involving agricultural lands are likely to be extensive—perhaps even unreasonably demanding. Some are internationally-driven, related to trade, OECD criteria, and growing consumer interest in how food is produced. Others are more directly related to local and regional concerns. At the national level, therefore, there may well be a tug-of-war between a desire for uniformity and demands for flexibility in design and administration driven by

more local interests. Also, the criteria may be used as a barrier against change, for EFR is threatening to some institutions and groups. Or, in the absence of experience, a puzzle with respect to its real potential.

In reality the experience with EFR in the context of agriculture is quite extensive. It covers a spectrum ranging from the “tough love” experience of New Zealand, which has removed subsidies and not replaced them with new incentives, to the multifunctionality approach of the European Union, where very generous support for maintaining intact agricultural landscapes is a policy objective. The USA and Canada fall somewhere in between, with the USA being much more advanced and varied in its use of economic instruments. There is a greater orientation of the taxation system towards ecological gifting and direct support of conservation organizations; use of tradable rights for conservation land use, auctions and other market-based tools; and the long-standing experience with direct payments to farmers for cover programs.

Canada has exhibited more interest in these approaches over the past decade, and has removed many of the major agricultural subsidies as well as bringing about enhanced opportunities for ecological gifting in a limited fashion through changes in tax law. There is a sense that the time is good for more extensive exploration, for example of conservation cover programs. And extensive experimentation with new systems of covenants and other measures is taking place within provinces. Canada cannot pick up approaches “off-the-shelf” from other countries for national application. There are too many interests to be served, and, therefore, support coalitions to be built within the country. Indeed it appears to be a strength of EFR that scope is broad, so that design can be tailored to particular circumstances.

CHAPTER 3. THREE CASE STUDIES

The three case studies each form quite a distinctive approach to EFR for agricultural landscapes. Taken together, they provide complementary approaches using suites of instruments. The cases are used to define just what information, including economic, social and environmental analysis and modeling, may be required in order to develop credible cases for EFR. Separate reports have been prepared for each case study. They are available as Annex 2a, b and c of this report. This chapter provides a summary of each report, plus some overall observations and conclusions about the results.

The cases are presented in a specific order, starting with on-farm awareness-raising and action stimulated through the creation of environmental farm plans (EFP). This case study draws heavily on experience in Ontario and Quebec where federal budget expenditures from the CARD fund assist farmers to understand what could be improved on their farms in order to provide both private and public benefits from on-farm environmental improvements. This case underscores the need to work at the level of individual farmers and farms since they make many of the decisions involving agricultural landscapes and also are the source of additional financial and in-kind resources that can leverage limited public financial contributions.

The second case study draws on North American experience with property tax credits, and especially with a pilot project to establish municipal property tax credits (MPTC) for farmland conservation in Manitoba. This pilot project, and other similar activities surveyed for this case demonstrate how fiscal measures can be implemented at the local government level in order to change farmer behavior.

The third case highlights the economic analysis required to determine the net external benefits (i.e. to society) arising from a conservation cover program, as it might exist across a whole watershed. As noted in earlier sections, conservation cover programs have been in place within the USA for many years. At present there are many quite specifically-tailored initiatives operating federally or jointly between states and the federal government. The analysis provided in this case study draws upon data within three quite different, predominantly agricultural water basin areas within Canada—the Grand River near Guelph, the Upper Assiniboine River Basin that crosses the prairies, and the Mill River in PEI.

ENVIRONMENTAL FARM PLANS (EFP)

Ontario and Quebec Models

Starting in the early 1990's farm organizations and governments began devising new methods of helping farmers become more aware of their impact on the environment. The most comprehensively developed of seven Canadian EFP programs are in Ontario and Quebec. Each model is quite distinctive, revolving around Environmental Farm Plan workbooks and peer review processes in Ontario (see Box 5), and agri-environmental

advisory clubs that have been formed in Quebec (see Box 6). On-farm environmental planning initiatives are spreading and many other provinces have created similar programs. EFPs build on voluntary action and link education and action of value to health, safety and environmental concerns both on-farm and off-farm. They are tied to incentive approaches such as awards and peer interaction. And, because they have an awareness-raising and capacity-building role, they may backstop other incentive-based or regulatory programs. Environmental farm planning helps farmers determine environmental risks and liabilities as well as strengths and assets that can affect their operations and both on-farm and off-farm environmental conditions. From this analysis farmers can flag areas of concern and identify opportunities for improvement. Environmental farm planning also makes farmers more aware about regulations that may apply to their farm.

Box 5. Ontario Environmental Farm Plans.

The Ontario EFP process is based on a workbook that each farmer fills out. The workbook contains a survey or questionnaire, which asks detailed questions about the farmer's specific operation, and the farmer will rate his/her operation based on the guidelines provided. Before a farmer begins completing the questionnaire he/she must complete a general review of the farm. This should help the producer start to think about their farm in a new way. Farmsteads are mapped out to help the farmer see where potential problems like run-off and proximity to water sources exist. Factors such as the farm's proximity to urban areas, rivers, streams and the presence of wildlife should all be considered. To help with this general farm review, producers can attend a workshop. During the workshop farmers are aided in assessing such issues as the soil types on their farm and characteristics of their farm in regards to wind and soil erosion.

Once the general review is completed the farmer fills out a number of worksheets that rate current conditions and practices. A numbered system from 1 to 4 is used, rating the farm's environmental risk either high to low, or best to poor. A high risk situation would include those conditions that are in violation of existing laws, for example related to manure disposal. The next step is to prioritize these areas of concern and then devise a plan that can be put into place either in the short-term or long-term in order to change high-risk ratings to a low-risk situation.

The action plan also includes looking at potential problems that cannot be changed, but may be compensated for. Compensating factors deal with finding alternative solutions to managing problems in a safer way, even if the risk rating will remain high. For example, the soil type of a certain field may have a high potential for erosion. The farmer cannot change the soil type, but she/he can compensate for this by better managing the land.

At this point the farmer has the option of submitting the action plan for a peer review (a group of local farmers who are knowledgeable in farm environmental issues and who have been trained by the Ontario Soil and Crop Improvement Association). This is not a mandatory step in the EFP process, it is a farmer's choice to either immediately implement the action plan, or have it reviewed before implementation. Sixty per cent of EFP participants chose to have their action plans reviewed, of which 95 per cent were deemed appropriate. A peer review must be completed before a producer can be eligible to participate in the Incentive Program and an Awards Contest.

The Quebec and Ontario programs each treat incentives quite differently. The private benefits of program content for both are delivered through participation, and a cash

transfer. In Ontario, this transfer is a \$1500 *payment to participants*, while in Quebec it is a \$500 annual fee *paid by participants*. This difference in direction of payment reflects the difference in intent. The Ontario payment is intended to promote program participation and the completion of on-farm projects⁵, while the Quebec fee is to support program costs⁶.

The difference in cash incentives (a \$1500 payment versus a \$500 fee) may be explainable in terms of the difference in the valuation of the private benefits provided by the program. In Ontario, producers face no regulatory requirement to produce an EFP or similar planning document, nor do they face a regulatory system with specific environmental management requirements. As a result, the private benefits of the program accrue from the value of the information provided in reducing costs of production and in community relations. In Quebec farmers are provided 25 hours of individual advisor time, something that would cost more than \$500 if obtained from the private sector, and for cattle growers in particular this time would be well used in addressing regulations for manure management.

