Towards a Market-Based Approach for Ecosystem Services in Alberta

Report prepared for the Institute for Agriculture, Forestry and the Environment

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March 2010

the PEMBINA institute
Sustainable Energy Solutions

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Suggested Citation:

The Pembina Institute. (2010). Towards a market-based approach for ecosystem services in Alberta. Report prepared for the Institute for Agriculture, Forestry and the Environment, pp. 59.

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The Pembina Institute is a national non-profit think tank that advances sustainable energy solutions through research, education, consulting and advocacy. It promotes environmental, social and economic sustainability in the public interest by developing practical solutions for communities, individuals, governments and businesses. The Pembina Institute provides policy research leadership and education on climate change, energy issues, green economics, energy efficiency and conservation, renewable energy, and environmental governance. For more information about the Pembina Institute, visit www.pembina.org or contact info@pembina.org.

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Executive Summary

The Institute for Agriculture, Forestry and the Environment (IAFE) was established to act as a catalyst in achieving the Alberta government's objective of 'green growth' and to contribute to making Alberta an environmental innovator and leader.[1]

To help achieve the institute's mandate, this report focuses on identifying and describing the policy structure, components and supporting mechanisms needed to facilitate the use of a market-based approach to providing ecosystem services in Alberta. Specifically, this report focuses on the following key themes:

- Introduce and define a market-based approach to ecosystem services.
- Outline the key components of a market-based approach to ecosystem services.
- Provide a framework to support policy development related to a market-based approach to providing ecosystem services.
- Outline areas of further research and policy analysis to guide future policy development in this area.

Existing science and knowledge is improving, which is enabling policy-makers to predict the outcomes of existing trends in natural resource use and consumption rates. However, we are still forced to manage and make decisions with incomplete information in a complex system of internal and external influences.[2] As such, when considering the governance of economic and environmental systems, a paradigm of continuous improvement is paramount in policy discussions. A market-based approach is considered, in the Alberta context, as a way to provide new options for policy-makers concerned with land and resource use decisions.

A market-based approach is generally characterized by the policy options it encompasses to drive policy change: market-based instruments (MBIs). MBIs deliver price signals and influence people's behaviour using trading mechanisms such as auctions and posted price markets, establish opportunities for brokers to benefit through arbitrage, and provide incentives for innovation and profit, in much the same way that regular markets do. In a market-based approach, market signals influence natural resource commodity production and contribute to better use of resources and improved environmental performance.[3]

In considering a market-based approach to ecosystem services, a number of authors have defined and categorized policy options for providing ecosystem services. A variety of such policies have

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[1] Ken Nicol, "The Institute for Agriculture, Forestry and the Environment" (presented February, 2009).

[2] Elinor Ostrom, "Beyond Markets and States: Polycentric Governance of Complex Economic Systems" (The Sveriges Riksbank Prize in Economic Sciences Lecture, Stockholm University, Sweden, December 8, 2009). http://nobelprize.org/nobel_prizes/economics/laureates/2009/ostrom-lecture.html

[3] OECD, *Improving the Environmental Performance of Agriculture: Policy Options and Market Approaches* (Paris, 2001).

been used in Alberta and the world. Policy options can be categorized according to the following approaches:

- market-based
- command and control
- suasive

The type of policy instrument that is ultimately chosen should be determined through an evaluation of the alternative policy instrument options in light of available information to support trade-off analysis, scenario planning and stakeholder engagement.

The type of information and questions policy-makers need to consider when considering a market-based approach can be captured in the following policy development stages:

- Understanding the policy context
- Defining and assessing market failures
- Making the case for policy intervention
- Selecting a short list of policy instruments
- Policy instrument design
- Policy implementation
- Policy evaluation

Once policy-markers have identified a suite of policy instruments that could be used to provide ecosystem services, it is also important to think about an appropriate governance model. In some cases a governance model for ecosystem services may already exist, which is most likely the case for regions with organized natural resource development. Either way a number of critical components are needed to ensure that the policy approach has the greatest potential for success. The components considered for inclusion in a market-based approach for Alberta should facilitate:

- the collaboration of specialists, market actors, and policy advisors in a creative and effective environment
- development of comprehensive biophysical, community and policy context information
- transparency in reporting
- validation of compliance with government policy
- integration of multiple policy instruments to support the achievement of environmental outcomes
- advances in the use and effectiveness of existing and future policy instruments

There is no doubt that the Alberta government is leaning more towards a market-based approach to address long-standing land and resource use problems. The work of the IAFE has contributed significantly to better understanding the issues that need to be considered as the Government of Alberta seeks to green its growth. While considerable research and analysis is needed to understand the complexity of the natural resource and economic interactions in Alberta, it does appear that a market-based approach is particularly relevant here, given the province's focus on business and economic growth.

1. Introduction

1.1 Introduction

The Institute for Agriculture, Forestry and the Environment (IAFE) was established to act as a catalyst in achieving the Alberta government's objective of 'green growth' and to contribute to making Alberta an environmental innovator and leader.[4] Its distinctive operating paradigm is to develop policies that integrate the environment into business decisions, making profitability and environmental protection and improvement mutually reinforcing. In particular, IAFE's role is to recommend to the government of Alberta a framework within which it can develop and implement market-based policies and processes that will encourage environmentally sound practices and enhance profitability in Alberta's agriculture and forestry sectors.[5] This report is specifically focused on addressing the following mandate for IAFE:

"*The IAFE will develop a recommended policy framework for the Government of Alberta for the evaluation, selection and implementation of market-based instruments that will maintain and enhance the provision of Ecosystem Services."*[6]

To help achieve this mandate, this report focuses on identifying and describing the policy structure, components and supporting mechanisms needed to facilitate the use of a market-based approach to providing ecosystem services in Alberta.

As human populations and their demand on natural resources continue to grow, citizens and officials from around the world search for effective ways to manage common resources, such as forests, fisheries, and river basins.[7] As has been discussed in a myriad of academic and policy articles, society is reaching the limit of the Earth's biophysical capacity to sustain existing population growth at current rates of material and energy consumption. The human population is now exceeding the Earth's ecosystem absorption and production capacities.

The 2005 Millennium Ecosystem Assessment revealed that 60% of the world's ecosystem services are being used in a way that cannot be sustained.[8] Over the past 50 years, humans have altered the Earth's ecosystem services at an unprecedented rate in order to meet rapidly growing

[4] Nicol, "The Institute for Agriculture, Forestry and the Environment."

[5] Institute for Agriculture, Forestry and Environment, *A Changing Environment* (International Think Tank on Market-Based Instruments to Preserve, Support and Enhance Ecosystem Services, 2009), 30.

[6] IAFE Mandate Letter.

[7] Krister Andersson and Elinor Ostrom, "Analayzing Decentralized Resource Regimes From A Polycentric Perspective," *Political Science* 41 (2008): 73.

[8] Forest Trends, UNEP and the Katoomba Group, *Payments for Ecosystem Services, Getting Started: A Primer* (2008), i.

demands for food, fresh water, fuel, timber and fibre.[9] While humans have made significant advances in the areas of material wealth and economic development through the extraction and use of renewable and non-renewable resources, such activities have resulted in the degradation of global ecosystem services. The declining capacity of ecosystem services results in diminished benefits for current and future generations, as key services are lost,[10] many of which are not replaceable.

Existing science and knowledge is improving, enabling policy-makers to predict the outcomes of existing trends in natural resource use and consumption rates. However, we are forced to manage and make decisions with incomplete information in a complex system of internal and external influences.[11] As such, when considering the governance of economic and environmental systems, a paradigm of continuous improvement is paramount in policy discussions.

Current research and a number of case studies have probed the use of various institutional arrangements and policy options for managing natural resources and the environment. Resource management and economics literature abounds with theories, models and recommendations for policy-makers on how to effectively allocate public and private capital to meet societal goals and ambitions related to the environment and natural resource use.

It is clear that there is no "one size fits all" prescription for better managing natural resources. The intention of this paper is to add to the discussion of appropriate institutional and policy arrangements by presenting a policy framework designed to support the use of a market-based approach to environmental and natural resource management in Alberta.

A market-based approach (MBA) harnesses market or price signals to provide incentives for environmentally positive outcomes. Through use of an MBA, market signals influence natural resource commodity production and contribute to better use of resources and improved environmental performance.[12] A market-based approach is generally characterized by the policy options it encompasses to drive policy change: market-based instruments. As discussed in more detail in Chapter 3, market based instruments include payment schemes, tradable permits and environmental taxes.

The impetus for developing a new approach to ecosystem services is the failure of existing policies and approaches to managing environmental issues and impacts in Alberta.

A recent report aimed at finding solutions to environmental decision-making in the province describes issues with the current approach to decision making in Alberta:

> *"The problem of unmanaged (and mismanaged) cumulative environmental impacts on Alberta's landscapes is not new, but it is more serious than ever because of Alberta's rapid*

[9] Millennium Ecosystem Assessment Board, *Ecosystems and Human Well-Being: A Report of the Millennium Ecosystem Assessment*. (World Resources Institute, 2005), 1.

[10] Ibid.

[11] Elinor Ostrom, "Beyond Markets and States: Polycentric Governance of Complex Economic Systems," (presented at Stockholm University, Sweden, December 8, 2009). http://nobelprize.org/nobel_prizes/economics/laureates/2009/ostrom-lecture.html

[12] OECD, "Improving the Environmental Performance of Agriculture."

> *economic, industrial and population growth. It can be traced to two structural characteristics of decision-making in Alberta. The first is the fragmentation of decisions among departmental 'silos'. The second is the incrementalism that occurs when decision makers issue individual permits, leases, approvals and licenses making way for the addition of new human activities on the landscape."*[13]

Concerns with decision-making in Alberta are compounded by the province's rapid pace of developments, especially oil and gas developments, which have contributed to an over-heated economy and unbridled economic expansion. These in turn have put extensive pressure on ecological functions. Alberta has seen a dramatic change in its landscapes as energy, forestry, agriculture and urban development has re-shaped the land-use patterns and disturbed existing ecosystem services. In a recent report justifying the need for land use reform, Kennett and Schneider (2009) note the following:

> *Conventional indicators of economic growth are moving in the opposite direction of indicators that matter most in their daily lives. There is also mounting concern that the province's focus on short-term economic growth, at the expense of other values, is threatening our long-term [sic] sustainability. In response, rural landowners, farmers, ranchers, recreational land users and individuals concerned about the environment are mobilizing and uniting — forcefully voicing their concerns about the wave of industrial development sweeping across Alberta.*[14]

Damage to and loss of ecosystem services has arisen, in part, because the full value of natural resource and environmental assets are not accounted for in market prices.[15] In other words, the full and complete costs associated with the production, consumption and disposal of goods and services are not reflected in the market prices of those goods and services; many environmental costs are currently not the responsibility of producers and consumers and are thus borne by society at large in the form of a degraded environment. When such costs are not taken into consideration, prices for goods and services associated with high environmental costs are lower than they would be if such costs were taken into account. In such cases, more of the good or service may thus be produced and consumed — what economists term a "market failure."

The Government of Alberta can consider the use of a market-based approach to begin to take environmental costs into account and reduce market failures. Model et al (2009), describes the shift in management that can accompany a movement towards use of a market-based approach:

> *"First, the market and its main economic actors should not only be interpreted as forces that disturb the environment, as was common opinion among environmental advocates in the 1970s and most of the 1980s. Major economic actors (such as producers, insurance companies, consumers, retailers, unions and credit institutions) and market institutions can*

[13] Danielle Droitsch, Steven A. Kennett and Dan Woynillowicz, *Curing Environmental Dis-Integration: A Prescription for Integrating the Government of Alberta's Strategic Initiatives* (The Pembina Institute and Water Matters, 2008). http://www.pembina.org/pub/1625

[14] Steven Kennett and Richard Schneider, *Alberta by Design: Blueprint for an Effective Land-Use Framework* (The Pembina Institute and Canadian Parks and Wilderness Society, 2008). http://www.pembina.org/pub/1590

[15] This is "lifecycle accounting" — valuing products from cradle to grave across the entire supply chain of the product.

also work in favour of environmental reform…Secondly, while the environmental state [Government] remains an important institution in safeguarding environmental quality, it needs to be restructured; moving from a bureaucratic, hierarchical, reactive, command and control state, towards a flexible, decentralized and preventive institution that creates networks with other societal actors and applies a variety of approaches and instruments to guide society into directions of sustainability." [16]

1.2 Purpose and Outline

The purpose of this report is to provide a companion document to the IAFE Ecosystem Service Market Policy Framework to support the board of IAFE in their mandate of developing a market-based approach to providing ecosystem services[17] in Alberta.[18]

This report focuses on the following key themes:

- Introduce and define a market-based approach to ecosystem services.
- Outline the key components of a market-based approach to ecosystem services.
- Provide a framework to support policy development related to a market-based approach to providing ecosystem services.
- Outline areas of further research and policy analysis to guide future policy development in this area.

This report provides information that will support a market-based approach for enhancing ecosystem services. The report is organized in the following manner:

- Chapter 2 provides background information on a market-based approach to ecosystem services.
- Chapter 3 outlines the policy options available to governments to enhance ecosystem services.
- Chapter 4 provides a framework to help governments choose between policy instrument options.
- Chapter 5 provides information on the policy components that can be helpful to support a market-based approach to providing ecosystem services.
- Chapter 6 provides conclusions on the research and analysis captured in this report to guide future policy research and analysis in this area.

[16] Arthur Mol et al., eds., *The Ecological Modernisation Reader: Environmental Reform in Theory and Practice* (Routledge Taylor and Francis Group, 2009).

[17] Providing ecosystem services explicitly recognizes the need for ecosystem service restoration, maintenance and improvement.

[18] This report focuses on a market-based approach to managing ecosystem services, while recognizing that a market-based approach is one of a variety of approaches available to government.

2. Background

Market-based approaches have been used by a number of countries, regions, and urban centres to alter the incentive structures for resource and land use. Based on a review of these programs and policies, a suite of high-level observations can be made about taking a market-based approach to environmental policy. In this section, we supply a definition of market-based approach and highlight the strengths and weaknesses of this approach relative to existing policy approaches in Canada.

