

The Application of Property Rights in Ecosystem Service Markets

by

David W. Poulton, Erin Sawyer,
Joanne Cave, Jill Gorr-Winther & Eran S. Kaplinsky

Alberta Land Institute

Prepared for Alberta Innovates

August 2019

Acknowledgements

The paper was commissioned by Alberta Innovates, whose support and interest we gratefully acknowledge. We particularly want to thank Carol Bettac for her encouragement. Many others gave generously of their time to share ideas, experiences and insights, to review drafts of the paper, or to participate in a workshop based on a draft. For that we owe thanks to Guy Greenaway, Greg Hale, Jonnette Watson Hamilton, Stephen Lougheed, Bill Newton, Carrie Selin, Ray Victurine, Marian Weber and Peter Woloshyn. Of course, any errors and omissions in the paper are solely the responsibility of the authors.

Contents

I.	Introduction.....	2
II.	Ecosystem Services and Ecosystem Service Markets.....	4
1.	Payments for Ecosystem Services.....	6
2.	Asset-Based ES Market Mechanisms	8
a.	Biodiversity Offsetting.....	8
b.	Cap and Trade	11
c.	Transfer of Development Credits.....	12
d.	Other Potential of ES Credit Markets in Alberta	12
III.	Characteristics of Ecosystem Service Credits.....	14
1.	Ecosystem Service Representation	14
2.	Compliance Value.....	15
3.	Exclusive Control	16
4.	Transferability.....	16
5.	Fungibility.....	17
IV.	Property Rights and Ecosystem Services.....	18
1.	Property Rights and Markets.....	18
2.	Fundamentals of Property Law	19
3.	Property Rights and the Production of Ecosystem Services	20
a.	Land Tenure	20
b.	Property in the Products of Conservation Activities.....	22
c.	Property in Ecosystem Service Credits	24
V.	Building Integrity in Ecosystem Service Credits.....	28
1.	Certification and Ecological Credibility	28
2.	Assigning Liability.....	29
a.	Seller Liability	29
b.	Buyer Liability	32
c.	Risk Pooling.....	33
3.	Assuring Exclusivity – Registry	34
a.	Land Titles	35
b.	Personal Property Security Interests	35
c.	Emission Offsets and Performance Credits.....	36
d.	Blockchain	37
4.	Regulatory Oversight of Trading – Commodity, Currency or Security?.....	37
VI.	Conclusion	40
	Appendix I: Excerpt from Alberta Land Stewardship Act.....	42
	Appendix II - Conceptual Registry Systems Comparison Table	46

I. Introduction

In recent decades, policy-makers in many countries have tried to recruit market forces to encourage resource conservation and environmental protection. This has been in part an attempt to move away from “command and control” regulation, which can be seen as heavy-handed and discouraging of initiative, innovation and economic efficiencies. Further, the turn to such “market-based instruments” (MBIs) reflects the realization that many of our environmental challenges are unintended consequences of legal norms – based in property and contract law, corporate liability, etc. – that allow or encourage producers to externalize the social and environmental costs from their private transactions, unloading such costs to nature and to the public.

MBIs are designed to capture such costs in private transactions fairly and efficiently. One of their innovative features is to ascribe an economic value to ecosystem goods and services, such that private agents (and sometimes governments) are incentivized to refrain from pollution or other harmful or wasteful actions, or to undertake remedial or protective measures that foster ecosystem health. A well-designed market-based instrument not only promotes the best or least-harmful courses of action, but also incents transactions that cause those actions to be taken by those parties who can do so at the lowest cost to society. The instrument this report deals with specifically, a tradeable ecosystem service credit, becomes relevant when a developer is required to take remedial action as a condition of development approval. It encourages alternative remedial action by other actors, or in other locations, when the alternative is superior. For example, suppose that a proposed feedlot is in the interest of society, but would degrade water quality. A market-based approach would allow the proponent to satisfy the regulatory requirements not by abating or mitigating the expected impact, but instead by purchasing a credit for remedial action of comparable or greater value taken by another agent in another location. Several jurisdictions have adopted this approach.

For several years policy initiatives from the Government of Alberta have expressed interest in the use of MBIs. In 2008, the landmark *Land-Use Framework* stated:

There are a variety of economic and noneconomic tools and approaches used throughout the world. There has been a shift away from traditional regulatory mechanisms to market-based instruments. Both approaches will be used in Alberta to encourage stewardship.

...