Box 6. Quebec Agro-environmental Advisory Clubs—the Basis for EFPs.

An agri-environmental advisory club is a voluntary association of producers with a shared interest in improving environmental management on their farms. Advisory clubs are organized on a regional basis and typically include about 20 to 70 farmers, although some are larger. The clubs are managed by farmers, so they determine the overall direction and activities of the clubs. Each club retains the services of a dedicated advisor with specialized knowledge of environmental management in agriculture.

To start an agri-environmental advisory club it is necessary to: assemble 20 members; form a board of directors; hire an advisor; design an action plan; and request le ministère de l’Agriculture, des Pêcheries et de l’Alimentation (MAPAQ) recognition.

Individual support offered through clubs can include an on-farm diagnosis, help in preparing a fertilizer plan (nutrient management plan) and a tillage plan as well as advise on pesticide use etc. It is estimated that each farmer receives 25 hours of individual professional advisory support a year.

The advisory clubs also offer extensive group support that can include the sharing of information among group members and the opportunity to participate in on-farm demonstrations and training workshops. The group structure also facilitates technology transfers and allows farmers to share the risk of trying new techniques on their farm.

Program Uptake

⁵ Ontario farmers receive the \$1,500 incentive money once they begin to implement their action plan.

⁶ The Quebec payment is a fee, not an incentive, as is noted in the text. However, it is included here as such a fee almost certainly has a negative impact on participation, and thus operates as an incentive.

In the last few years participation in the Advisory Clubs has increased rapidly. In 1998 around 15 clubs with 1000 members existed. In March of 2001 over 65 clubs with close to 4000 members were in place in Quebec. This represents 12 per cent of Quebec's farms and 18 per cent of agricultural lands and animal units in Quebec. Dairy farmers are the most likely to become a club member as they represent 53 per cent of all farmers that participate in a club. Dairy farmers are followed by crop farmers who make up 17 per cent of club members, and pork producers who comprise 13 per cent of club members. Farmers with animal operations benefit by joining an advisory club through which they can seek technical advisory services on nutrient management plans.

The Ontario EFP initiative was launched in 1993. It was developed by the Ontario Farm Environmental Coalition⁷ in partnership with AAFC and the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA.) The EFP is delivered by the Ontario Soil and Crop Improvement Association in partnership with OMAFRA. In 1993 a pilot program was launched involving 500 farmers across seven counties. The pilot was a success and by 2000 over 19,500 farm families in Ontario had participated in the EFP program. This total is about 35% of all farms in the province.

A number of factors influence program uptake. The most important are: (1) *Voluntary initiative*. A successful agri-environmental program is producer driven; (2) *Confidentiality*. In order to ensure farmers will be honest about the way their operation works and its environmental impact, confidentiality must be ensured; (3) *Incentives*. While farmers are more than willing to make changes on their farm to increase environmental sustainability, they often can't afford to make the necessary changes. A \$500 incentive used initially in Ontario was insufficient; (4) *Due Diligence*. Completing an environmental farm plan may help demonstrate due diligence on the behalf of the farmer; (5) *Profitability*. Under many circumstances an environmentally friendly farm is a farm that is more profitable. Decreases in pesticide and fertilizer use equals a decrease in the cost of production; (6) *Market Access*. Farmers who make a commitment to use environmentally safe practices may have an advantage in local and global markets; and (7) *Educational Benefits*. Producers who participate in an environmental planning process benefit from resource material either through a workbook in the Ontario EFP, or through shared expertise between participants in the Quebec Advisory Clubs. In general, environmental farm planning gives producers access to information regarding new and innovative farm technologies and practices, as well as an increased understanding.

Is There an Optimal Incentive Package?

The EFP approach to EFR raises a number of questions about how best to address the form of incentive (Box 7). There is a wide range of incentives offered in the various provinces. For example, The P.E.I. ADAPT Council, which manages federal CARD money, allocates assistance for producers to implement their EFP at a maximum of

⁷ composed of the Ontario Federation of Agriculture, Christian Farmers Federation of Ontario, AgCare and the Ontario Farm Animal Council

\$10,000 per applicant or 1/3 of the costs over \$1,500 The first \$1,500 towards the implementation of an EFP is reimbursed 100 per cent.

With the largest payout to producers for implementation of the EFP, P.E.I. also boasts the highest participation rate of producers of all provinces that offer an EFP program. Since 1996 when the program began around 850 farms have participated in the EFP process which represents over 40 per cent of P.E.I. farms, and over 35 per cent of the total agricultural area.

While it is difficult to determine what an ideal incentive package would look like, based on all provinces that offer an EFP (excluding Quebec) it would appear that \$1,000 would be the minimum payout to entice producers to implement their EFP.

Box 7. Questions Regarding EFP Incentives.

- Is there an ideal incentive package? What might be the components and level. How would we arrive at conclusions about what the package might be?
- Should incentives be different for large and small or medium-sized farms?
- Should incentives be linked to specific environmental objectives?
- What is the relationship of incentives to uptake or to actual environmental performance? What level of leverage is it reasonable for incentives to generate and how much will be used for public and how much for private benefits?
- Is there any justification for expenditures/incentives beyond the original incentive package?
- Is it an expensive program to manage—what is the efficiency?

Targeting is another issue. There is, of course, recognition that limited funds are available to be spent on agri-environment issues, either by the government or the private sector. Limited funding immediately implies the need to target funding towards the highest benefit or greatest need. In this case, it is not clear where that lies in terms of big vs. small farms, or hogs vs. cattle, vs. other commodities. There does seem to be consensus on the need to improve water quality and address risks to water supplies, but whether this will remain the main focus remains to be seen.

Neither is it clear who should pay. There are many caveats, and what they all seem to add up to is a need for flexibility and for local issues to be given play in the process. In a way, because they have evolved through the federal CARD fund and other sources that place emphasis on bottom-up design, EFP programs already do this. The process is allowed to speak in that producers identify the priorities and when and how to act on them. The best way for government to speed this process remains to be found, but targeting on the basis of environmental issue rather than farm size or commodity type would seem at first glance to work better with the EFP process.

Program Funding

Funding for the Ontario EFP program currently is provided by the Federal government through the CARD fund. To date, the Federal government has contributed over \$20 million towards the Ontario program, which has an annual budget of approximately \$2 million per year. The Province of Ontario provides in-kind support of the Ontario EFP program through technical assistance provided by extension officers.

The Quebec program is funded through a three-way cost-sharing agreement in which each partner contributes one third of the costs of the program. The Federal government, provincial government, and participating producers each contribute \$2.085 million annually to the program. The Federal contribution comes from the CARD fund, the Provincial contribution is through the *Prime Vert* program, and participants' contributions are through membership fees.

Assuming there is an on-going need for EFP, there is a need for dedicated funding to EFP, but who should pay for this, and how, remains to be seen. The CARD funding is not intended to be an on-going source of support. These questions of course raise additional issues such as the magnitude of funding per farm, whether on-going support for individual farm EFPs is warranted, and various issues about linking the EFP effort to other regulatory or incentive-based activities affecting farmers and the agricultural landscape.