2.1 Overview of a Market-Based Approach

A market-based approach relies on market forces to re-allocate goods and services through full and effective pricing. A market-based approach can be voluntary or it can be a form of government regulation and governance. The assumption underlying this approach is that once the true cost of environmental degradation is internalized in market prices, a more optimal allocation of goods and services will occur, prompting more efficient and sustainable levels of production and consumption. It is important to note that a market-based approach is not about the unfettered privatization of public goods.[19]

In Alberta, an export oriented economy, a market-based approach can lead to a number of beneficial outcomes:

- Resource revenues for firms that enhance their environmental compliance.
- Innovative management practices and strategies as firms compete for conservation revenues.
- A more robust environmental compliance framework for industrial land users, resource-based companies and urban developers.
- A mechanism for companies, individuals and whole sectors to benefit from converting inputs to economic outputs while seeking to reduce environmental impacts and increase efficiencies.[20]

2.2 Strengths of a Market-Based Approach

By adjusting prices to include environmental impacts, a market-based approach uses the economic principles of supply and demand to better manage natural resources and limit

[19] Paul Portney, *Market-Based Approaches to Environmental Policy* (Resources for the Future, 2003). http://www.rff.org/rff/Documents/RFF-Resources-151-Marketapproaches.pdf

[20] Michael Porter, *The Competitive Advantage of Nations* (Free Press, 1990).

environmental impacts to water, biodiversity, and habitat. With careful design and implementation a market-based approach can:[21]

- Internalize and make more transparent the full-cost of resource production and land use.
- Raise funds that can be used to help achieve environmental and conservation objectives.
- Create an incentive for landowners and resource managers to maintain or improve ecosystem services as they compete for the financial rewards associated with environmental compliance or improvements.
- Enable communities and governments to more clearly understand the compliance costs imposed on business and industries related to environmental policy.
- Eliminate the need for inclusion-exclusion rules for resource management that may be politically polarized through entrenched lobbying interests[22] (e.g. command and control policies designate who has access to the resource whereas a market-based approach enables access to anyone who can pay).
- Reduce incentives for free-riding[23] on the degradation of ecosystem services as the marginal value of ecosystem services improvements/degradation increases.
- Be coupled with a suite of policy compliance options so that companies and individuals can choose how they want to comply with environmental policy. [24]

2.3 Challenges of a Market-Based Approach

While a market-based approach to policy development has numerous strengths (described above), challenges to its use also exist. The challenges presented below have been compiled from a survey of market-based policies[25] for ecosystem services from around the world and relevant literature sources:[26,27]

[21] Drew Collins and Michell Scoccimarro, "Designer Carrots: Market-Based Instruments Decision Support Tool," Market Based Instruments Capacity Building Program, Department of Natural Resources and Water, Government of Australia. http://www.marketbasedinstruments.gov.au/PublicationsProducts/DesignerCarrotsdecisionsupporttool/tabid/134/Default.aspx

[22] Pontus Cerin, "Bringing Economic Opportunity into Line with Environmental Influence: A Discussion on the Coase Theorem and Porter and van der Linde Hypothesis," *Ecological Economics* 56 (2006): 212.

[23] Free-riding refers to situations when individuals or firms consume more than their fair share of a public resource, or shoulder less than a fair share of the costs of its production (e.g. Agriculture producers who use in-stream flow supply for irrigation at no cost).

[24] Gebhard Kirchgassner and Friederich Schneider, "On the Political Economy of Environmental Policy," *Public Choice* 115 (2003): 370.

[25] Michael Kennedy et al., *Maintaining Ecological Goods and Services: Overview of Issues and Options* (report prepared for the International Model Forest Network, 2008).

[26] C. Abdalla, T. Borisova, D. Parker and K. Sacke Blunk, "Water Quality Credit Trading and Agriculture: Recognizing the Challenges and Policy Issues Ahead," *Choices* second quarter (June 2007).

[27] Karen Haugen-Kozyra, *Lessons Learned in Alberta's Carbon Market*, (Climate Change Central, 2008).

- Market-based instruments, like tradable permits, require the need for setting caps (limits) and baselines (starting point) for pollution levels. Setting limits on pollution can be contentious and involve consensus building, which can be costly and time consuming.
- Market-based instruments, like taxes, require political capital as constituents rarely support increases in costs, particularly in the form of taxes where costs are made to be explicit in transactions.
- Encouraging and maintaining information sharing and data availability is critical to well-functioning markets and is often the cause of market failure.[28] Avoiding information asymmetry is critical to ensure that buyers and sellers come together for efficient and effective exchanges of money for credit/service.
- The transaction costs associated with some market-based approaches can be higher than initially anticipated.
- Acceptance by targeted sectors is often a challenge. Targeted sectors have (sometimes considerable) leeway for negotiations with regulatory agencies under a command and control system, and may be loathe to give this up.
- Self-preserving forces within the bureaucracy sometimes seek to maintain the status quo of command and control policies.
- The costs of command and control policy are less visible than the costs of market-based policies. The sudden transparency of compliance costs may discourage broad-scale use of a market-based approach.
- A market-based approach for providing ecosystem services grants access to such services to those who can pay. Without policy design considerations targeted at smaller market players, in some cases communities and small-scale producers may be forced out of the market.

2.4 The Alberta Context

In considering a market-based approach to ecosystem services it is important to consider the social context in which such a policy framework would operate. This section considers the existing social values in Alberta for environmental policy, market-based instruments and enabling policy conditions.

Increasing Environmental Awareness

Concern for environmental issues is gaining ground in public policy discussions in Alberta. Numerous public opinion surveys confirm that Canadians and Albertans are concerned about the environment and natural capital.[29] A poll commission by the Alberta Council for Environmental Education in 2009 found that 10% of Albertans rate the overall quality of Alberta's environment

[28] Richard Thaler and Cass Sunstein, *Nudge*, (Yale University Press, 2009), 15.

[29] Alberta Research Council, *Ecological Goods and Services Opportunities for Agriculture in Alberta: Strategic Feasibility Study* (report prepared for the Government of Alberta, September 2005).

as excellent, 45% rate the quality of the environment as good, 34% as fair and 11% as poor.[30] In looking to the future, 37% of Alberta feel environmental quality will improve while 41% feel that environmental quality will worsen.

Where motivation to protect the environment exists, a market-based approach can provide a flexible way for targeted sectors to meet desired environmental outcomes.

Public Support for Market-Based Instruments

Arguably, the public discourse around environmental issues has reached a level at which new solutions and ideas are being considered. The poll commissioned by the Alberta Council for Environmental Education found relatively strong support for the polluter pays principle and the use of market-based instruments. [31] Some relevant findings are highlighted here:

- 53% of Albertans believe that protecting the natural environment is important to their personal health.
- 45% of Albertans strongly agree and 34% agree that that it is possible to have a strong economy in Alberta while protecting the environment.
- 38% strongly agree and 28% agree that more government action is needed to address environmental issues.
- 46% strongly agree and 29% agree that companies that pollute more should be taxed more and companies that pollute less should be taxed less.
- 35% strongly agree and 29% agree that people who pollute more should be taxed more and people who pollute less should be taxed less.
- 91% of survey respondents feel that companies should pay for damages to the environment.
- 34% strongly agree and 37% agree that governments should provide tax incentives for developers who improve previously developed areas.

While polling indicates that Albertans favour a market-based approach, the reflections, opinions and comments provided by stakeholders in the development of the IAFE policy framework indicate that there is still a large amount of uncertainty amongst industry, government and non-government policy-makers about the use of such instruments.

Legislative Enabling Conditions for a Market-Based Approach

The *Alberta Land Stewardship Act* (ALSA)[32] enables expanded use of conservation easements and the use of conservation directives, conservation offsets and transfer of development credits.

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[30] Alberta Council for Environmental Education, "Provincial Polling on Environmental Education and Market-based Instruments" (poll conducted by Ipsos Reid Public Affairs, March 2009). The survey interviewed 801 participants.

[31] Ibid.

[32] The content for this section is pulled directly, word for word, from Government of Alberta, "Alberta Land Stewardship Act Conservation Tools" (April 29, 2009). http://alberta.ca/home/NewsFrame.cfm?ReleaseID=/acn/200904/25803E9093830-088F-F98A-70A7DF158F1CDF66.html

While ALSA leaves many of the details of this system to be enacted by regulation, it has established the framework for the system.[33]

Conservation easements

- A conservation easement is a voluntary legal agreement between a landowner and a qualified organization, such as a land trust or government, to conserve the ecological integrity of a piece of land. The easement is registered on the land title, but landowners retain ownership of the land.
- Conservation easements have been in place in Alberta for over 10 years. Currently, around 300 square kilometres, or 0.2 per cent, of Alberta's private lands are under conservation easements.
- The legislative provisions are being moved from the *Environmental Protection and Enhancement Act* and expanded through ALSA to also be used to conserve agricultural land.
- The intent is to more closely align conservation efforts with land-use planning efforts in the province and to reduce the fragmentation and conversion of agricultural land to other uses.

Conservation offsets

- Offsets counterbalance the effects of an activity on both public and private land. They can be used to replace, restore or compensate for affected landscapes. For example, a company can conserve an environmentally significant area to offset its industrial activity elsewhere.
- Existing environmental standards or regulatory requirements remain in effect.
- ALSA sets the framework for offsets to be used for restoration, mitigation or conservation. It provides a legal basis for the government to establish an offset program and to set rules for defining and trading offsets.
- ALSA contemplates regulations that will restrict the maximum effect of an activity on the environment, and may specify a stewardship unit that will counterbalance the effect of an activity, specify the period of time within which the stewardship unit must be used or extinguished, and prohibit that activity without the extinguishment of the stewardship unit. This will make stewardship units vital for future development and industrial activity affected by the regulations under ALSA.[34]

Conservation directives

- ALSA enables the use of a new tool, the conservation directive, to conserve valued landscapes, ecologically sensitive areas and scenic landscapes.
- Regional plans may expressly set aside specific areas to protect, conserve and enhance land with environmental, scenic or aesthetic values or agricultural land.

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[33] Davis LLP, "Alberta's Proposed Land Stewardship Legislation: Effects on Conservation Tools" (2009). http://www.davis.ca/en/blog/Environmental-Energy-and-Resources-Law/2009/05/15/Albertas-Proposed-Land-Stewardship-Legislation-Effects-on-Conservation-Tools

[34] Ibid.

- The Alberta government will compensate owners of these lands for any decrease in the market value of their land. The principles for deciding on compensation payable are drawn from the *Expropriation Act*.

Transfer of development credits (TDCs)

- TDCs help direct development away from specific areas needed to conserve ecologically sensitive, scenic, historical or agricultural areas.
- Land-use plans (regional, sub-regional or municipal) may allow for the use of TDCs. Plans may designate the areas to be conserved and areas to be developed.
- TDCs have the potential to address issues such as urban and rural growth pressures and loss of agricultural land and ecological or heritage landscapes.

Conservation exchange

- A conservation exchange supports, verifies and tracks the use of market-based conservation and stewardship instruments such as conservation offsets or transfer of development credits.
- ALSA provides a legal foundation for the creation of an exchange in Alberta.
- The activities of the exchange could include:
  - facilitating the purchase and sale of offsets or credits;
  - registering and tracking trades in offsets or credits;
  - providing authentication of offsets or credits;
  - providing information on a range of market-based instruments; and
  - reporting on results from the use of these instruments.

3. Policy Options for Providing Ecosystem Services

In this chapter the key policy options that can be used to enhance ecosystem services are discussed. The policy options for providing ecosystem services have been defined and categorized by a number of authors. A number of such policies have been used in Alberta and the world. Policy options can be categorized according to the following approaches[35]:

- market-based
- command and control
- suasive

3.1 Policy Approaches and Instruments

For each policy approach noted above, there are accompanying policy instruments. Table 1 links the three policy approaches with the relevant policy instruments.

Table 1. Policy approaches and instruments for providing ecosystem services

Approach	Description of Policy Approach	Examples of Instrument
Market-based	Market creation (quantity-based) instruments establish a property right on a unit basis and that unit can be traded or purchased.	Tradable permits or credits Tradable disturbance rights Compliance or voluntary offsets
	Market shifting (price-based) instruments influence the market by incorporating the environmental benefit or cost of particular activities.	Environmental taxes User fees Payment schemes Tax credits
	Market shifting (market friction) instruments remove obstacles to ecosystem service market formation or growth.	Performance based insurance premiums Performance based or risk management-based interest rates Consumer information
Command and control	Quantity-based instruments are used to set aside designated land	Land use planning Protected areas/conservation directives

[35] Robert Stavins, *Market-Based Environmental Policy: What Can We Learn from the U.S. Experience (and Related Research* (Resources for the Future, 2001). http://www.rff.org/documents/RFF-DP-03-43.pdf

	for particular uses.	Covenants
	Performance based instruments provide flexibility in meeting clear environmental objectives.	Management plans Compulsory best management practices Licensing
Suasive (Supporting)	Suasive instruments and voluntary approaches seek to change behaviour in support of achieving an objective by raising awareness and providing information. Suasive instruments are commonly used in combination with other approaches discussed above.	Awareness and Information programs Education programs

The third policy approach presented above — suasive instruments — focuses on providing information to consumers and investors. Suasive policy options are sometimes presented as market-based approaches as they are intended to indirectly *influence* market forces. These supporting policies, while sometimes employed on their own to raise awareness about a particular environmental issue, are generally not effective at achieving environmental outcomes on their own. Rather, supporting policies are often employed to complement market-based and command and control policy approaches.

3.2 Market-Based Instruments

In this section market-based policy instruments for enhancing ecosystem services are described in additional detail.