The Government of Alberta will support and encourage stewardship of private land in Alberta through the development of applicable incentives and market-based instruments.¹

In the years since the *Land-Use Framework*, the use of MBIs has been investigated by such organizations as the Institute for Agriculture, Forestry and the Environment, Alberta Innovates, and the Alberta Land Institute. A legislative interest in moving in this direction was incorporated into 2009's *Alberta Land Stewardship Act*², which supported research into MBIs³ and enabled the implementation of specific market-based policy tools.⁴ Sustained stakeholder interest has been evidenced through organizations such as the Ecosystem Services & Biodiversity Network⁵ and the Alberta Association for Conservation Offsets.⁶ Concurrently, the academic and research communities have been gathering data and developing the monitoring and modelling tools necessary to implement MBIs.

This paper focuses on one means of giving financial value to healthy ecosystems, namely by conceiving of ecosystems as providers of valuable services to humanity (“ecosystem services”) and conceptually breaking those services into units of environmental and financial value (“ES credits”) capable of private ownership, transfer and exchange. The use of such credits transforms the benefits of a healthy ecosystem into financially valuable assets, which can be the objects of market exchanges.

In this study we consider the legal and economic features of that ES credits will have to exhibit if they are to be useful as both a mechanism of environmental protection and an object of efficient market exchange. Further, we consider how established notions of property rights apply to such credits and whether current Alberta law is adequate in that regard. Finding that there is a need for improvement, we examine the likelihood of needed policy innovation from the courts, Alberta regulators or legislators. We also review some of the key aspects of ES credits and their exchange which ought to be considered and incorporated into their design.

[Section II](#) examines the nature of ecosystem services and several common MBIs which rely on ecosystem services or similar concepts to give financial value, and thus economic incentive, to the conservation of healthy ecosystems. This is a way of highlighting some of the policy options available to policy makers in Alberta. It is also a means of enquiring what features we would expect of credits used in such MBIs.

¹ Government of Alberta, *Land-Use Framework* at 33, online Alberta Environment and Parks: <<https://www.landuse.alberta.ca/LandUse%20Documents/Land-use%20Framework%20-%202008-12.pdf>>.

² SA 2009, c A-26.8.

³ *Ibid*, s 23

⁴ *Ibid*, Part 3.

⁵ Ecosystem Services & Biodiversity Network (webpage), online: <<https://ecoservicesnetwork.ca/>>.

⁶ Alberta Association for Conservation Offsets (webpage), online: <<http://www.aaco.ca/>>.

[Section III](#) faces that question directly, enumerating five characteristics we suggest are key to ES credits playing their expected roles in ES markets: ecosystem service representation, compliance value, exclusive control, transferability, and fungibility.

Property rights and markets are intimately related. In order for market exchanges to occur buyers must have confidence that sellers have exclusive rights to control and transfer the objects of the exchange.

[Section IV](#) turns to the central question of how property rights apply to the production of ecosystem services and to ES credits. While property rights are well-defined in land and the physical components of the ecosystem, they are not yet developed for ES credits as assets in themselves. Given the unlikelihood of such a novel concept being developed or recognized by regulators or the courts, we examine the status of Alberta legislation that might be used for this purpose. While the *Alberta Land Stewardship Act* contains ample enabling provisions for this purpose, those provisions have not been used. We conclude that in Alberta the current regulatory regime does not provide adequate security to support a market in ES credits, and, therefore, new regulation is needed to develop this form of MBIs in the province.

[Section V](#) returns to the question of the necessary characteristics of ES credits. It puts aside the question of which institution is best suited to design and implement credits, instead focusing on key or useful aspects, which should be considered by any entity taking on the job of ES credit and ES market design.

II. Ecosystem Services and Ecosystem Service Markets

A notable definition of ecosystem services was offered by Dr. Gretchen Daily in one of the seminal works on the topic:

Ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of *ecosystem goods*, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. The harvest and trade of these goods represent an important and familiar part of the human economy. In addition to the production of goods, ecosystem services are the actual life-support functions, such as cleaning and recycling, and renewal, and they confer many intangible and aesthetic benefits as well.⁷

The concept gained significant prominence in academic and policy circles and among the general public as a result of it being an organizing concept for the Millenium Ecosystem Assessment (“MA”), an

⁷ Gretchen C Daily, “Introduction: What Are Ecosystem Services?” in Gretchen C Daily (ed), *Nature’s Services: Societal Dependence on Natural Ecosystems* (Washington, DC: Island Press, 1997).

evaluation of the global ecosystem at the turn of the 21st century undertaken by over 1360 experts at the request of the Secretary General of the United Nations.⁸ The MA set out four categories of ecosystem services: “*provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling.”⁹

Biological diversity (or “biodiversity”) is not in itself an ecosystem service. Nevertheless, a rich mixture of species is essential to the production of ecosystem services. Each species plays a role in the complex process of mobilizing inanimate resources, such as minerals and sunlight, into products and services useful to humanity. Further, a healthy diversity of life helps provide stability to ecosystems by assuring that stress to some components does not break down ecosystem functions entirely.¹⁰ Biodiversity is part and parcel of ecosystem function and services.