Spillover with Other Programs and Regulations

There is a natural-enough aversion to use of the term cross-compliance, i.e., the notion that eligibility for one program would depend upon participation in another. Thus participation in an EFP generally has not been tied to other programs in a compulsory way. But there are several instances where there are obvious ties. For example, in Quebec, participation in a club is beneficial in providing access to expertise concerning manure management and, for some cattle farmers, access to further funding to address these problems. In PEI access to provincial Agriculture and Environment Resource Conservation (AERC) Program funding (up to \$30,000) requires completion of an EFP.

And, municipalities such as the region of Waterloo and others have programs in place that leverage the EFP process to obtain improvements in rural water quality. The Waterloo Rural Water Quality Program uses EFP as a screening criteria for access. Producers who have completed an EFP and are in an area of concern for surface or ground water qualify for cost-shared payments from the program to put in place best management practices related to water quality improvements. Payments can total up to \$25,000 with cost-sharing rates from 50% to 75% depending on the specific actions taken. The region of Waterloo has committed \$1.5 million to this 4-year program, with additional funding from the National Soil and Water Conservation program and the Grand River Conservation Authority.

Conclusions

An EFP is a means of addressing environmental awareness-raising and capacity-building within the farm community. The expansion of environmental plan use across the country and by expanding participation rate would foster the spread of information and the continuing education and re-education of Canadian producers as they move towards more sustainable practices.

But it has potential to go beyond these important needs. Because it creates incentives for action, there should be measurable positive impacts on the environment, on-farm or in the air and watershed. These may also be related to increased farmer interest and capacity to participate in other environmental improvement programs as a consequence of EFP participation. There also might be direct economic benefits, if, for example, participation in the program were to improve market access or reduce production costs.

An EFP appears to be an effective tool in helping farmers meet regulatory requirements by, first, educating them to what the requirements are and second, by helping farmers meet these regulatory standards with the proper tools and technology. In this fashion farmers can work within the regulatory system in a voluntary and proactive way. There is much caution expressed about how it might be used for cross-compliance, since a fundamental concern of farmers is confidentiality. They want to know about their farm's environmental issues, but generally, they do not want that information used against them, or to make participation in other programs contingent on the EFP.

A key gap in these programs is the lack of systematic monitoring of environmental impacts. The primary mandate of the programs is to provide useful environmental information to participants, but there is no direct investigation as to how that information is put to use and what the results of that use might be. A University of Guelph survey of Ontario EFP participants concluded that producers were taking action to complete their action plans, and that those producers felt that the process did prevent an "environmental peril" from occurring on the farming operation. The majority of respondents to the survey said EFPs "increased their awareness", helped them "identify potential problems/health risks" and "increased their knowledge (education)".⁸

This study identified risks to the health of the farm family, risks to soil health, and risks to water health as the main environmental issues addressed (in that order). A remarkably large investment apparently is made by participants who qualify for the \$1500 incentive payment. The survey estimated total investment levels of \$67 to \$112 million on the part of farmers. It is not surprising that most of the actions were focused on providing benefits to the immediate farm areas, on issues such as well covers, environmentally-safe storage of wastes, including manure, soil management and other matters that are of direct concern to the farm family. There is a major element of private benefit, and a lesser direct focus on public benefits such as wildlife and watersheds, although certainly some of the private benefits would spill over into these broader environmental concerns.

⁸ Fitzgibbon, Dr. John, Ryan Plummer and Robert Summers. *Environmental Farm Plan Indicator Survey*. (Guelph: University of Guelph, 2000) p.5

Environmental farm planning must be unique to each type of farm operation and the distinct geography of farms across Canada. There is considerable latitude in design, and it should be driven by farmer organizations and provincial considerations. So far the greatest interest has been within central and eastern provinces, but there is potential for a national program that takes into account these points.

MUNICIPAL PROPERTY TAX CREDITS FOR ON-FARM CONSERVATION AREAS

A municipal property tax credit (MPTC) is an instrument that could also be used to encourage various land uses for conservation action. Several examples are reviewed in Annex 2b, especially from the USA. The example chosen for detailed examination is a pilot project in Manitoba. The incentive effects of property taxes depend on whether mill rates vary by land use characteristics, on whether property owners know how the rates vary, and any other specific features of the property tax system. If the assessed value assumes the land is being used for production and the tax rate is uniform across all types of land uses, there is a clear incentive to use the land for agricultural products (crops, livestock production). Any unused land, i.e., land set aside for conservation (assuming a strict conservation interpretation of no agricultural use), will generate no revenues for the farmer, but will incur the property tax. As noted in Chapter 2, a profit-maximizing/cost-minimizing farmer will then only set aside land for conservation if development for agriculture generates net private losses.

If a rural municipality (RM) offers a *tax credit*, a reduction in property taxes for each acre of land set aside for conservation, the incentive is now much stronger to set aside for conservation land of low market value, but high ecological value. The tax credit is simply a negative tax and as such provides a reward for the landowner for conservation. However, the incentive will be strongest for lands that have the lowest opportunity cost, those with the lowest value in production.

Manitoba Pilot Project

A three-year pilot study covering two rural municipalities in Manitoba provides a \$1 per acre municipal tax credit for landowners who adopt specified environmentally sustainable land-use practices on portions of their land. Financial funding for the project comes from Ducks Unlimited Canada, the Prairie Farm Rehabilitation Administration, and the Northwest Soil Management Association, and the two municipalities provide support in-kind. Participation is voluntary. Land is eligible for the tax credit if it is used for conservation cover that includes tame forage, native grassland, wetlands, riparian buffer zones (trees or grass within 100 metres of a waterway), and annual cropland with a minimum of 40 percent straw cover. The size of the tax credit was based on two factors: \$1 per acre represented the average property tax paid in Manitoba for wetlands and bush, and it was felt that any smaller amount would not provide a strong enough incentive to get farmers to sign up for the program. The tax credit is clearly not sufficient to

compensate owners for the total ecological services provided by their land, but it provides a small amount of compensation for allowing society to benefit from conservation. The sponsors of the program also emphasize its educational value—illustrating to farmers the need for conservation practices and that society does value them.

Landowners must apply to the program each spring, specifying the lands that they consider eligible. RM staff helps the landowners prepare their applications. Satellite imaging confirms land uses in conservation cover for each applicant. Ground inspection for a small percentage of each RM's area helps to ensure compliance. Tax credits to those in compliance are paid at the time taxes become due in the fall. The program has protected some 6,538 acres of wetlands, 15,116 acres of land under conservation tillage, and 39,334 acres of tame forage, native prairie and riparian zones. This represented 31% of the land base in 2000. The average tax credit pay-out was \$261, with individual farmers receiving between \$1 and \$1,628. An evaluation of the program via mail survey indicated that 86% of participants agreed the program was worthwhile and 88% agreed the property tax system was effective compensation. The total cost of the program in 1999 was \$75,787, of which approximately \$61,000 represented the tax credits paid and the balance covers modest administrative costs (satellite imagery and classification, advertising and communications, labour, travel, processing, and evaluation of the program.)