3.2.1 Overview of Quantity-Based Instruments

Quantity-based market instruments create markets for tradable goods or services. "There are two types of trading systems: cap-and-trade systems and credit systems. Cap-and-trade systems limit the total allowable environmental impact (e.g. total emissions or total land disturbance per year) with allowances for impacts either auctioned or grandfathered to existing sources. Credit systems allow firms to earn credits for reducing impacts below the standard or baseline, which can be sold to other firms who exceed the baseline. Trading systems allow firms which can reduce their impacts at a low cost to profit from doing so, while firms which can not reduce their impacts have the opportunity to purchase additional credits in order to meet the overall objective. Credit programs can be costly to administer because they involve establishing baselines and measuring performance against the baseline. Cap-and-trade programs provide assurance about meeting the environmental target, while credit systems are not constrained by an overall cap or limit."[36]

Table 2 presents three types of quantity-based instruments: tradable permits, offsets and offsets with banking.

[36] Jay Anderson et al., *Natural Capital: Using Economic Valuation and Market-Based Instruments as Tools for Sustainable Forest Management* (SFM Network State of Knowledge Project, April 2009).

Table 2. Quantity-based instruments

Policy Instrument	Description
Tradable permit	A policy instrument in which rights to pollute or exploit resources can be exchanged through either a free or a controlled permit-market. e.g. Hunter River Salinity Trading[37]
Offsets	Offsets are used to compensate for impacts from development. In a cap and trade system, for example, an offset is an action carried out by a third party that generates credits (by reducing or avoiding pollution or resource use). These offset credits can then be sold to polluters or resource users. e.g. Clean Development Mechanism[38]
Offsets with banking	A conservation bank is a parcel of land or a collection of lands containing natural resource values that are conserved and managed in perpetuity through a conservation easement held by an entity responsible for enforcing the terms of the easement.[39] e.g. U.S. Wetland Mitigation Banking[40]
Transfer Development Rights (TDRs)	TDRs allow landowners to relinquish development rights from properties in government-designated low-density areas, and sell them to purchasers who want to increase the density of development in areas that local governments have selected as suitable for higher density development. e.g. New Jersey Pinelands Development Credit Program[41]

Strengths of Quantity-Based Instruments

- Can provide certainty of performance towards a specific environmental outcome.
- Create a market for trading, which means a high degree of flexibility in how environmental compliance is achieved.
- Most cost-effective instruments for dealing with a large group of regulated sectors with heterogeneous compliance costs.
- Enables the off-site financing of ecosystem services by regulated sectors who can pay.

Weaknesses of Quantity-Based Instruments

- Requires considerable stakeholder buy-in to establish.

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[37] New South Wales Government, "Hunter River Salinity Trading Scheme." www.environment.nsw.gov.au/licensing/hrsts/index.htm

[38] UNFCCC, "Clean Development Mechanism." http://cdm.unfccc.int/index.html

[39] Nathaniel Carroll et al., *Conservation and Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems* (EarthScan, 2008), 9.

[40] U.S. EPA, "Mitigation Banking Factsheet: Compensating for Impacts to Wetlands and Streams." http://www.epa.gov/owow/wetlands/facts/fact16.html

[41] New Jersey Pinelands Commission, "The New Jersey Pinelands Development Credit Program," (2009). http://www.state.nj.us/pinelands/infor/fact/PDCfacts.pdf

- Setting caps/limits on pollution levels is difficult and requires extensive consultation.
- The time required to develop and create the market can be significant.
- Transactions costs can be prohibitive when the market is targeted at a small group of regulated sectors.

3.2.2 Overview of Price-Based Instruments

Price-based market instruments assign a price to environmental impacts or attributes through positive instruments (e.g. payment, auctions and grants) or negative instruments (e.g. charges and taxes).

Table 3. Price-based policy instruments

Policy Instrument	Description
Environmental taxes	A price is levied against a quantified unit of resource extraction, waste disposal or environmental pollution. e.g. British Columbia's carbon tax
User fees	User fees are paid by those who benefit from the use of infrastructure or services. e.g. National Park use fees
Payment Schemes	Annual payments are provided to landowners for measurable improvements to land management practices or because certain detrimental land management practices were reduced or eliminated. e.g. Costa Rica's payment for ecosystem services program
Tax credits	Income tax credits are provided to individuals or businesses who place lands into a conservation easement. e.g. Canada Eco-gift program

Strengths of Price-Based Instruments

- In the case of taxes, tax revenue can finance complementary initiatives or reduce other taxes faced by firms (e.g. income taxes, consumption taxes etc.).
- For taxes and tax credits, instrument design can be simple and the lag time to implementation short.
- Taxes can provide a clear schedule of payments to firms so they know what their costs will be.
- Payment schemes provide financing to land owner/users that can be used to overcome technological and/or management barriers to achieving environmental outcomes.
- Payment schemes can provide a means to transfer public benefits provided by private entities into the hands of private entities directly.
- Instruments provide directional and on-going improvement towards an environmental objective.

Weakness of Price-Based Instruments:

- Price-based instruments do not provide certainty of achieving a particular environmental outcome.

- Payment schemes are not the most cost-effective option.

A Note on Payment Schemes

It should be pointed out that one of the most widely used instruments for providing ecosystem services is payment schemes. Payment schemes, as currently designed, have been criticized for their lack of cost-effectiveness, lack of targeting and uncertainty due to reliance on public funding.[42] While these criticisms are accurate and often warranted, a number of design provisions have been recently developed to deal with these issues. Specifically, some of the design features that can improve payment schemes include:

- **Reverse Auctioning:** The most difficult aspect of a payment scheme is setting accurate payment amounts. Payment schemes have been criticized for the arbitrary nature of the value of the payment. Ideally, the payment is equal to the landowners' cost of providing an ecosystem service plus a small savings to offset the next best technological option. One mechanism to encourage this outcome is to design the incentives as reverse auction systems where the landowners specify the level of reward they require to engage in such activities. This would make the process a competitive bidding process and allow the landowners to dictate what level the incentive would have to be to entice them to participate.[43]
- **Targeting strategies:** With the environmental outcome objectives in mind, a number of targeting strategies can be deployed within a payment scheme.[44] Some of strategies that can be considered include:
  - Acreage maximization: buy the lands with the lowest cost (regardless of benefits).
  - Benefits targeting: purchase the highest quality lands (lands with highest benefit) within budget.
  - Benefit /cost targeting: purchase lands with the highest benefit/cost ratio given the budget.
- **Establishing long-term funding**: A criticism of payment schemes is that they are often considered to be an unsustainable policy option as payments can be susceptible to fluctuating government budgets. To mitigate this criticism, payment schemes can establish long-term funding by implementing these schemes in concert with environmental taxes. In Costa Rica, payments (*Pagos for Servicios Ambientales*) are financed with revenue from the national gas tax (*Impuesto Combustible Nacional*).

[42] Fransisco Alpizar and Roger Madrigal, "Constructing Payment Schemes for Ecosystem Services at the Local Level: Methodological Approach and Lesson Learned" (paper presented at Economics for Conservation in the Tropics: A Strategic Dialogue, San Francisco, California, January 31 to Februrary 1, 2008).

[43] Rebecca Goldman et al., "Institutional Incentives for Managing The Landscape: Inducing Cooperation for the Production of Ecosystem Services," *Ecological Economics* 64 (2007): 333-343.

[44] David Zilberman., "Market-Based Instruments to Preserve, Support and Enhance Ecosystem Goods and Services" (paper presented at the IAFE International Think Tank to Preserve, Support and Enhance Ecosystem Goods and Services, Banff, Alberta, February 2009).

3.2.3 Market Friction Instruments

Market friction instruments aim to improve the operation of existing markets by reducing the costs of operating in those markets.[45] Further, market friction instruments can be used to provide additional information to consumers and enhance product differentiation.[46] A wide range of market friction instruments can be developed to improve the functioning of existing ecosystem services markets. Table 4 below provides some examples of market-friction instruments deployed to encourage environmental improvements in product sales, auto insurance and risk management.

Table 4. Examples of market-friction instruments

Policy Instrument	Description
Eco-labelling	Attaching a notice to a product or container bearing information on its environmental attributes including contents, use, manufacturer and any cautions or hazards of use.[47] e.g. USDA Organic[48]
Performance-based insurance	Providing an incentive for insurance purchasers to gain from environmental improvements. e.g. Pay-As-You-Drive Auto Insurance[49]
Web-based exchange system	Using web-based information systems can enhance the trade in environmental improvements as well as reduce overall transaction costs. e.g. Markit Environmental Registry[50]

3.3 Overview of Command and Control Instruments

Command and control policies specify actions that can or can not occur on privately owned property and Crown land. They control development through site-specific prescriptions

[45] Stuart Whitten et al., *Market-based Instruments for Ecosystem Services in a Regional Context* (report prepared for the Rural Industries Research and Development Corporation, Publication No. 08/196, 2009).

[46] Australian Government, "Market Friction Instruments," Designer Carrots: Market-Based Instruments Decision Support Tool, 2009. http://www.marketbasedinstruments.gov.au/WhatisanMBI/RangeofMBIsforNRM/Marketfrictioninstruments/tabid/124/Default.aspx (Accessed March 2010).

[47] European Environment Agency, "Glossary: Labeling," Environmental Terminology and Discovery Service. http://glossary.eea.europa.eu/terminology/concept_html?term=labelling

[48] Ecolabelling.org. http://ecolabelling.org/

[49] Ceres, "Drive Less, Pay Less: Environmental and Transportation Groups Unveil Performance Standard for Pay-as-you-drive Auto Insurance," December 9, 2009. http://www.ceres.org/Page.aspx?pid=1157 (Accessed March 2010).

[50] Markit, "Environmental." http://www.markit.com/en/products/our-clients/asset-class/cross-asset-class.page (accessed March 2010).

(technology, emissions limits and actions) and restrictions.[51] Command and control instruments are the most widely used policy approach used by governments to date. Table 5 presents examples of command and control policies that have been widely used in Alberta and Canada.

Table 5. Examples of command and control policy instruments

Policy Instrument	Description
Land Use Zoning	Land use zoning means the scientific, aesthetic, and orderly disposition of land, resources, facilities and services with a view to securing the physical, economic and social efficiency, health and well-being of urban and rural communities.[52] e.g. B.C. Land and Resource Management Planning[53]
Licensing	Licenses, which are issued or sold by government or some other legal authority (such as a conservation authority), are legal documents that give official permission to undertake certain activities. e.g. British Columbia Crown Land Disposition
Management Plans	A program of action designed to meet a specific set of objectives. e.g. Forest Management Agreement Management Plans [54]
Convenants	A conservation covenant is a written agreement between a landowner and a conservation organization in which the owner of the land promises to protect the land in specified ways[55]. e.g. Islands Trust Fund Conservation Covenants

Strength of Command and Control Instruments

- Certainty of achieving a particular environmental outcome.
- Prescriptive to the environmental issue being dealt with.
- Governments have a long history of experience with command and control approaches, making them familiar and easy to understand, develop and implement.

Weakness of Command and Control Instruments

- Restricts innovation by focusing solely on compliance.
- Focuses on disincentive (penalties, fines and court action) for non-compliance.
- Can reduce intrinsic motivations for environmental compliance.
- Allows parties with a vested interest considerable latitude to lobby and influence policy design.

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[51] Nancy Olewiler, *Securing Natural Capital and Ecological Goods and Services for Canada* (Institute for Research and Public Policy, 2007).

[52] Canadian Institute of Planners, "Planning is…" http://www.cip-icu.ca/web/la/en/pa/3FC2AFA9F72245C4B8D2E709990D58C3/template.asp

[53] British Columbia Government, "Integrated Land Management Bureau." http://ilmbwww.gov.bc.ca/slrp/index.html

[54] Alberta Sustainable Resource Development, "Forest Management Plans." http://www.srd.gov.ab.ca/forests/managing/forestmanagementplans.aspx

[55] Islands Trust Fund, "Conservation Covenants." http://www.islandstrustfund.bc.ca/covenants.cfm#

3.4 Overview of Suasive Instruments

Suasive instruments increase the effectiveness of market and command and control policy approaches by providing relevant information to targeted actors. Consumers have better access to information.[56] Suasive instruments can take many different forms. Table 6 describes the range of suasive instruments being used by governments to deal with environmental policy isssues.

Table 6. Examples of suasive instruments

Type	Description
Pollution Inventories	Pollution inventories contain information on pollutants and off-site waste transfers from industries and businesses. e.g. Canada's Greenhouse Gas Inventory
Information programs	Programs that seek to communicate knowledge concerning any aspect of the ecosystem, the natural resources within it or, more generally, the external factors surrounding and affecting human life.[57] e.g. United Nations Environment Programme[58]
Education programs	Organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainably.[59] e.g. Evergeen Foundation

Strengths of Suasive Instruments

- Relatively inexpensive to development and implement.
- More effective at bringing about longer-term change (changing social norms and attitudes).
- Often politically feasible as they serve as an indirect influence on existing markets.

Weakness of Suasive Instruments

- Can be ineffective as a stand along policy instrument.
- Require long time periods to bring about behavioral change.

[56] Thaler and Sunstein, *Nudge*, 189.

[57] European Environment Agency. "Glossary: Environmental Information," Environmental Terminology and Discovery Service. http://glossary.eea.europa.eu/terminology/concept_html?term=environmental%20information

[58] United Nations Environment Programme. www.unep.org

[59] The Evergreen Foundation. http://www.evergreen-foundation.com/

4. Framework for Policy Choice Selection

4.1 Policy Choice Framework

Choosing the appropriate policy instrument(s) involves the consideration of a wide range of environmental, social and economic issues.

Among other sources, the information gathered for this chapter is from existing work on economic governance and policy instrument selection. It is important to note that research in this area is evolving quickly. The 2009 Nobel Prize in Economic Sciences was co-awarded to academic Elinor Ostrom for her work "on economic governance, especially the commons."[60] Specifically, Ostrom was recognized for her work on the institutional analysis of collective action problems for common-pool resources[61] — research that is relevant to this policy framework and Alberta's Land Use Framework.

Indeed, further research in Alberta related to institutional analysis of environmental governance is needed. Currently, consideration of a market-based approach to ecosystem services must be done without full information on the trends in ecosystem services, the rules governing decisions made by companies, land-owners and other institutions, and how all of these factors combine and interact to create land and resource use outcomes.

To begin to frame the information needed to make informed decisions regarding the appropriate policy approach in Alberta, a simple policy development framework is provided in Figure 1. This framework outlines the approach taken to capturing information needs for policy-makers in Alberta to consider in moving towards a market-based approach to ecosystem services.

It should be noted that *policy objective and target setting* is not discussed in this document; it is presented here only to provide a complete policy development process. In Alberta, many of the policy objectives and targets for ecosystem services will be developed through the Government of Alberta's Land Use Framework. As such, this stage of the policy development process will already be addressed when policy-makers begin to make decisions about the appropriate policy approach to achieve the policy objectives and targets.

[60] Nobel Foundation, "The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2009." http://nobelprize.org/nobel_prizes/economics/laureates/2009/

[61] Elinor Ostrom, Roy Gardner and James Walker, *Rules, Games, and Common Pool Resources* (Ann Arbor: The University of Michigan Press, 1994).

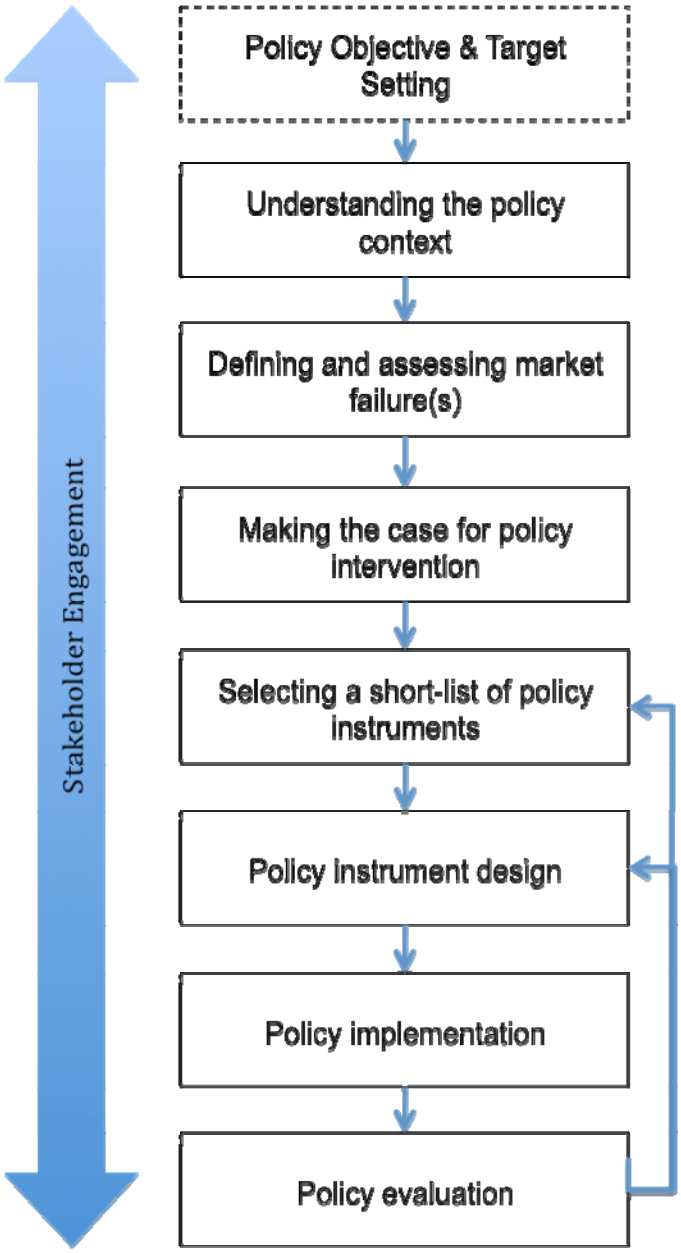

Figure 1. Framework for policy development

The type of policy instrument that is ultimately chosen should be determined through an evaluation of the alternative policy instrument options in light of available information to support trade-off analysis, scenario planning and stakeholder engagement.

The following sections highlight the type of information that is needed to move through the policy development process. The information presented herin draws heavily from the work of Collins and Scoccimarro (2009),[62] Whitten et al 2009[63] and Weber 2005[64].

[62] Collins and Scoccimarro, "Designer Carrots."

4.2 Understanding the Policy Context of Ecosystem Service(s)

Understanding the policy context related to an environmental issue is important in framing the choice of policy instrument. The policy context should outline the following components of an environmental issue:

- The biophysical problem, management context and the community concerned with the problem.
- The institutions being impacted by policies, actions and actors that are driving unwanted changes for an environmental issue.

To guide the development of the policy context, a number of key considerations are presented below. Many of these considerations are standard for all environmental policy options including a market-based approach.

4.2.1 Defining the Biophysical Problem

Knowledge of the severity and extent of the environmental issue to be addressed is an important factor in deciding between different policy approaches. Information needed to define the biophysical problem includes:

- Type and location of the ecosystem services being threatened.
- The relationship between land-use activities and actions and environmental change. In environmental economics this is referred to as the dose-response between economic and/or conservation actions and environmental outcomes.
- Measurable targets and goals for the ecosystem service based on information available through a review of the "science" of the ecosystem service. What are the limits to changes that are acceptable before irreversible or unacceptably costly damage occurs?
- Timing of the policy response required (short-term or long-term response). Once policies are in place and actions are happening on the ground, there will be a lag before actual changes can be measured.

4.2.2 Understanding the Management Context of the Ecosystem Services

Understanding the existing management context for ecosystem services is critical when considering policy reform. The actions of individuals and firms at the operational level directly affect the physical world. As such, the management context has to do with the spatial and distributional impacts on the ecosystem service. Understanding who and what the sources of change in ecosystem services are is critical to identifying and prescribing solutions.

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[63] Whitten et al., *Market-based Instruments*.

[64] Marian Weber, *Environmental Goods and Services Opportunities for Agriculture in Alberta: Strategic Feasibility Study* (report prepared for Alberta Agriculture and Rural Development, 2005).

Collins and Scoccimarro recommend that policy-makers consider the following questions when examining the management context for environmental issue:[65]

- What is the nature of the threat? Is it broadly across the catchment or is it localized?
- Could a management change(s) address the threat?
- Does everyone need to make the same changes to get the result or can this vary?
- Does it matter where in the landscape management changes occur, or will they require tailoring to different circumstances or tailoring at different times?
- What is the current policy environment? Is there any existing legislative framework?

In Alberta, one of the critical management issues that will require further consideration is the treatment of public lands in a market-based approach. This is an area for further consideration. The text box below captures some of the thinking related to use of public land in a market-based approach.

Public Land and a Market-based Approach

An issue that deserves a great deal more attention than it will receive in this report is that of applying a market-based approach to public lands. In this regard, two themes are noteworthy. The first theme relates to economic rent capture and how the additional benefit from enhanced ecosystem services is shared among the land owner (the Alberta public), the land manager (the Crown) and developers (forestry, agriculture, oil and gas and tourism companies) who may or may not have incurred a private expense to enhance the provision of ecosystem services. The second theme relates to the role of vast tracts of public land as a "backstop" to ecosystem service markets in the event of tradable permit/credit reversal. Each of these themes is discussed in more detail below.

Ecosystem Services and Economic Rent: Because a market-based approach involves the exchange of money, there are ramifications for resource or land rents.[66] Given that the province owns the land on which many land developers (forestry, agriculture, oil and gas and tourism and recreation) operate, if there is to be benefits incurred through a change in management through participation in an ecosystem market, the province deserves a portion of this benefit.

Public Land as an Insurer: In Alberta, the Crown owns 60% of the land area. There is a concern that if a market-based approach was adopted for providing ecosystem services, the Crown, as a majority land owner in the province, could swamp initial demand for ecosystem services. In the event that a tradable permit or offset scheme was adopted, to avoid the Crown having too great a share of the market, the government could instead play the role of system insurer. They could do so by holding back credits in a reserve pool in case of credit/permit reversal due to natural or human caused disturbance. In this role, the Crown can provide stability to the overall ecosystem market while also creating the potential for driving down overall transaction costs in a provincial ecosystem service market.

[65] Collins and Scoccimarro, "Designer Carrots," 12.

[66] Rent refers to the benefit to a landowner from the resources found on the land. In forestry rents are equal to the value of the forest resource at the stump (i.e. stumpage value).

4.2.3 Community of Change and the Community Impacted

Along with understanding the management context of the environmental issue, it is important to understand the policy constituencies. In this regard, there are two constituencies to focus on when introducing new policy instruments. These can be characterized as the community of change and the community impacted. In many cases, these groups will be composed of similar stakeholders. For example, a local landowner can often be part of the targeted constituency for change (i.e. community of change) as well as being impacted by the policy through changes that might arise in the local economy (i.e. community impacted).

Community of Change: This group of stakeholders can include those sectors, communities and individuals that are targeted for behaviour change with a particular policy. With the community of change, policy-makers should focus on what motivates the targeted constituency and what sorts of values and attitudes guide their behaviours. By understanding the underlying values and attitudes of communities of change, policy-makers can prescribe policy instruments that should have a higher rate of success.

Community Impacted: This group of stakeholders includes those individuals and communities that may be positively or negatively impacted by a particular policy. In this regard, understanding how the community will be impacted is important for policy design as well as for predicting policy response. Assessing the community impacted can be done in a number of ways. Below, we describe a community resilience[67] approach that policy-makers might want to consider as a framework for guiding data gathering and stakeholder engagement. The purpose of focusing on community resilience is not to negate the changes that will occur to the community, but rather to ensure that the community impacted has the resources to adapt and change. Indeed, change, whether driven by policy intervention or not, is certain. By focusing on community capacity and resiliency, we are assessing the community's ability to respond to change.

Community of Change: Community Values Mapping

It is useful to understand the values and attitudes of the parties that will be impacted by policies before they are implemented. This information helps identify the type of policy needed to achieve environmental objectives as well as the amount of time and energy that should be spent on building support for policy action. For example, in some communities, a simple suasive instrument — an understanding of the environmental issue and the actions needed to address it — may be sufficient to change behavior and achieve goals. In other cases, a combination of policies may be required to both help affected parties understand the issue and alternative actions for addressing it and also provide incentives for change. And while regulations and market-based instruments can achieve environmental objectives without changing the attitude or values of those at which the policy is targeted, there can be significant political risks to pursuing such policies without a minimum level of support from affected parties.[68]

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[67] A resilient community is one that takes intentional action to enhance the personal and collective capacity of its citizens and institutions to respond to and influence the course of social and economic change. Source: Community Resilience Project Team, "The Community Resilience Manual." http://www.cedworks.com/communityresilience01.html

[68] Susan Owens and Louise Driffill, "How to Change Attitudes and Behaviours in the Context of Energy," *Energy Policy*, 36 (2008): 4412-4418.

Through a comprehensive policy strategy, governments can nudge certain value-based groups to support policy action and also identify those groups likely to oppose policy intervention. Community values mapping is a useful way to identify and engage such groups. Figure 2 shows how the value roadmap method differs from the conventional social change/policy change method.

	Values Roadmap Method		Conventional Social Change Method
1.	Define base supporters/opponents	vs.	Define problem
2.	Identify constituents of opportunity	vs.	Identify technical policy to fix problem
3.	Identify shared "bridge values"	vs.	Sell technical policy to public/policy-makers
4.	Craft strategic initiatives to strengthen bridge values to build support for issue	vs.	Implement and defend technical policies
5.	Measure changes to bridge values over time		

Figure 2. Social values roadmap versus conventional social change method

Source: Sustainable Prosperity 2009

The majority of the early work on values roadmaps was done in the United States. Driven mainly by the desire for advocacy groups to develop social change strategies, the use of values roadmaps is now increasing. They are useful to policy-makers as they bridge the gap between values and attitudes and behaviour.[69]

Values Roadmap Example: Six Audiences for Climate Change Policy in the United States

"The six audiences for climate change policy were identified using a large nationally representative survey of American adults conducted in the fall of 2008. The survey questionnaire included extensive, in-depth measures of the public's climate change beliefs, attitudes, risk perceptions, motivations, values, policy preferences, behaviors, and underlying barriers to action. The Six Americas are distinguishable on all these dimensions, and display very different levels of engagement with the issue. They also vary in size - ranging from as small as 7 percent to as large as 33 percent of the adult population.

[69] Emily Huddart Kennedy et al., "Why We Don't 'Walk the Talk': Understanding the Environmental Values/Behaviour Gap in Canada," *Human Ecology Review* 16, no. 2 (2009): 151-160.

The Alarmed (18%) are fully convinced of the reality and seriousness of climate change and are already taking individual, consumer, and political action to address it. The Concerned (33%) - the largest of the six Americas - are also convinced that global warming is happening and a serious problem, but have not yet engaged the issue personally. Three other Americas — the Cautious (19%), the Disengaged (12%) and the Doubtful (11%) — represent different stages of understanding and acceptance of the problem, and none are actively involved. The final America — the Dismissive (7%) — are very sure it is not happening and are actively involved as opponents of a national effort to reduce greenhouse gas emissions."

Source: Anthony Leiserowitz et al. "Global Warming's Six America's" (Center for American Progress, Washington, DC, 2008) http://www.americanprogress.org/issues/2009/05/6americas.html

Values roadmaps can provide policy-makers with direction on where critical messages (information programs, education) should be targeted to produce a shift in behaviour. More importantly, they can identify demographic groups where information and education programs are likely to be insufficient to change behavior and where a specific policy instruments (MBIs and/or command and control) might be required.

In Canada, Sustainable Prosperity recently commissioned Environics Research Group to develop a values roadmap for Canada to identify people's values towards environmental pricing.[70] The results of the polling done on environmental pricing reform reveal that only about 16% of the population supports environmental pricing reform, while 21% strongly oppose this approach. These results demonstrate the importance of communicating new policy approaches, like a market-based one, in a way that people understand and can relate to.

Community Impacted: Understanding Community Resilience

From a community resilience perspective, environmental policies impact communities in two key ways:

- Introducing new environmental policy can lead to the re-allocation of resources in a way that can present a new opportunity or a cost to businesses or industries that communities depend on for employment or tax receipts.
- Introducing new environmental policy can lead to changes in access to natural resources that may alter the social or economic outcomes for community members.