Social benefits are believed to include (1) *Improvements in Environmental Quality* such as: preservation of soil quality/reduction in erosion, improvements in water quality for drinking water and recreation, reduced flooding, increase in and maintenance of wetlands, protecting air quality (carbon sequestration), preservation of riparian ecosystems with associated benefits, biodiversity conservation, wildlife habitat enhancement for aquatic and terrestrial species, and energy conservation; and (2) *Reduced public expenditures on environmental infrastructure* such as: less silt removal needed from waterways, lower water treatment costs, reduced flood control expenditures, lower erosion, culvert, and crossing repairs, and less drain clogging. Neither set of benefits have been quantified.

Environmental improvements resulting from conservation induced by a MPTC may reduce a municipality's costs of supplying public services. Improvements in environmental quality may also, over time, lead to higher productivity on lands in production due to e.g., less erosion. This could raise land values, and in turn, generate more property tax revenue. A benefit only emerges if the tax revenue leads to an increase in the provision of public goods and services. The municipality may respond by simply lowering the mill rate to stay within a given target revenue range. The MPTC over time might even lead to a more diversified local economy through more recreational opportunities on conserved lands, more tourism, different crop mixes, and so on. The well being of residents may rise.

The costs of the MPTC program depend on how the program is administered and the sources of the funding. The tax credit are not really a social cost from the viewpoint of

the local government if the funding comes from the province, federal government, or other sources that would have otherwise spent their money in other regions.

Landowners who participate in the MPTC program obviously benefit from the payment of the tax credit. However, for a profit-maximizing landowner, land will be allocated to the program as long as the payment (and any appreciation in property values due to capitalization of now lower property taxes into land prices) exceeds the alternative uses of the land plus any costs the landowner occurs by participating. Therefore, no incremental net benefits arise from the MPTC. The list of potential private benefits to the landowner include: the property tax credit, environmental quality improvements, product diversification, enhanced forage, better relationships with local government, formal recognition of conservation activities, and economic rent from appreciation of property values.

Analysis of Social Benefits and Costs

The net benefits of a property tax credit program for conservation should enumerate the total benefits of the program and net out the total costs. If these occur over time, the present value of the net benefits should be computed. If one wants to assess the 'value' of the program, the focus should be on *social benefits and costs*—those incurred by society as a result of the program.

The *social benefits* may include improvements in environmental quality; reduced public expenditures on environmental infrastructure, restoration and mitigation of damaged environmental resources; greater level of environmental awareness that provides a stimulus for land owners to undertake more private initiatives for conservation; and spillovers/synergies with other programs. *Social costs* could include foregone revenues (and hence, goods and services produced) by the municipalities who participate in the MPTC program; incremental administrative costs of the program (above the 'normal' operation of property tax collection); and costs of assessing the program's effectiveness in meeting environmental targets.

The next issue is at what level of jurisdiction should the social benefits and costs of a MPTC program be measured—the municipality, region, province, or nation? Normally, one would focus on the jurisdiction doing the decision-making, in this case, the municipality. But this is problematic for the MPTC because the environmental benefits may extend far beyond the boundaries of the municipality. As well, a share of the costs of the programs may be borne by governments or agencies outside of the jurisdiction. This further complicates the calculations. Ideally, a calculation should be done at three levels—local, provincial, and national. In our case, data limitations require a focus that is more regional, allowing for the calculation of environmental benefits that spill over local boundaries.

Factors Influencing Success

Assessment of existing and past MPTC programs and the data available to date do not allow for precise measurement of any program's success, primarily because the environmental benefits have not been assessed and quantified. However, lessons can be learned from the Manitoba case and other examples to draw some conclusions about what components of the MPTC program and other external factors help contribute to a program's success (Box 8).

Box 8. Factors Contributing to a Successful MPTC Program.

(based on experience in various North American programs reviewed in Annex 2b.)

- Support is required from a broad spectrum of affected parties, including local government
- Voluntary program
- Tax credits than can reduce a landowner's property taxes below zero are more appealing than those constraining tax credits to total taxes paid
- Should be annually reviewed, with features that permits reversible land use if conditions change and it should return cash to the farmer each year of participation
- Programs that have relatively small minimum acreage required for participation are more flexible and desirable from the landowner's viewpoint
- Administrative simplicity—programs with fewer and less complex eligibility requirements will be more successful
- Public awareness and political climate should be right, with no sense that the program is an unwarranted subsidy, but simply a payment that recognizes the social benefits from conservation that occurs on private lands
- Design that is not likely to initiate any international trade actions
- Adapted to local conditions and more flexible than “one-size-fits-all programs”
- “Stand alone” program that does not require landowners to participate in other programs, but can be readily integrated with other conservation programs.

The steering group that designed the Manitoba MPTC have produced an interesting list of principles they believe might guide such programs (Box 9). Whether such a lengthy number of principles is warranted is another matter. Certainly at least some deserve consideration in design of future programs.

Box 9. Principles for a Municipal Tax Credit Program.

The Environmental Tax Working Group that has steered the Manitoba Municipal Property Tax Credit has produced an interesting set of principles for such programs:

- Complementary with other agency's mandates.
- Societal acceptance and broadened funding support.
- Economic and social viability.

- Broad program availability.
- Voluntary.
- Regional flexibility, meeting local priorities.
- Integration with existing delivery systems.
- Recognition and rewards for sustainable land and water management.
- Targeted.
- Trade neutral.
- Based on good science.
- Effective marketing and communication.
- Clear goals and effective evaluation.

Implementation Challenges

Based on review of several MPTCs in North America, the challenges include: (1) *Sustainable Program Funding* since the tax credit reduces municipal revenues, at least in the short run. Programs require some form of long-term funding, probably from senior levels of government because of the spillovers of public benefits from improved environmental quality beyond the local region. Other options could be considered, including potential tax shifting features. For example, the federal government could rebate to municipalities offering conservation MPTCs a higher percentage of their GST payments than currently granted; (2) *Low Participation Rates/Lack of Awareness of the Program* arising from too large a minimum size of acreage covered, lack of awareness of the program (not enough advertising/communication), eligibility requirements that are too costly and complex for the landowner to comply with (if costs of compliance plus foregone revenues exceed the tax credit, the landowner will not participate), and program design not well targeted at clear environmental objectives; (3) *Difficulty in Measuring MPTC Environmental Benefits*. This is a challenge less amenable to “easy fixes” since it is difficult to measure how much environmental quality has improved, especially since the assessment of conservation value of lands may be crude; (4) *Whether the PTC is even Necessary?* The issue here is how to ensure that the MPTC isn't being granted for actions landowners would have undertaken themselves without the incentive of a tax credit; (5) *Determining the Tax Credit*. A rate too low will fail to get participation; a rate too high gives the landowner unnecessary rents. An advantage of an incentive-based policy is that the administrators can iterate to an appropriate rate; and (6) *Integration with Other Programs: How to Avoid Double Dipping*. If more than one program operates in a region simultaneously, the challenge is to ensure that the landowner is not collecting two payments for exactly the same activities unless this is the goal (due, e.g., to different funding sources). Proper accounting for conservation activities is required, as is consultation among all possible sponsors of conservation cover programs (at each level of government).