The objective of understanding the community in policy development is to minimize the negative impacts of policy change on community outcomes. As a means to assess the relative vulnerability of a community to changes that might emerge from new environmental policy, a community capacity approach should be considered.

Community capacity can be defined "as the collective ability of a group (the community) to combine various forms of capital within the institutional and relational contexts to produce desired results and outcomes."[71]

[70] Sustainable Prosperity, "Reframing the Environmental Pricing Dialogue: A Social Values Maps for Canada" (prepared for Sustainable Prosperity Montebello Retreat, February 28, 2009).

[71] Beckley et al. "Multiple Capacities, Multiple Outcomes: Delving Deeper into the Meaning of Community Capacity," *Journal of Rural and Community Development* 3, no. 3 (2008): 56-75.

To assess community capacity, Beckley et al (2008) developed a model that assesses the impact of change on community outcomes (Figure 3). The figure lists seven capacity outcomes. In fact an infinite number of outcomes may exist and these outcomes can range from the rather small and mundane *(e.g., obtaining a new piece of playground equipment)* to large and profound (*e.g.,the creation of new governance institutions, major infrastructure, and the like*).[72]

Figure 3 also shows;

> *how various threats or opportunities serve as catalysts to activate the system toward identifiable outcomes. Varieties of capital or community assets take many forms and include economic capital, social capital, natural capital, and human capital. All these represent financial resources, talents, skills, natural resource endowments, and social networks that may be mobilized to produce desired outcomes. The spheres of market, bureaucratic, associative, and communal relations are where the organization and mobilization of these assets happen. This mobilization results in capacity outcomes.*[73]

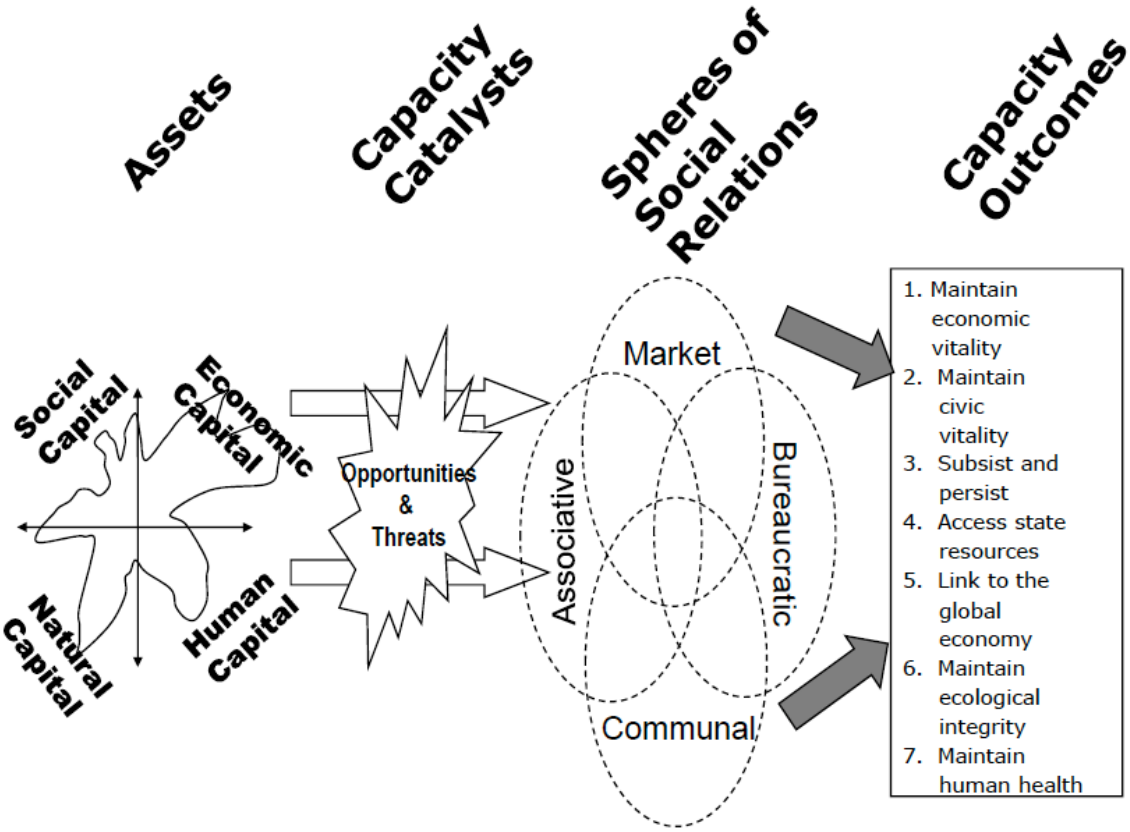

Figure 3. Community capacity model

Source: Beckley et al. 2008

[72] Ibid., 61-62.

[73] Ibid., 61-62.

While it might be too onerous in every case to build and assess a community capacity model like the one depicted in Figure 3 for every policy change under consideration, policy-makers should consider the impacts that new policy may have on the components in the community capacity model. Further, if governments move towards a market-based approach, it would be a worthwhile exercise to begin to develop these types of models for the communities that are likely to be impacted by new policies.

4.3 Identifying the Cause of Market Failure

Before policy action is taken, it is important to consider whether a market failure is contributing to the environmental issue to be addressed.

A primer on market failure

Market failures exist when the benefits and costs of supplying environmental outcomes are not captured in market transactions.

Market failures take two forms:

Externalities: when the costs of a transaction are not incorporated in market prices. Externalities occur when those producing or consuming a good or service do not incur all the costs or benefits associated with that production or consumption. While externalities can be positive or negative, it is the negative ones that are generally the focus of government intervention.[74]

Public goods: when consumption of a good by one individual does not reduce availability of the good for consumption by others; and when no one can be effectively excluded from using the good.

Clearly understanding what type of environmental issue policy-makers are dealing with will help to guide the decision about what type of instrument is appropriate. In the case of externalities, a wide range of policy instruments are appropriate to enhance ecosystem services. However, for public goods, because of their non-excludable nature, certain instruments may not be feasible (e.g. cap-and-trade schemes), particularly where existing property rights prohibit establishing new property rights.

If a market failure exists, an assessment of it can help identify (i) the sources/drivers of negative environmental outcomes, and (ii) where the key levers for policy change exist.

In this regard, policy-makers should identify the main causes of the market failure. The range of causes of market failure is described succinctly below:

> *"A combination of institutional, market and policy failures results in underpricing of scarce natural resources and environmental assets, which is then translated into underpricing of resource-based and environmental-intensive goods and services. Institutional failures such as the absence of secure property rights, market failures such as environmental externalities and policy failures such as distortionary subsidies, drive a wedge between the private costs and the social costs of production and consumption. As a direct result producers and consumers do not receive correct signals about the true scarcity of resources they use up or the cost of environmental damage they cause. This leads to the socially wrong mix of economic output: over-production and over-consumption of commodities that are resource-*

[74] Whitten et al., *Market-based Instruments,* 11.

> *depleting and environment-polluting, and over-production and under-consumption of commodities that are resource-saving and environmentally friendly. Thus the emerging pattern of economic growth and structure of the economy is one that undermines its own resource base, and is ultimately unsustainable, since relative scarcities are not respected."*[75]

Once the causes of market failure are identified, these should be assessed for a range of potential solutions. To help identify solutions to market failures, three key questions should be considered:[76]

- Are there policies in place that are causing the problem in the first place or that through minor adjustment could address the problem?
- What policies have been applied in the past? Were these successful, and why or why not?
- Is the policy adequately addressing the market failure?

The implications of the answers to these questions will begin to shape which policy instruments may be effective in the particular jurisdiction being considered. Further, Whitten et al. suggest policy-makers also keep in mind a broad suite of issues related to market failure that need to be considered in policy selection and design.[77] Table 7 presents a summary of market failure and policy design issues policy-makers should consider when selecting and design market-based instruments. These issue presented in Table 7 are not discussed in detail; however considerable discussion of these issues are presented in numerous publications by the Australian Commonwealth Scientific and Research Organization (CSIRO).

Table 7. Summary of possible market failures and policy design issues

Market Failure	Issues	Considerations
Incomplete property rights	1. Definable	Create and define property rights.
	2. Measurable	Develop metric to describe relevant attributes so that changes in inputs of ecosystem services can be linked to property rights.
	3. Excludable	If free-riders cannot be excluded, empower public agency to purchase ecosystem service.
	4. Transferable	Create right that can be transferred separaely from other rights (e.g. separate from land title).
Information (lacking, or asymmetrically held)	1. Ecosystem service production function unknown	Develop metric to link land management actions with ecosystem service production.
	2. Benefits of management actions unknown to buyer	Metric applied by buyer/public agency to calculate public benefits of management actions by landholders. Non-market valuation to capture public non-use values.
	3. Benefits of	Apply metric and extension programs to inform

[75] Theodrore Pantayou, *Instruments for Change: Motivating and Financing Sustainable Development* (London: Earthscan, 1998), 6.

[76] Collins and Scoccimarro, "Designer Carrots."

[77] Whitten et al., *Market-based Instruments,* 21.

	management actions unknown to producer	landholders how to produce ecosystem service, and of the associated private benefits.
	4. Scientific uncertainty	Incorporate 'risk premium' into metric. Further research to reduce uncertainty.
	5. No common marketplace	Create marketplace.
Market structure	1. Thin markets	Expand scope of market to bring in more traders. Work to maximise participation rates.
	2. Market power	Expand market scope to bring in more competitors. Regulate to prevent cartel formation.
Difficulty evaluating outcomes	1. Principal–agent problem	Monitoring. Performance-based payments. Trust.
Constraints to market participation	1. Capital	Upfront payments.
	2. Transaction costs	Public agency to provide information and advice. Minimise complexity of property rights and bidding/trading process.
	3. Inexperience with mechanism	Provide training on market mechanism.

Source: Whitten et al. 2009

Policy-makers will want to consider the range of market failures present above as they move forward in the policy development process to address whether intervention is required and which instruments are most appropriate.

4.4 Making the Case for Policy Intervention

As demand for ecosystem services increases, there will be a growing need for government intervention to manage these services. To properly intervene, governments will need to assess the relative trade-offs or costs and benefits associated with alternative policy and management options. Cost-benefit analysis can be used to quantify the benefits and costs and to help inform decision-making. Indeed, using cost-benefit analysis to appropriately evaluate trade-offs is one of the main drivers of economic valuation work.[78]

Cost-benefit analysis is the most widely used framework for assessing and comparing economic and financial trade-offs.[79] It attempts to determine whether a proposed project or policy would enhance or diminish social well-being.[80] More specifically, it attempts to compare the private and public benefits with the private and public costs for making a particular policy or

[78] Robert Young, *Determining the Economic Value of Water: Concept and Methods* (Washington, DC: Resources for the Future, 2005), 15.

[79] Lucy Emerton and Elroy Bos, "Value: Counting Ecosystems as Water Infrastructure" (Gland, Switzerland: IUCN, 2004).

[80] Peter Townley, *Principles of Cost-Benefit Analysis in a Canadian Context* (Scarborough, Ontario: Prentice Hill Canada Inc, 1998).

management decision. In relation to ecosystem services, cost-benefit analysis has been used to support or reject infrastructure investments and conservation programs.[81] In choosing the appropriate policy instrument for enhancing ecosystem services, policy-makers will need to clearly measure the public and private costs and benefits of a range of policy options.

Once the costs and benefits of alternative policy interventions have been quantified, researchers suggest the following guidance:[82]

- Positive incentives should be considered when public net benefits are highly positive and private net benefits are close to zero;
- Negative incentives should be considered when public net benefits are highly negative and private net benefits are slightly positive;
- Information programs should be considered when public net benefits are highly positive and private net benefits are slightly positive;
- Technology development should be considered when private net costs outweigh, or are similar to, public net benefits; and
- No policy intervention should be considered when private net benefits outweigh public net costs, where public and private net benefits are both negative, where private net benefits are sufficiently positive to prompt rapid adoption of environmentally beneficial activities, or where private net costs outweigh public net benefits (provided that technology development is not sufficiently attractive).

4.5 Selecting a Short-list of Appropriate Policy Instruments

This section of the report provides support to policy-makers who are seeking to reform existing incentive and disincentive structures related to natural resource and land use. Figure 4 (below) describes a framework comprised of a series of steps designed to assist in choosing an appropriate policy instrument.

Note that this figure can be, and was, drawn in a number of different ways. Indeed, the information summarized below is not meant to be a stand-alone decision support system for choosing the appropriate policy instrument but should be considered in the context of information gathering in subsequent phases of the policy development process and embedded within a stakeholder engagement process. Indeed, this section is intended to develop a concise and succinct framework for policy-makers to follow when considering the complexity and range of issues associated with beginning to choose between alternative policy approaches and instruments.

When considering alternative instruments, governments should consider expert advice to focus stakeholder discussions, identify research and other information gaps, and to supplement knowledge in the technical areas that support trade-off analysis.

[81] John Lawlor, Colm McCarthy and Sue Scott, "Investment in Water Infrastructure: Findings from an Economic Analysis of a National Program," *Journal of Environmental Planning and Management* 50, no. 1 (2007): 41-63.

[82] Ibid.

Choosing appropriate policy instruments is one part of the larger policy development process, as described in Section 4.1 of this report. Figure 4 describes a proposed framework for policy-makers to follow when considering alternative policy instruments. In reading the proposed instrument selection framework it should be noted that:

- Bold boxes represent key decision making nodes.
- Dotted boxes present the alternative outcomes for each of the decision points.
- Gray boxes identify the policy option/s appropriate for further assessment.

When working through the framework, after each decision point, policy-makers should assess the appropriate policy option according to: (i) the likelihood that the policy objective has been achieved given the contextual information about the area of focus and the expected changes in incentive and disincentives; and (ii) the performance of the policy option against the policy evaluation criteria discussed in Section 4.8.

As previously mentioned, the key decision points that should be considered in choosing an instrument are identified by a bolded box. Information to consider in the bolded boxes is described in more detail below.