Conclusions

The MPTC is an incentive-based policy that merits continuation and extension of pilot programs as one of a potential suite of EFRs designed to improve environmental quality. A MPTC creates a market-like value for conservation activities valued by society but not traded in traditional markets. The landowner faces the “price” (tax credit) per unit of land if specified conservation activities are undertaken and equates this price to the land's marginal returns in any other use. While typically a modest incentive, it gets across the idea of valuing non-market environmental benefits to landowners. Programs with clear eligibility requirements, low compliance costs, and flexibility in land allocated through small minimum acreage are more likely to succeed in having respectable participation rates. In turn, these are more likely to deliver environmental benefits. Key challenges are funding the tax credit and measuring the net benefits from the programs to ensure that they are successful in improving environmental quality in a cost effective way.

CONSERVATION COVER PROGRAM (CCP)

In the past year, Ducks Unlimited Canada has proposed a national conservation cover incentive program CCP. Targeted lands would have a number of conservation values, such as those exhibited in riparian zones or wetland areas. A CCP provides for the removal of these lands from agricultural use either permanently or for a period of years. Economic incentives to encourage this land conversion provide a policy instrument that facilitates a public investment into private land use decisions to ensure that the agricultural landscape provides a range of goods and services valued by society. These external environmental benefits may include a number of factors associated with improved water quality, including decreased treatment costs; lower dredging costs to remove sediment from water conveyance and storage infrastructure; and increased recreational opportunities including fishing and swimming. Other external benefits may include greater wildlife use, biodiversity, stewardship for species at risk, aesthetic values, increased carbon sequestration and decreased net greenhouse gas (GHG) emissions, and mitigation of flooding.

External costs of the conservation cover program may include the extra costs associated with delivering land conversion incentives and compensation required for incremental crop depredation by wildlife. In addition to these external costs and benefits a range of private costs and benefits will be imposed on the individual landowner who is converting a portion of his or her land.

This study evaluates the external benefits and costs of a CCP using information relevant to three watersheds located in various regions of Canada. It is assumed that if the landowner decides to convert a parcel of land to conservation cover, the private benefits, including the economic incentive provided by the institution responsible for delivering the program, are greater than the private costs associated with the conversion. Therefore, quantifying only the external benefits and costs associated with the land conversion will facilitate calculation of the net external benefits (or costs) of the program. The three river

basins/watersheds located in various parts of Canada include: the Upper Assiniboine River Basin of Saskatchewan and Manitoba; the Grand River Watershed located near Guelph, Ontario; and the Mill River Watershed, in western PEI. These units were selected because they represent important agricultural landscapes and because reasonable data exist for each one.

While some data problems remain, especially for the Mill River, there is a consistent pattern that demonstrates a very substantial net external benefit from a conservation cover program. In the case of the Grand River the best estimate was net external benefits of \$195/ ha/ year (range \$79 to \$342). The Upper Assiniboine River demonstrated net external benefits in the range of \$29 to \$106, with a best estimate of \$65/ha/year. Information on the Mill River was much less complete, so that the values were extremely conservative, not taking into account several important variables that would raise the net external benefits. Still the best estimate was \$144.75/ha/year (range of \$69 to \$236).

In the case of both the Upper Assiniboine River and the Grand River it has been possible to determine optimal program impacts using a supply response based on known lease rates. Tables 1 and 2 show the calculated values for the external benefits and the calculated optimal program impacts for each river.

The external benefits in this and the Grand River case both show a similar pattern (with net benefits higher in the Grand than the Assiniboine watershed). The largest external benefits arise from a combination of carbon sequestration and Greenhouse Gas Emission reduction. But the next largest benefit is saved government payments because land is taken out of agricultural production. In the Grand River case the figure is even higher (\$46 compared to \$12). Also in the Grand River, there are additional benefits such as phosphorus reduction (\$23.50), recreational fishing (\$26) and high non-consumptive wildlife use value. These all contribute to the higher net external benefit for a CCP in this river which flows through areas of relatively high human population density.

The major contribution of this study is the substantial level and quality of information compiled. An economic analysis like this has not been done before. Moreover, the economic analysis is not “back-of-the-envelope” guesses. The figures are rigorously developed from the best available economic and ecological information. They make a compelling case that a conservation cover program would provide a very good return to society in a variety of watershed settings representing different environmental and regional conditions across Canada. The figures compiled for each case represent an “average” watershed situation—a baseline condition. Through further fine-tuning, it would be possible to examine the benefits for particular kinds of conservation cover programs, for example, of riparian zones. This fine-tuning would require more information on the specific impacts of riverside and watershed cover of various types on factors such as sediment trapping by riparian vegetation, or nutrient removal, enhanced fish production, etc. In each instance such information would have to be translated into economic impacts.

Table 1. Estimates of external benefits of a conservation cover program in the Upper Assiniboine River Basin in eastern Saskatchewan and western Manitoba.

External Benefits (costs) \$/ha/yr	High	Best Estimate	Low
Saved Government Payments	19.25	12.83	6.42
Saved Crop Insurance Premiums	5.27	3.51	1.76
Water Quality – Sediment	9.34	4.62	1.34
Water Based Recreation	1.37	0.91	0.46
Wind Erosion	4.01	2.67	1.34
Change in GHG emissions	14.07	9.38	4.69
Carbon sequestration	29.40	19.60	9.80
Wildlife – consumptive use	19.11	10.71	5.36
Wildlife – non-consumptive use	6.45	4.16	2.08
<i>Gross Benefits</i>	<i>108.25</i>	<i>68.39</i>	<i>33.23</i>
Program Administration costs	(1.04)	(2.08)	(3.12)
Depredation compensation	(0.32)	(0.64)	(0.96)
<i>Net external Benefits</i>	<i>106.89</i>	<i>65.67</i>	<i>29.15</i>
Supply response			
Ha per \$35/ha payment	25,000	12,000	6,000
Optimal Program Impacts			
Area in program (ha)	76,350	22,515	4,996
Gross External benefits	\$8,264,888	\$1,539,830	\$166,002
Program costs	\$8,240,465	\$1,525,420	\$161,205
Administration costs	\$79,404	\$46,832	\$15,588
Payments to producers	\$8,161,052	\$1,478,588	\$145,617
Cost to producers	\$4,080,526	\$739,294	\$72,808
Gain to producers	\$4,080,526	\$739,294	\$72,808
Overall gain	\$4,080,526	\$739,294	\$72,808

The three watersheds were chosen to represent different agricultural regions and thereby different climates, farming operations and farming practices. The information clearly could be refined over time, and the analysis to date has revealed a variety of data gaps. In its own right this shortcoming can add value, for it highlights research needs. There would be high returns to our knowledge by compiling additional and better information around these three rivers, rather than repeating the exercise at a superficial level in other basins. The values obtained for these rivers can be used in regional program designs of various types. For example, the data could help in the design of EFPs and MPTCs.

Table 2. Estimates of external benefits of a conservation cover program in the Grand River watershed in southern Ontario.