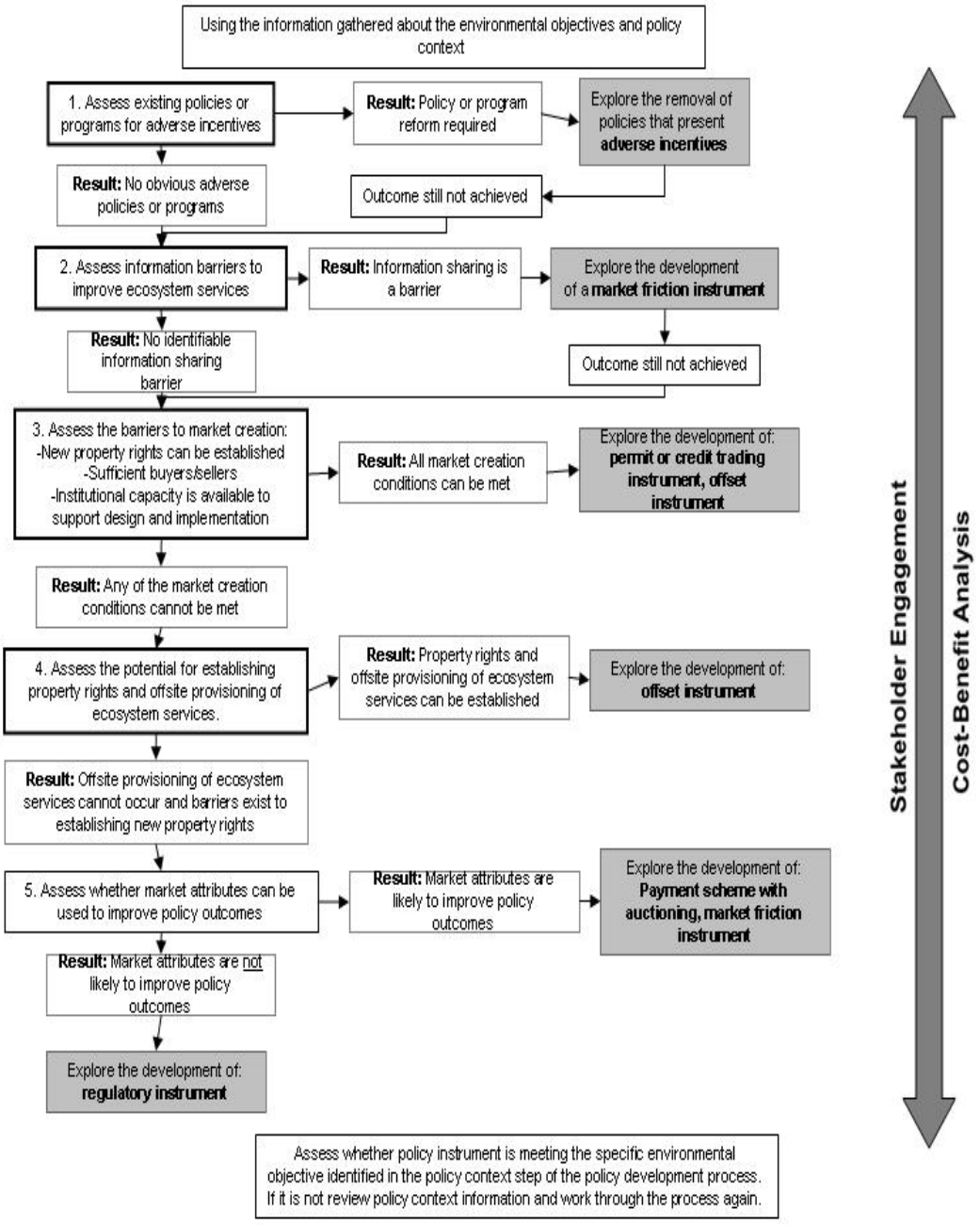

Figure 4. Policy choice framework

Adapted from Collins and Scoccimarro, 2009

Step 1: Assess whether current market reform will achieve ecosystem service goals

The first step in the policy choice framework is to consider whether reforming or removing an existing policy or policies would achieve the desired policy objective. Currently, in the forestry and agriculture sectors there are a number of policies that exist to encourage commodity

production.[83] Many of these policies are established for social or economic reasons. However, they may also be encouraging actions that have an adverse impact on ecosystem services. Removing or reforming such policies may be sufficient to achieve the policy objective. Furthermore, if such policies are not removed or reformed before new policy instruments are introduced, the effectiveness of the new policy may be compromised.

To assess current policies and programs and their potential impact on ecosystem services, Collins and Scoccimarro (2009) recommend that the following questions be posed:

- What are the actions that are causing degradation to ecosystem services?
- Are there current policies supporting these actions?
- What is the potential[84] for reforming any such policies?
- Will reforming policies that have an adverse impact on ecosystem services provide the necessary change in behaviour on the land base to move towards the identified environmental outcomes?

Once existing policies and programs have been assessed, policy-makers must decide whether ecosystem service policy goals can be achieved by reforming or removing existing policies. If the policy goal cannot be achieved by eliminating or reforming existing policies, then policy-makers should continue to work through the policy choice framework, moving to Step 2.

Step 2: Assess information barriers

As discussed in Section 2.3 and 4.3 , information sharing plays a critical role in the functioning of all markets. When choosing an appropriate policy approach, it is critical to assess whether alleviating barriers to information sharing may improve ecosystem services. If alleviating information sharing barriers can enhance the provision of ecosystem services, then a suasive policy approach is likely a cost-effective solution.

Information barriers can be reduced through the use of suasive policy instruments (eg. pollution inventories, education initiatives, information programs, eco-labelling etc.). Information on how a firm is impacting an ecosystem service or how a firm performs relative to its competitors can sometimes provide sufficient motivation for companies to ameliorate or reduce their negative impact.[85] Further, making relevant information available to the public can create an incentive for those having a negative environmental impact to adjust their behaviour.[86]

[83] For more information see: The Pembina Institute, *Adverse Incentives in the Forestry and Agriculture Sectors* (report prepared for IAFE, 2009).

[84] Examining the potential for reforming existing policies will have political and economic dimensions that should be considered.

[85] Thaler and Sunstein, *Nudge*, 190.

[86] It should be noted that information barriers, when alleviated, can enhance the performance of voluntary markets (which currently exist for ecosystem services in Alberta) by more effectively bringing together buyers and sellers for exchange and promoting the transparency in trade and reporting.

Step 3: Assess barriers to market creation

There are a number of potential barriers to market creation that need to be assessed before any of the quantity-based market-based instrument can be employed. For a market creation instrument like **tradable permits** to function appropriately, the following key conditions should exist:

- The number of firms participating in the market is sufficiently large.
- No single firm has the power to set market prices.
- There is a heterogeneous range of costs.

To assess market power, policy markers should consider the land holdings and production levels of any firms that may be perceived to have significant market power. The European Commission recommends the following factors for assessing market power:[87]

- Market share: Substantial market share is generally needed for a firm to have market power. Though possible, it would be very unusual for a firm with a market share below 25% to have significant market power. The courts have usually found that firms with market shares of 50% or more have a dominant position.
- Barriers to market entry: If barriers to entry are low, the possibility of entry may prevent a firm increasing its price despite having a high market share. If barriers to entry are high, the firm is more likely to have the ability to substantially increase its prices.
- Economies of scale: An established firm may be able to achieve substantially lower per-unit costs than a competitor could, which may act as a barrier to entry.
- Economies of scope: An established firm may be able to manufacture several products at once, and achieve lower costs than a competitor.
- A highly developed distribution and sales network: A well-established firm may have exclusivity agreements with distributors, making it difficult for competitors to enter the market.

There are a number of other conditions that need to exist before market creation is undertaken. To decide whether a quantity-based instrument (like tradable permits/credits) or a price-based instrument is most appropriate, policy markers need to evaluate whether limiting compliance costs are more critical than meeting a specific environmental target. If both are equally important, then **price and quantity-based instruments** can be explored. If achieving the ecosystem service target is a relatively higher priority, than a **quantity-based instrument** is desirable. If limiting compliance costs is a relatively higher priority, than a **price-based instrument** may be desirable.

If governments are not willing to transfer liability to those damaging ecosystem services or to recognize the contribution made by those improving ecosystem services, than a market-based instrument is not feasible and policy-makers should consider Step 5.

[87] European Commission, Office of Fair Trading, "Assessment of Market Power: Understanding Competition Law." http://www.google.ca/url?sa=t&source=web&ct=res&cd=2&ved=0CAsQFjAB&url=http%3A%2F%2Fwww.oft.gov.uk%2Fshared_oft%2Fbusiness_leaflets%2Fca98_guidelines%2Foft415.pdf&ei=z2T0SrOnNIuIsgOy9fkF&usg=AFQjCNHKmC8QLKMOAq4bXwPO05yPj_ofJQ

Step 4: Assess potential for activities to fund the provision of offsite ecosystem services

In this step of the policy choice framework, policy-makers should consider whether environmental objectives can be met by regulating activities (through a charge or compliance mechanism) that could be used to fund offsite ecosystem services. This involves the use of multiple policy instruments: one that requires mitigation actions to be undertaken (e.g. **command and control**) and one that distributes the funds to meet ecosystem service objectives (e.g. **offsets** or **payment scheme**).

For this type of policy to be appropriate, policy-makers need to identify developers or land owners that are causing irreversible impacts on ecosystem services (e.g. oil sands, mining, seismic lines, urban development). Once identified, **compliance offsets** should be considered. This type of policy first requires governments to impose a regulation that requires those causing disturbances to mitigate their impact by funding set-asides or offsets. The regulation can take the form of a charge on the disturbance with the funds collected in a compliance fund or through a mandatory performance standard that requires developers to meet specific disturbance thresholds.

In Alberta, this option represents a viable opportunity, as there exists a wide variety of large land users who require a social licence to operate. For more information on how this option could be applied in Alberta, see *Regulated Conservation Offsets with Banking: A Conceptual Business Model and Policy Framework.*[88]

If an opportunity to fund the provision of ecosystem services from specific regulated activities does not exist, policy-makers should move to Step 5 (below).

Step 5: Assess whether market attributes can be used to improve policy outcomes

To be functional, quantity-based instruments, like tradable permits, require a broad distribution in the marginal cost of environmental compliance. With a broad range of marginal compliance costs, firms with a low marginal cost of compliance will seek ways to reduce their environmental impact. Firms with a high marginal cost of compliance will purchase permits or credits. If a broad distribution of marginal costs exists in the sectors being considered for regulation, then policy-makers can consider market creation instruments like tradable permits.

If there is limited variability in marginal compliance costs, a market creation instrument will not be appropriate. In such cases, policy-makers can consider the use of market attributes to improve policy outcomes.

In this step, policymakers should assess the potential to use market attributes to lower transaction costs, introduce additional efficiency to the chosen policy instrument and provide additional incentives or disincentive to produce a given outcome. A range of instruments can be considered in this stage. **Price-based instruments** such as levies, charges, tax credits or **payment schemes**

[88] Alberta Boreal Conservation Offsets Advisory Group, *Regulated Conservation Offsets with Banking: A Conceptual Business Model and Policy Framework* (2009).

are examples. **Market friction instruments** such as auctions, risk-based insurance schemes and outcome-based support are also potential examples. In reaching this step, policy makers have already determined that most other market-based instruments are not appropriate, so exploring the use of the instruments described above is done with a view to increasing the cost-effectiveness and efficiency of regulation.

4.6 Policy Instrument Design

Designing the appropriate policy instrument involves gathering the same information as suggested in the subsequent sections. However, when shifting to policy instrument design in the policy development process, policy-makers should already have a short-list of policy instruments that they have deemed appropriate based on knowledge related to the policy context, management context and market failures, and the need for policy intervention.

Policy instrument design, like instrument selection, should take place with the guidance of expert advice and stakeholder involvement. Expert advice can provide policy-makers with analysis and information, while stakeholder involvement can provide insight into additional information and more important about existing rules[89] that govern natural resource use in regional economies.

Policy instrument design is an iterative process.[90] As the process develops, additional issues and considerations will need to be taken into account. As well, each instrument design process will be unique.

Due to the limited experience in Canada with market-based approaches, this section relies heavily on policy instrument design experiences and lessons from Australia. It should be noted that this experience is different than what might be expected in Alberta as much of the experience in Australia is on influencing private landholders. Further research in policy instrument design for public land will need to be considered as Alberta moves forward with a market-based approach.

4.6.1 Metric Design

Metric design is a critical component to the use of market-based instruments. The metric is the basis for measuring relative and absolute outcomes in ecosystem services and is vital to defining property rights and to determining who benefits and who pays. A core principle of a metric should represent the quantity and quality of the ecosystem service. Further, "it [metric design] represents a complex bundle of trade-offs and is not simply a question of estimating a measure of biophysical change (which in itself is extremely complex) but often must also take into account other drivers of values."[91]

[89] Rules are referred to here as the moral and legal obligations that set out what is allowed, required and permitted for land and natural resource use.

[90] Whitten et al., *Market-based Instruments,* 23.

[91] Ibid., 24.

From experiences in Australia, Whitten et al. (2009) posit that only rarely will the same measure be suitable for multiple purposes within the policy design framework. As well, the following lessons have been learned from market-based instrument use and metric design in Australia:

- A market-based policy framework that involves multiple policy instruments will likely require multiple metrics.
- In some cases the metric will be directly linked to policy targets.[92] As such, policy targets should be framed in a measurable way to enable the use of market-based instruments, if they are appropriate.
- In many cases the metric will only be indirectly linked to overall targets, in part because MBIs may only be aimed at achieving one part of the overall target.
- It is uncommon for the same measure to be used for both an impact assessment and a monitoring role within the MBI. This is because most MBIs to date evaluate the impacts of alternative management actions based on an estimate of their future impacts on the target outcome.