External Benefits (costs) \$/ha/yr	High	Best Estimate	Low
Saved Government Payments	69.98	46.45	23.23
Water Treatment - sediment	10.27	5.60	1.87

Water Treatment - phosphorus	44.50	23.50	2.50
Sedimentation of conveyance/storage	1.27	0.69	0.23
Decreased flooding	7.50	4.80	2.10
Increased recreational fishing	48.44	26.42	8.81
Other river-based recreation	2.80	1.40	0.70
Change in GHG emissions	28.80	19.20	9.60
Carbon sequestration	26.85	17.90	8.95
Wildlife – consumptive use	35.04	17.52	8.76
Wildlife – non-consumptive use	68.97	34.49	17.24
Gross Benefits	344.12	197.97	83.99
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Program Administration costs	(1.04)	(2.08)	(3.12)
Depredation compensation	(0.32)	(0.64)	(0.96)
Net external Benefits	342.76	195.25	79.91
Supply response			
Ha per \$100/ha/yr payment	10,800	7,200	3,600
Optimal Program Impacts			
Area in program (ha)	37,018	14,058	2,877
Gross External benefits	\$12,738,291	\$2,782,921	\$241,604
Program costs	\$12,726,445	\$2,773,924	\$238,843
Administration costs	\$38,498	\$29,239	\$8,975
Payments to producers	\$12,687,947	\$2,744,684	\$229,868
Cost to producers	\$6,343,973	\$1,372,342	\$114,934
Gain to producers	\$6,343,973	\$1,372,342	\$114,934
Overall gain	\$6,343,973	\$1,372,342	\$114,934

Conclusions

While the models used are far from perfect, they do provide honest and credible attempts to estimate the external benefits of a conservation cover program. The case studies demonstrate very substantial net external benefits from a conservation cover program and suggest a strong enrollment response from landowners. The economic models for the Upper Assiniboine River and Grand River case studies reveal that the largest external benefits arise from a combination of carbon sequestration and greenhouse gas emission reductions and saved government payments when land is retired from agricultural activities.

The major contribution of this study is the substantial level and quality of information compiled and analyzed in one model—and the concurrent identification of the gaps that exist in our scientific knowledge of the environmental, societal and economic benefits of a conservation cover program. Undoubtedly there are years of scientific investigation needed to irrefutably establish or reject the “best estimates” as scientific fact. However, this should not prevent the development and implementation of a conservation cover incentive program in Canada. Indeed, the USDA developed the Conservation Reserve Program (CRP) with far less information as guidance.

Some 15 factors have been identified as important in the development of a successful conservation cover incentive program (see Annex 2c). Many parallel the lessons learned from the US Conservation Reserve Program (as noted in Box 3). While there may be overwhelming evidence that a Conservation Cover Incentive Program could be very successful in Canada, the development of this program in Canada will face challenges. These challenges include:

1. *The Federal Government's history of a short term, crisis management approach to assisting farmers.* Few would argue against the notion that the entire farming paradigm needs to be changed—both from producer and government perspectives. But patience and leadership will be required from the Federal Government in order to design an effective conservation cover program that maximizes environmental benefits relative to program costs.
2. *Seeking sectoral financial leadership and partnership.* Clearly, Agriculture and Agri-food Canada needs to lead any CCP initiative, along with their provincial counterparts. However, a Conservation Cover Incentive Program would very positively affect the missions of all 5NR federal agencies and their provincial counterparts. Therefore, it is in the public's interest for all of these government departments to financially support any such initiative. Additionally, non-government conservation organizations have a substantive role to play in bringing this national program to the community level.
3. *Whether the Government of Canada wants to provide the Canadian public with environmental benefits through the use of taxpayer-funded environmental stewardship payments to farmers?* An economic and environmental case has been put forward in the study included as Annex 2c. that a CCP is a solid and sensible solution to help address the long-term environmental sustainability of Canadian agriculture. Yet there are many competing priorities for funding in this and other sectors.

CHAPTER 4. CHALLENGES AND OPPORTUNITIES—THE WAY FORWARD

Farmers throughout Canada have been recognized for their leadership and commitment to conservation. There are many inspiring examples of what vision and long-term commitment can accomplish in terms of maintaining both production and conservation on individual farms—whether these are in Alberta foothill ranches, prairie pothole landscapes, Ontario dairylands, Quebec farms shaped by the seigneurial system farms along the St. Lawrence, or the farm/woodlot ecosystems of the Maritimes.

It is fair to say, however, that the level of farmer understanding and acceptance, and political and administrative conditioning and awareness towards an environmental incentive approach are still at quite an early stage for the full application of EFR in the protection of ecological integrity and conservation within Canada’s agricultural landscapes. As the variety of examples discussed in the report demonstrate, the timing is ripe for expanded understanding and implementation on greater use of on-farm incentives to achieve the goal of improved environmental integrity within agricultural landscapes. Starting points are already in place, for example, the detailed case studies plus initiatives such as the ecological gifts program.

Challenges

There seems little doubt that EFR initiatives can be successfully implemented within Canadian agricultural landscapes. This review suggests that EFR provides a clear mechanism for society to safeguard and provide ecological services. The case studies and other examples studied suggest that success depends on engaging a substantial portion of the farmers within whatever region is selected. It will no doubt be necessary to adjust incentives, to consider the impact of issues such as cross-compliance, and to build a level of understanding about what exactly is to be achieved. There are practical concerns including those noted in Box 10. And certainly any change from the *status quo* will be challenged by some affected parties.

Opportunities

Compelling strengths of the programs discussed in detail within this paper are that they are voluntary and have the potential to save society and governments money. The case studies have illustrated that MPTC pilot programs and EFPs are in place and on the basis of the limited analysis to date, appear are achieving their objectives—greater conservation activities achieved at relatively modest costs per acre or hectare. The data on benefits from a CCP are compelling even if one takes the low estimates of the social benefits.

The available range of instruments provides many options and opportunities to assemble suites of instruments that are mutually supportive, that expand the opportunity for voluntary action, stewardship, and that help lend substance to the notion of eventual “green branding” of Canadian agriculture. Definitely there must be a progression from building awareness and knowledge, to implementation, and to adequate assessment of outcomes such as improved environmental conditions in agricultural watersheds and landscapes.

<p>Box 10. Some Potential Barriers to Implementation of EFR for Agricultural Landscapes.</p>

- An atmosphere of continuing crisis in relation to farm support programs, with a lobby for reinstating production aid packages. This may work against innovation.
- A mixed level of farmer support, with some farmers who fear that conservation-oriented programs could force them out of production, substituting urban for rural values; or that conservation-oriented support is unlikely to adequately replace lost production income.
- Governmental concerns about the feasibility, lost revenue, additional costs, administrative burden and other factors that might be associated with EFR.
- Federal-provincial differences of opinion about program design and funding requirements.
- On-going debate about what will actually be accomplished through application of conservation biology concepts to agricultural landscapes—will the impact be sufficiently positive to justify substantial changes in land management? This problem is exacerbated if monitoring of environmental results is inadequate.
- Lack of detailed knowledge about the operation of EFR instruments on the part of decision-makers, including farmer organizations, concerning matters such as transition strategies, political acceptability, impacts on national, provincial and municipal revenues.
- Concern that voluntary incentive approaches may become a back-door entry to enforced regulatory compliance.
- Concern that new programs, especially those involving significant program expenditures, will be viewed as new subsidies by producers in other countries—who may start expensive, even if misdirected, international trade actions.
- Limited capacity within administrative systems to carry out the type of integrated programs and horizontal cooperation among agencies that is desirable for addressing environmental issues at the landscape level. A coordinated approach involving two or three levels of government, suites of instruments, and linkages among voluntary programs is needed but not easy to implement.