Metric design requires the examination of a wide range of factors that are likely to impact the ecosystem service outcomes. Whitten et al. (2009) propose a set of metric design principles, which, it should be noted, apply also to broader policy instrument design:

- **Quantity/quality:** the development of a quantity and/or quality metrics for ecosystem services should send an appropriate message to land and resource users and relate to the achievement of desired policy outcomes.
- **Spatial relationships** between an ecosystem service and management actions and relationships between ecosystem services need to be considered to ensure policy outcomes are measurable and traceable to changes in behaviour by land and resource users.
- **Baseline:** changes in ecosystem services relative to an established baseline condition are critical to establishing measurable outcomes.
- **Spatial location** of the ecosystem service relative to the community impacted is important to understand the expected value of policy outcomes.
- **Timing** of ecosystem service outcomes is critical to market and individual instrument success. For political reasons, achieving outcomes in the short-term are generally weighted more heavily than achieving outcomes in the longer term.
- **Risk** of achieving ecosystem service outcomes from the range of management action responses needs to be weighted appropriately. Risk can be accounted for in metric design or broader policy instrument design.
- **Irreversibility** of existing trends in ecosystem service change relative to critical thresholds is critical in metric design and overall policy instrument design.
- **Spill-over:** how metrics are established and outcomes are achieved are likely to have consequences for other aspects of the land and natural resource management system and this potential effect should be accounted for.

[92] Ibid.

Through the work of IAFE, metric design has been explored for Alberta. For more information on establishing metrics for ecosystem services in Alberta see *Ecosystem Assessment for Ecosystem Service Markets in Alberta*.[93]

4.6.2 Mixing Instruments to Improve Outcomes

As mentioned in Section 4.5, a successful market-based approach to ecosystem services relies on a combination of instruments to effectively achieve policy outcomes. For example, quantity-based instruments need to have a regulatory (and often prescriptive) underpinning to create effective property rights. Further, numerous studies have emphasized that all instruments require strong communications and stakeholder engagement support.

Whitten et al. (2009) note: "little formal analysis has been undertaken on strategies and pitfalls in mixing instruments to achieve outcomes more effectively. The case for combining instruments has been reinforced by market failure analysis that has repeatedly indicated the importance of incorporating a range of instruments to effectively overcome the multiple market failures that are faced in many MBI situations."[94]

Existing research on market-based instrument implementation provide important considerations for policy-makers to take into account when developing a market-based approach:[95]

- Combining additional instruments into the mix to support MBIs will not always yield the synergistic outcomes anticipated.
- Generally there will be a trade-off between the additional costs involved in combining additional instruments and the additional ecosystem services produced.
- In nearly all cases explored to date it is clear that an information and extension program is required in the early stages of implementation in order to reduce the transaction costs to participating in new and unfamiliar instruments.

4.6.3 Nesting Instruments to Reduce Transaction Costs

Nesting policy instruments refers to actively designing MBIs to fit within existing government and non-government programs and initiatives. This complements the idea of instrument mixing, as discussed above.

The impetus for designing policy instruments within existing policy frameworks is an attempt to reduce transaction costs. Nesting instrument may not necessarily reduce all components of transaction costs, particular for regions like Alberta that have limited experience with MBIs, as transaction costs associated with defining or refining property rights will be fixed in the short-term. Where nesting instruments have been shown to be effective in reducing transaction costs is in the area of policy implementation, administration, monitoring and enforcement for the public

[93] Alberta Biodiversity Monitoring Institute, *Ecosystem Assessment for Ecosystem Service Markets in Alberta* (report prepared for the Institute of Forestry, Agriculture and Environment, March 2010).

[94] Whitten et al., *Market-based Instruments,* 30

[95] Ibid.

sector.[96] Private transaction costs of learning how to engage with new instruments can also be reduced through nesting in some circumstances, particularly as new policy instrument engagement and administration overlaps with existing private land policies and programs.

Whitten et al. (2009) suggest that in many cases MBIs can be nested into current structures rather than creating new ones. Further, in practice, nesting involves a trade-off between incorporating aspects of less than perfect existing instruments with the cost of designing and implementing new ones.

4.7 Policy Implementation

Policy implementation is critical to the success of any new policy or program; a market-based approach is no different. The information for this section of the report is drawn from a number of sources including (i) literature on market-based instruments that are operating in other jurisdictions, (ii) feedback and comments from stakeholders that attended the IAFE stakeholder consultation sessions, and (iii) comments and feedback from participants at the IAFE International Think-Tank on Ecosystem Services.

In considering the implementation of a market-based instrument it is important to considering the following points:

- The success of the instrument is not likely to be realized right away. It will take time for ecosystem services to respond to operational management actions.
- The design of policy instruments is likely to be fraught with difficulties and challenges. The perfect policy instrument should not be expected from the start, but the design of each instrument should be considered within the context of continuous improvement.
- A phased approach may be needed, with instruments designed and tested in pilot settings before being rolled out on a larger regional or provincial scale.

4.8 Policy Evaluation

Policy evaluation is critical to the success of new policy instruments. In developing an approach to evaluating the policy instruments that are deemed appropriate for the Alberta context, policy-makers should first consider policy evaluation criteria. It should be noted that policy-markers are best served to work with stakeholders to define the evaluation criteria. Potential policy evaluation criteria for policy-markers in Alberta include the following:

- Environmental effectiveness
- Cost effectiveness
- Economic efficiency
- Competitiveness
- Fiscal impact
- Fairness
- Administrative simplicity

[96] Ibid.

- Political feasibility
- Integration with global policies

4.9 Cost-Benefit Analysis

As is shown in Figure 4, cost-benefit analysis and stakeholder engagement play a critical role in supporting policy instrument selection. Stakeholder engagement is discussed in detail in a separate IAFE publication.[97] In this section of the report, the role of cost-benefit analysis in policy assessment is discussed.

As demand for ecosystem services increases, there will be a growing need for government intervention to manage these services. Justifying government intervention in a functioning marketplace requires a quantitative assessment of the associated benefits and costs. To properly intervene, governments will need to be able to assess the relative trade-offs or costs and benefits associated with alternative policy and management options. Cost-benefit analysis can play an important role in facilitating the evaluation of benefits and costs to help inform decision-making. Indeed, using cost-benefit analysis to appropriately evaluate trade-offs is one of the main drivers of economic valuation work.[98]

Economic Valuation to Support Cost-Benefit Analysis[99]

Economic value measures the degree to which the provision of a good or service satisfies an individual's preferences. Typically, our preferences are revealed through our decision to buy or not to buy particular goods and services. If an individual decides to purchase Good A, he or she is willing to pay at least as much as the price of Good A. In this way we can use the willingness of an individual to pay as a measure of their level of satisfaction derived from the good or services (i.e. economic value).

From an economic perspective, natural capital (the stock of natural asset in a watershed or landscape) derives value from the quality and quantity of its underlying ecological attributes and the flow of services it produces over time, because these ecosystem services provide satisfaction to humans (i.e. improves human well-being). Therefore, the willingness of an individual to pay for an ecosystem service is one way to attribute value to natural capital.

The usefulness of economic valuation assessments for decision-making depends on the ecosystem service management or policy decision under consideration. There are a number of contexts in which economic valuation assessments are not necessary. At the same time, there are other contexts in which economic valuation assessments can contribute to better natural resource management and policy decisions. More specifically, for resource managers, as will be discussed in more detail below, economic valuation can play an important role in:[100]

- Informing management and policy decisions when trade-offs exist.

- Providing estimates for natural resource damage assessments.

[97] The Pembina Institute, *A Strategy for Stakeholder Engagement* (Report prepared for IAFE, March 2010).

[98] Young, *Determining the Economic Value of Water*, 15.

[99] For more information see: Amy Taylor and Mike Kennedy, *Scoping Report on Canadian and International Water Valuation* (report prepared for the Canadian Council of Ministers of Environment, 2008), 73.

[100] National Research Council of the National Academies, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making* (Washington, D.C.: The National Academies Press, 2005), 37-38.

The resource management decision at hand will determine the level of economic valuation assessment that is required. In some cases, a comprehensive assessment of the value of a suite of key ecosystem services may be required, while in other cases, a simpler study based, for example, on benefits transfer (using the results of a valuation assessment in one region and applying them to another) may suffice.

Economic valuation allows natural resource managers to gauge the efficiency with which natural resources in a region are being used and to compare the value of ecosystem services with other forms of capital using a common denominator (usually monetary). In the context of natural resource management decisions, this allows managers to assess alternative land uses on a level playing field and to base infrastructure investment, resource development and/or conservation decisions on a full account of the trade-offs associated with choosing one option over another. The trade-offs between alternative resource and land uses are often assessed within a cost-benefit framework in which economic valuation can be used to account for the full suite of costs and benefits (market and non-market) associated with alternative land and resource uses.

Economic valuation can also play a role in providing estimates for natural resource damage assessments. Like other forms of capital, the value of ecosystem services depreciates with over-use and exploitation. By valuing the stock of natural assets, managers can begin to get an estimate of the aggregate depreciation of the natural wealth of a region and in doing so assess the loss of ecosystem services resulting from excessive land or resource use. The United States, through the Department of Interior's Natural Resource Damage Assessment and Restoration Program, has undertaken work to this end.[101] Through the mandate of the Department of Interior, communities, businesses and governments can seek compensation for damages, incurred by oil spills or toxic releases into the environment.

Cost-benefit analysis, in general is used in environmental policy development to support better understanding of:[102]

- The costs to human health, business profitability and broader social welfare for actions currently undertaken by firms, governments and individuals or for inaction by these same actors.
- The costs and benefits of new policy initiatives with respect to budgetary expenditures and other significant investments.
- Assessing the results of decisions for finance and planning agencies in economic language.

In terms of policy instrument selection, cost-benefit analysis can be used to (i) assess whether policy intervention is warranted, and (ii) provide insight to policy-makers in choosing between policy instruments, as each instrument can present unique costs and benefits.

In Europe, where the use of market-based instruments is more wide-spread, the application of cost-benefit analysis to evaluate environmental policies has also increased considerably.[103]

[101] U.S. Department of Interior, "Natural Resource Damage Assessment and Restoration Program." http://restoration.doi.gov/ (Accessed May 6th, 2008).

[102] David Pearce, "Cost Benefit Analysis and Environmental Policy," *Oxford Review of Economic Policy*, 14 (1998): 84-100.

[103] Kirchgassner and Schneider, "On the Political Economy of Environmental Policy," 372.

Cost-benefit analysis is the most widely used framework for assessing and comparing economic and financial trade-offs.[104] It attempts to determine, from an economic perspective, whether a proposed project or policy would enhance or diminish social well-being.[105] More specifically, it attempts to compare the benefits to society and/or government with the costs to society and/or government for making a particular policy or management decision. In relation to ecosystem services, cost-benefit analysis has been used to support or reject infrastructure investments and conservation programs.[106] Through the use of ecosystem service valuation, the breadth of the costs and benefits incorporated into this decision-making framework can be expanded to account for both market and non-market goods and services.

[104] Emerton and Bos, "Value."

[105] Townley, *Principles of Cost-Benefit Analysis in a Canadian Context.*

[106] Lawlor, McCarthy and Scott, "Investment in Water Infrastructure."

5. Support Mechanisms for a Market-based Approach

Once policy-makers have identified a suite of policy instruments that could be used to provide ecosystem services, it is also important to think about an appropriate governance model. In some cases a governance model for ecosystem services may already exist, which is most likely the case for regions with organized natural resource development. As such, to support a market-based approach, a number of critical components are needed to ensure that the policy approach has the greatest potential for success. This section outlines some of the components needed to support a market-based approach in Alberta.

This section of the report is drawn from the *Ecosystem Service Market Policy Framework*.[107] The information was gathered from discussions with stakeholders within the Government of Alberta, Agriculture and Forestry sectors and the environmental non-government sectors. This section is included to provide a more complete suite of information for policy-markets to consider as they move towards a market-based approach. It should be noted that not all components of the market-based approach are required. For example, a market-based approach may not include the use of tradable permits, in which case a trading platform is not required. As with policy instrument selection, expert advice and stakeholder engagement should be used to develop a governance model for a market-based approach.

To a market-based approach to ecosystem services a number of critical components must be established in order to facilitate:

- The collaboration of specialists, market actors, and policy advisors in a creative and effective environment.
- Development of comprehensive biophysical, community and policy context information.
- Transparency in reporting.
- Validation of compliance with government policy.
- Integration of multiple policy instruments to support the achievement of environmental outcomes.
- Advances in the use and effectiveness of existing and future policy instruments.

The institutional components of a market-based approach are illustrated in Figure 5. The multi-stakeholder, arm's-length body designated as the "governing institution" is established to manage and coordinate the components of the system and will have other important

[107] Institute for Agriculture Forestry and Environment, *Ecosystem Service Market Policy Framework* (March 2009).

responsibilities associated with risk management, financing, cost-benefit analysis, stakeholder engagement and creation of effective and collaborative partnerships.

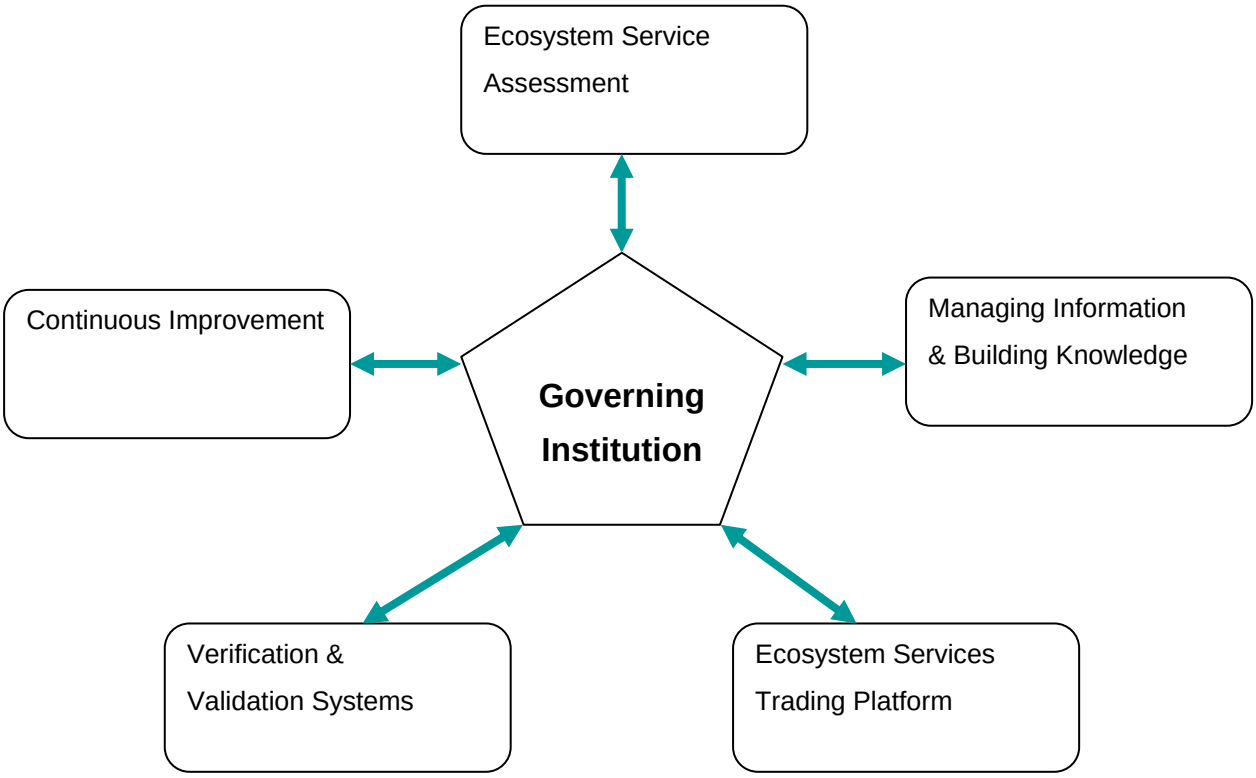

Figure 5. Institutional components for a successful market-based system

Source: IAFE, *Ecosystem Service Market Policy Framework* (March 2010)

5.1 Ecosystem Service Assessment

An accepted, systematic way of assessing ecosystem services underpins any ecosystem services market system. Assessments are done to identify the ecosystem services available and determine the condition and extent of each of the ecosystem services in a given region.

The ecosystem service assessment enables the establishment of metrics and currencies to facilitate identification and registration of ecosystem service units. Its focus is to facilitate the following marketplace measurement functions:[108]

- Estimating the quantity and quality of ecosystem service units.
- Identifying and describing the spatial relationship between management actions and ecosystem change in a region and the expected impact on ecosystem services.
- Establishing baselines against which to measure future changes in ecosystem services.

[108] Whitten et al., *Market-based Instruments*.

- Assessing the location of ecosystem service outcomes and their relative value to adjacent communities.
- Assessing the timing of ecosystem service outcomes.
- Assessing the risk and certainty of management outcomes based on predicted human and natural factors.
- Enabling the scaling-up of ecosystem service outcomes to assess the positive and negative impacts for other markets and large-scale ecosystem functions.

This information provides baselines against which future changes can be measured and transactions verified. The assessment of ecosystem services builds from new and existing data sets and inventories.

The assessment system must be integrated across provincial, regional and local scales and enable prioritization and the assigning of a value (or currency) to the particular ecosystem service attached to the area.

5.2 Managing Information and Building Knowledge

Managing information and building knowledge is critical to the development of the ecosystem service marketplace. Establishing the long-term supporting mechanisms for the market-based approach is important for overall provincial success with environmental outcomes. These mechanisms are similar to those needed for all resource management approaches and include:

- Research and policy analysis capacity
- Data procurement and development of supporting models

Knowledge networks have been an effective approach to facilitate the collaboration of researchers and policy analysts working on similar natural resource and environmental issues. In Canada, examples of this approach include the Sustainable Forest Management Network for research and analysis and the Model Forest Network for research, analysis and policy application. Similarly, a knowledge network will be needed to support a market-based approach to ecosystem services. The text box below summarizes an example of a type of knowledge network that can support the approach outlined in this report.

Convention on Biodiversity: Clearing-House Mechanism

The Convention of Biological Diversity's (CBD) Clearing-House is based on the philosophy that broad participation and easy access must be a top priority. The Clearing-House brings together a network of non-government organizations, other institutions and governments to promote the goals of the CBD.[109]

The mission of the CBD Clearing-House is to:

- *Promote and facilitate technical and scientific cooperation, within and between countries*
- *Develop a global mechanism for exchanging and integrating information on biodiversity*
- *Develop the necessary human and technological network*

[109] Convention on Biological Diversity, "Clearing-House Mechanism." http://www.cbd.int/chm/

The Clearing-House is coordinated by the Executive Secretary and overseen and guided by an Informal Advisory Committee. The committee works in a transparent and cooperative manner to promote awareness of the multiple needs and concerns facing various communities, countries and regions.

In addition, a network of national focal points for the mechanism is being established to address matters relating to technical and scientific cooperation. The parties have emphasized the need to strengthen the role of these focal points.

A robust information management system is based on collaboration, cooperation, transparency and data sharing among all stakeholders and partners to achieve efficiency, effectiveness and increased transparency. A solid foundation of collaboration and cooperation between government, business and communities will change the way solutions are developed for complex environmental issues. Shared participation and collaboration across all resource management sectors will help to bring about a new environmental management paradigm and brand Alberta as an environmental leader. This Framework recognizes the significance of supporting collaboration by ensuring that the institutional infrastructure and tools are in place to promote open innovation and build capacity.

Some of the main components of the information management system include:

- A spatial ecosystem service inventory;
- An ecosystem service indicator database to provide an understanding of trends in ecosystem services provincially, regionally and sub-regionally; and
- An economic valuation database to identify local and regional benefits.

Connected with information management is the need to build a distributed knowledge infrastructure that supports data management, policy instrument evaluation and the integrity of marketplace transaction and institutional networks. This infrastructure in turn will build capacity in personnel, science, research, and policy analysis management to ensure the functioning of individual instruments and the overall ecosystem service marketplace.

Collecting and sharing information required to support land-use planning and decision-making is critical to the success of the ecosystem services market. Creation of an integrated system to ensure decision makers have access to the information they need is fundamental.

5.3 Ecosystem Services Trading Platform

A trading platform to facilitate and register transactions in the marketplace is required when a trading permit or credit scheme is considered. Indeed, a properly operating platform provides credibility and transparency, is efficient, and can provide a starting point for building on and interacting with international market exchange platforms.

The ecosystem services trading platform serves as a central point for buyers and sellers to exchange ecosystem system service units. The trading platform will be robust enough to incorporate a range of potential functions including:

- Bilateral trades: where one-on-one negotiations are undertaken through a bargaining process and market participants only requires the registration of the traded ecosystem service units.
- Exchanges: a public forum where buyers and sellers can meet and exchange ecosystem service units in a transparent pricing environment.

Along with facilitating transactions, the ecosystem service trading platform will include the management or coordination of the following components:

- Data inventory: Ecosystem services baselines need to be calculated for each regulated component and, overall, for an ecosystem. Baselines help identify appropriate ecosystem targets and to monitor change.[110]
- Registry: Acts as an exchange-recording entity and a custodial system for credits. A registry enhances the credibility and transparency of environmental transactions and provides confidence to the marketplace, reducing risk and facilitating lower transaction costs.
- Common protocols: Use of an internationally accepted ecosystem services accounting methodology increases the interchangeability of credits and the legitimacy of the program.
- Determination of initial allocation: Fair and clearly defined allocation of credits and limits of credits is integral to reducing uncertainty for regulated parties. This forms the basis for initial ownership for ecosystem services as recorded in the registry.
- Public reporting: Encourages transparency and accountability of the trading platform.

5.4 Verification and Validation Systems

With the establishment of a marketplace for ecosystem services, the entity that oversees the marketplace will also need to ensure verification that the exchanges between buyers and sellers are valid. This will mean developing specific protocols to ensure that those who assess the exchanges are proficient and fully understand the metrics involved so that the correct credits are associated with the action. Correct in this context includes quantity and quality validation.[111]

Documenting ecosystem service outcomes is based on the use of quantitative methods to measure the ecosystem services achieved by applying a particular instrument and in verifying that the action directly achieves or connects to the broader ecosystem outcomes. The ecosystem service marketplace will rely on globally recognized third-party verification systems as the basis for documenting the integrity of ecosystem system service units.

The system provides opportunities for traditional commodity producers to use tools like eco-labelling or branding to tell consumers when a product is validated to be “environmentally

[110] See also: Alberta Boreal Conservation Offsets Advisory Group, *Regulated Conservation Offsets with Banking: A Conceptual Business Model and Policy Framework* (2009).

[111] For more information, see the work of the Willamette Partnership, described at http://www.willamettepartnership.org/

friendly." Traditional products supplied by marketplace participants can be assessed to validate the products to assure consumers that it meets specific environmental standards.

A credible, globally recognized validation system will assure Albertans and global consumers that desired ecosystem outcomes and transactions are being achieved and that claims made in the marketplace are legitimate.

The intent of the Framework is to build on the good work already done by Alberta government in establishing clear outcomes and baselines with validation protocols built around ecosystem services outcomes. Then once a price is placed on ecosystem services and it is possible to verify that the desired ecosystem outcomes are being achieved, companies and resource managers will receive price-based feedback, positively or negatively, on their management practices. This creates an enhanced opportunity for innovation and commercialization of new, more sustainable approaches as businesses seek to improve their economic performance.

5.5 Institutions and Governance

A good governance structure with clear delineation of decision-making and of the roles and responsibilities of government, business, and other stakeholders is critical to the success of the market-based approach for providing ecosystem services.

Governance refers to the process of making decisions and the process by which decisions are implemented. Among other things, good governance is participatory, accountable, transparent, responsive, effective and efficient, equitable and inclusive, and follows the rule of law. It is reasonable to expect that the policy direction envisioned in this Framework would have the characteristics of good governance. With a market-based policy approach, the government will continue to be responsible and accountable for the public assurance component of ecosystem management, including compliance with and monitoring of outcomes.

The Government of Alberta recognizes that "individuals, communities, industry, municipalities and non-profit organizations all have an important role to play in achieving our vision for Alberta."[112] These roles, as they pertain to ecosystem services markets, should be clearly described and communicated. Opportunities for timely stakeholder engagement also need to be provided at key decision points while markets and potential market instruments are being considered, developed, and evaluated.

At a minimum, there will be specific governance roles for buyers and sellers of ecosystem services, for the marketplace regulator, and for government in ensuring market and policy efficiency and effectiveness. Implementing the Framework is best achieved through an independent, multi-stakeholder body, acting in the public interest, that coordinates and provides oversight and executive management functions to support the market. This body would be accountable to the Government of Alberta in its public assurance role over the province's natural resources and would report to the Government and to Albertans on a regular basis.

Governance of a functioning marketplace must be supported by:

[112] Source for both quotes: Government of Alberta, *Budget 2009: Government of Alberta Strategic Business Plan*, 1. http://www.finance.alberta.ca/publications/budget/budget2009/govbp.pdf.

- Coordinating and managing the components to ensure a functioning market system;
- Undertaking appropriate evaluation and analysis of costs and benefits to help inform decision making;
- Adopting risk management and mitigation strategies;
- Engaging stakeholders and developing partnerships;
- Creating and maintaining distributed networks;
- Building capacity;
- Communicating and reporting; and
- Financing and funding of the market structure.

6. Recommendations and Conclusions

This report has attempted to develop a contextual framework to support a market-based approach to ecosystem services in Alberta. As indicated in the introduction, this report was commissioned to support policy recommendations for the Government of Alberta by the board of the IAFE.

Through the development of this report, the author communicated extensively with a number of other stakeholders, researchers and policy-makers concerned with ecosystem services and the use of market-based instruments. While this report is not exhaustive in its consideration of the many issues related to using a market-based approach to ecosystem services, it should at a minimum support future policy development in this area.

It is clear that further research and analysis is needed in this area as the Government of Alberta shifts to the use of market-based approach. Some of the critical areas for future policy consideration in Alberta include:

- Developing biophysical ecosystem service inventories to support policy development related to land and resource use;
- Identifying cause-effect relationships between land and resource activities and their resulting impact on a range of ecosystem services;
- Developing a better qualitative understanding of environmental values in Alberta to facilitate more effective communication and decision-making related to land and natural resource use;
- Developing the information needed to support an institutional analysis of natural resource governance in Alberta to more clearly define the factors driving environmental outcomes in Alberta; and
- Building on the existing work commissioned by IAFE to conduct a more thorough review of existing legislation and policies that affect land and resource use and their resulting impact on activities that impact a range of ecosystem services.

Despite the gaps in existing knowledge and information in Alberta, it is clear that a market-based approach represents an opportunity for the government to address many of the existing market failures related to land and resource use. Through a strong and effective stakeholder engagement process, the government should proceed with policy development for the use of market-based instruments for an initial suite of ecosystem services.

The full range of IAFE recommendations for the Government of Alberta are captured in the *Ecosystem Services Market Policy Framework*. However, those recommendations that pertain to the information captured in this report include:

- The Government of Alberta should reconfirm its commitment to set specific and attainable environmental outcomes through the Land Use Framework, to enable a functioning ecosystem services market.
- The Government of Alberta should commit to the development of the ecosystem services marketplace, and the establishment of the critical system components, as a government-wide priority, and ensure full engagement and cooperation of the respective ministries. This includes clearly articulating the roles and responsibilities of government (public assurance) and those of other stakeholders (business and the market) as defined within the Ecosystem Services Market System.
- The Government of Alberta should commit to the development of a comprehensive, provincial ecosystem services assessment and inventory, with concurrent establishment of a credible currency (credit) system as the foundation of an internationally recognized and respected system for assessing and documenting ecosystem integrity.

There is no doubt that the Alberta Government is leaning more towards considering a market-based approach to address long-standing land and resource use problems. The work of the IAFE has contributed significantly to better understanding the issues that need to be considered as the Government of Alberta seeks to green its growth. While considerable research and analysis is needed to understand the complexity of the natural resource and economic interactions in Alberta, it does appear that a market-based approach is particularly relevant here, given the province's focus on business and economic growth.