The value of environmental farm plans is to act as a precursor for action—by providing the baseline knowledge and opportunity to “kick-start” small initiatives at the individual farm level. The municipal property tax credit shows that even a small incentive can be helpful for reinforcing conservation behavior. The EFP and MPTC are very complementary since the former would help to identify for the landowner which lands would be best to set aside. Also municipalities might wish to extend MPTC to those with an EFP. Economic analysis of net external benefits could be used not only for CCP design but also for a range of other purposes, including the monitoring of which lands are most valuable for conservation easements or other applications of incentives such as the MPTC.

The various cases demonstrate that each level of government can take a role in EFR for agricultural landscapes. This is attractive for the use of suites of instruments. But not every level of government needs to be involved in each case. For example, the federal role in MPTC is likely to be less than provincial and municipal governments. However, the MPTC should reinforce other EFR initiatives, including those involving the federal government.

The study has noted a number of key factors influencing program uptake. Certainly one very important matter is to remember that one size will not fit all. Provincial inputs and philosophies, flexibility of designs based on inputs of specific agricultural sectors and regional groups, simplicity in operation and administrative rules (even if it may mean less

capacity for targeting at the initial stage), and modest administrative costs are all hallmarks for a successful program.

There is a need to examine how best to tailor EFR to specific regions, especially when several initiatives are layered, possibly on present command and control regulatory approaches such as zoning. A “one-window” approach may be helpful for farm producers faced with a variety of programs and regulatory concerns. It is not clear what level of uptake constitutes success. In the USA and elsewhere the demand for programs such as CCPs generally outstrips capacity to fund them. For initiatives such as EFPs in Canada, the programs are still functioning below the level desired. But five years from now, it is likely, within at least some provinces, that a majority of farms will have them. This raises interesting possibilities about what might then be accomplished with complementary programs and spillovers, for example to regulatory matters such as manure management.

Strategic investment in science and program assessment is required to support the various EFR initiatives. There is far too little monitoring of results and outcomes. And it is difficult to sort out the value of individual programs when several are contributing to changes. Science must be linked in many instances to economic analysis. This is most clearly demonstrated in the watershed net external benefit analysis. While this is the best effort at a landscape-scale quantification of costs and benefits so far, it is far from perfect. There are years of work ahead, especially for targeted activities such as riparian zone conservation initiatives. However, this should not prevent the development and implementation of these programs.

Indeed, programs could be designed using the Adaptive Resource Management model (Gunderson et al., 1995), whereby programs could be implemented with the clear intent from the outset of evaluating their effectiveness through rigorous scientific monitoring. The results of these scientific investigations could then be used to adjust or fine-tune the programs so that they can more effectively and efficiently achieve their intended targets (e.g., water quality). Much of this work must focus upon integrative approaches such as the use of GIS and other tools that can make sense of large and disparate databases. It is a very cheap way for society to obtain information about the environmental conditions and ecological dynamics of agricultural landscapes.

But it is important to recognize and respect the need for confidentiality. If farmers, for example those participating in EFPs, believe the information will be used in a regulatory fashion, it will be very difficult to get cooperation. Transparent assumptions are needed, so that it is possible to understand and, sometimes, challenge the quality of information on which benefits and costs are being calculated.

The outcome of EFR in agricultural landscapes needs to be focused on the positive net benefits/externalities for society. Private benefits may also accrue, but it is not necessary for society to pay for them. In the design of programs, revenue neutrality may or may not be a goal. As noted in the studies, these programs have the potential to be effectively revenue neutral if the conservation activities result in lower costs to government for mitigation of environmental degradation. The important point is to be able to

demonstrate as clearly as possible that the results do truly reflect a cost-effective positive level of social benefit. The expression of benefits must be clearly understood by a range of people and organizations, including producers, stakeholders and decision-makers. Failure to do so will threaten otherwise well-planned initiatives. Often this will mean partnerships that can both generate and use knowledge in an adaptive fashion—learning by doing, as outlined above.

“Mission-Critical” Components

By way of summary it is worth reviewing several “mission-critical” components that are likely to influence the successful planning and eventual outcome of an EFR approach in the context discussed within this paper. Much more could be said about each of the components identified below. The intent here is to provide some concepts that may be of value in design and implementation, and, as important, in moving from uncertainty to acceptance of the very notion of EFR.

Transition Strategies

- Assume the transition towards EFR is already underway, with a number of unifying themes emerging at federal, provincial/territorial levels and within some municipalities. Attempt to move beyond “willingness to explore” to “design, implement and monitor” stages.
- Build upon federal/provincial/territorial commitment of agricultural ministers (June 2001) to accelerate environmental action on-farm by incorporating EFR within approaches that could be defined over the coming year.
- Continue to move from the general to the very particular, building upon pilot projects and scientific information to generate initiatives that have clear outcomes and ease of implementation.
- Strengthen the role of precursor activities that create practical knowledge and awareness on the part of farmers about their farms and the context of environmental improvements. The EFPs are an excellent example of how this transition might occur.
- Support decisions by linking high quality information with rigorous analysis such as that provided in the conservation cover case.
- Search for complementarity among measures and consider their spillover effect. The value of EFPs in Quebec in relation to manure management regulations is an example. More generally, the complementarity among all three of the detailed case studies is striking.
- Build on modest initiatives, such as the MPTC in Manitoba, which is low cost but enjoys a good level of buy-in. Examine whether several modest programs can be linked to produce synergies.
- Create on-going dialogue nationally, regionally and locally so that learning on the part of farmers, administrators, political decision-makers and others is continuous and so that problems can be addressed and program adjustments made before they become crises.

- The transition will take place over a long time span, certainly at least a decade or more. Thus strategies can be staged, starting with initiatives that are likely to be relatively straight forward to implement and to demonstrate results.

Delivery Capacity within the Agricultural and Environmental Sectors

- Recognize that institutional capacity problems and barriers exist and therefore need to be identified and action taken for EFR to achieve its potential. There are several indications that the right signals are starting to be sent. These include: an increasing focus on integration and horizontal cooperation; a substantive round of sustainable development planning and reporting; the growing focus on “green branding” and the recognition of the need to treat environment as an issue critical to the future viability of Canadian agriculture; the interest expressed by departments such as Finance and Environment (and some provincial/territorial counterparts) in market incentives.
- Coordinated, ecologically-based program planning and delivery mechanisms are needed.
- Issues such as consistent funding, ability to set clear policies and targets, and capacity to assess performance will influence delivery.
- Central agencies such as Finance and Treasury Board require compelling cases to be made, perhaps with more and better information than exists for current regulatory and program expenditure regimes. The capacity to do so must be built since this will be an on-going concern.
- Delivery capacity will be affected by the success of building partnerships and voluntary action. Over the longer-term, resources currently devoted to delivering environmental regulations primarily through command and control mechanisms may be redirected.

Partnerships to Deliver Effective Programs

- “One-stop shopping” involving federal, provincial and possibly municipal levels of government, and, where appropriate, covering both governmental and non-governmental arrangements. This approach may be used to reduce transactional costs for farmers and farm groups, provide better consistency of funding, eliminate duplication and avoid any potential for “double-dipping”, and open opportunities for using suites of instruments for maximum synergy and efficiency in achieving desired outcomes.
- Bottom-up design and implementation criteria to meet farmer concerns and subsector or local needs.
- Cost-sharing, with documentation of both private and public benefits and costs. This information is important to have for refinement of programs, including recognition of farmer capital and operational costs, and definition of the appropriate burden to be borne by governments for societal benefits.
- Cost-effective knowledge-gathering and dissemination in the context of continuous learning, innovation and adaptation.

Monitoring/Evaluation/Assessment in Support of Adaptive Management Approaches to EFR

- Commitment to science-based but participatory experimentation approach so that program adjustments can be evidence-based and with the guidance of farmers.
- Information needed for integrated land and water management can be gathered with techniques such as GIS that draw upon a wide range of types and sources. As suggested by the conservation cover analysis, it will be better to extrapolate from several regionally representative, well-researched watershed cases than by gathering more superficial information from a large number of locations.
- Modeling and “visualization”. Building understanding of potential outcomes and alternative approaches that might use different combinations of instruments is vital to optimizing design, creating understanding and support, and monitoring progress. Various modeling tools that help illustrate potential and actual performance are available and might be used interactively with decision-makers, administrators and farmers.
- Performance assessment needs to be factored into budgets for EFR. Currently this does not seem to always be the case, and certainly not as much assessment occurs in the critical early years of programs.

Communication/Public Awareness Programs

- EFR is new to most people and there is an inherent caution about embracing changes that may be feared to affect taxes, to reduce existing support packages, or to open the door to more onerous burdens. The most effective way to build understanding is, of course, through direct participation, or by learning through the actual experience of others. This observation helps explain the success of EFPs in Ontario and Quebec. Part of the value of pilot initiatives such as the Manitoba MPTC is the conditioning provided by a cheque in the pocket compared to distant and theoretical discussions of public and private benefits.
- At present, there is certainly no concerted effort to explain EFR to farmers or to the public. Within government systems, the level of understanding is similarly limited. The very breadth of the instruments, and the use of terms such as tax credits, pollution taxes and tradable emissions permits raises caution on the part of some members of the public. Indeed, the use of the term “voluntary initiative” is felt by some to be a means for governments to weaken regulations. Thus communication and public awareness raising needs to be a long-term commitment, with consistency in messaging.
- One of the most powerful means for addressing information needs and awareness raising on the part of farming subsectors is through dialogue fostered and maintained by farmer organizations. A two-way conversation linked to partnerships for design and implementation of EFR makes sense.

Regional Tailoring

- Geographic and Sectoral Considerations
 - Regional differences (western, central and eastern) or based on ecozones.
 - Main types of farm habitat and sub-sector activities under consideration.
 - Scale issues (e.g. large industrial farming, large ranches, smaller operations and mixed farms).
 - One size fits all vs. tailored programs: generally, tailored programs that have benefited from farmer and farm organization inputs
 - Equity/fairness implications may arise and have to be addressed as a consequence of tailoring. As the EFP approach demonstrates, there can be considerable variation even within the context of a single program that operates with shared decision-making between provinces, the federal government and producer organizations.
 - Legal and constitutional issues need to be recognized, for example, when making recommendations about municipal taxation, or in the context of identifying outcomes such as those related to water quality protection.
 - Likely acceptability at political, administrative, conservation and farmer levels. While regional tailoring may help to adjust intended programs to local differences, there are distinctive views that need to be appreciated. For example, Alberta's views on EFPs may be quite different than Ontario's. But, as the EFP case of Ontario and Quebec reveal, similar objectives may be achieved through quite different designs.

Conclusion and Recommendations

EFR for agricultural landscapes will be implemented only to the extent that demand exists to drive programs forward, sometimes in the face of barriers that favour the *status quo*. At least some of the demand will be generated through global accords such as climate change, where there is interest in carbon sequestration, and voluntary initiatives such as greener production certification at national (e.g. Swedish Seal Program) or international levels. Unless net societal benefits are clearly articulated and can be verified by monitoring of outcomes, the full value of EFR approaches, which do provide farmers with flexible options, is not likely to be achieved.

The following recommendations are proposed for follow-up action to this report.

- (1) the NRTEE should continue its exploration of EFR, with a focus on increasing understanding of the potential applications to the agricultural sector, and by providing specific recommendations to governments (federal and provincial) that would assist in the design and implementation of such initiatives;
- (2) federal departments, led by AAFC, develop a plan for “green branding” of Canadian agriculture nationally and internationally that fully incorporates EFR, including voluntary initiatives that can be implemented through farmer stewardship;

- (3) meet the June 2001 ministerial commitment to accelerate the pace of improving environmental practices on-farm by expanding programs based on EFR, for example, via environmental farm plans, municipal property tax credits and conservation cover initiatives;
- (4) develop specific high-priority conservation cover and environmental initiatives based upon the watershed ecological-economic analysis presented in this report, for example, designing a program for improving water quality associated with farm runoff;
- (5) expand federal and provincial commitment to the gathering and sharing of information on the effectiveness of EFR initiatives, indicators of success, and to development of mechanisms for using this information in the design of complementary EFR initiatives employing suites of instruments; and
- (6) farmer organizations prepare to become more involved in the promotion, design and implementation of EFR initiatives, with a focus on becoming active partners in the development of regionally and sectorally focused approaches.

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(Additional references are appended to individual reports in Annex 2.)

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ANNEXES

1. List of EFR and Agricultural Landscapes Working Group Members
2. Case Study Reports:
 - 2a. Environmental Farm Plans (EFP) and Ecological Fiscal Reform
 - 2b. Property Tax Credits for Conservation
 - 2c. Conservation Cover Incentive Case Studies: Grand River Watershed, Ontario, Upper Assiniboine River Basin, Saskatchewan and Manitoba, Mill River Watershed, Prince Edward Island

ANNEX 1. List of EFR and Agricultural Landscapes Working Group Members.

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Richard Dixon	Policy Secretariat, Alberta Environment
Bob Dobson	Conservation Farmer, Cobden, Ontario
Jan Dyer	Associate Director General, Agriculture and Agri-Food Canada (AAFC)
<i>AAFC Alternates:</i>	<i>Jackie Holden, Cross Sectoral Policy Development</i> <i>Asim Maqbool, Research Economist</i> <i>Roger Martini, Economist, Special Projects</i>
Brian Gray	Director of Conservation Programs, Ducks Unlimited Canada
Frédéric Guay	Analyses économique, Ministère de l'Environnement du Québec
Arthur Hanson	Distinguished Fellow and Senior Scientist, Int'l Institute for Sustainable Development (IISD); Strategic Advisor, EFR Program
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Nancy Olewiler	Professor, Dept. of Economics, Simon Fraser University
Sara Rose-Carswell	NRTEE Policy Advisor, EFR Program

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David Armitage Senior Researcher, Ontario Federation of Agriculture

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