The importance of conceiving of ecosystems as providers of beneficial functions lies in recognizing that they are essential to human well-being, not simply curiosities or objects of fascination. Further, thinking of ecosystems in this manner makes possible, or at least conceivable, the prospect of discovering the economic value of particular ecosystem services in particular circumstances, which in turn allows for a quantitative analysis of the tradeoffs which we make when we alter ecological conditions. For example, when we drain a wetland to enable a new development, how does the value of the wetland ecosystem services lost compare to the economic values provided by the new development? Thinking of both in economic and financial terms allows a comparison.

In environmental policy MBIs seek to go beyond mere analysis to mobilize the value of ecosystem services as means of encouraging their production and conservation and deterring their destruction and waste. They do this through attaching financial rewards to beneficial behaviour and costs to environmentally destructive behaviour.

While MBIs rely on various forms of market function to mobilize such incentives, the framework for this must be set by a regulatory context. It is regulation which provides the constraints that create the scarcity

⁸ Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis* (Washington, DC: Island Press, 2005, online: <<https://www.millenniumassessment.org/documents/document.356.aspx.pdf>>. An overview of the MA can be found online at <<https://www.millenniumassessment.org/en/About.html>>.

⁹ Millennium Ecosystem Assessment, *supra* note 2 at v.

¹⁰ Bradley J Cardinale et al, “Biodiversity Loss and Its Impact on Humanity” (2012) 486:7401 Nature 59.

necessary for market exchanges and provides a framework for such exchanges. This is reflected in the definition of MBIs offered by Robert Stavins, one of the leading scholars of the concept:

*Market-based instruments are regulations that encourage behavior through market signals rather than through explicit directives regarding pollution control levels or methods. These policy instruments, such as tradable permits or pollution charges, are often described as "harnessing market forces" because if they are well designed and implemented, they encourage firms (and/or individuals) to undertake pollution control efforts that are in their own interests and that collectively meet policy goals.*¹¹

Many MBIs provide for the producer or steward of an ecosystem service to receive payment for doing so. The payment may come from a public body or interested private parties. The means by which such payments are provided and incented vary widely, but for our purposes we delineate two main types. The first is contractual payment for the provision of services. The second is the conveyance of an asset encompassing a unit of environmental service. It is the second which is our main focus, but, for the purposes of completeness, we first deal with contractual payments for ecosystem services.

1. Payments for Ecosystem Services

There is no commonly-accepted definition of payment for ecosystem services (PES) schemes as an economic tool of environmental stewardship. One oft-quoted definition offered by Sven Wunder has five components:

1. A *voluntary* transaction where
2. A *well-defined* ES (or land-use likely to secure that service)
3. Is bought by one or more ES *buyers*
4. From one or more ES *providers*
5. If and only if the ES providers secure ES provision (*conditionality*).¹²

This definition is based on the case where a beneficiary of ES strikes a voluntary bargain with a provider. Arild Vatn, however, has pointed out that in practice many PES schemes operate by way of an intermediary, often a public authority or a non-governmental organization, which provides payments and

¹¹ Robert N Stavins, *Experience with Market-Based Instruments* (Washington DC: Resources for the Future, 2001) at 1 [emphasis added, footnotes omitted], online: Econostor <<https://www.econostor.eu/bitstream/10419/119660/1/NDL2002-052.pdf>>.

¹² Sven Wunder, *Payments for Environmental Services: Some Nuts and Bolts*, CIFOR Occasional Paper, vol. 42. (Bogor, Indonesia: Center for International Forestry Research, 2005) at 3 (emphasis in original), online: <https://www.cifor.org/publications/pdf_files/OccPapers/OP-42.pdf>.

collects the necessary funds from third parties whose payment may or may not be voluntary.¹³ Further, as Vatn points out, the ES that are incited by such payments are often public or collective goods, so the notion of a buyer is somewhat misguided.

Taking up Vatn's perspective, we note that PES schemes rarely result in a transfer of rights, possession or a property interest between the provider of ES and the payor (*not buyer*). The payment may be conditional upon the production of ES, and perhaps proportional to the extent of that production, or it may be based on undertaking or maintaining certain behaviour or management practices expected to produce the desired ES. It is not, however, based on the sale of a product. Indeed, it may not be open to the provider to distribute the benefits of the ES, much less transfer it exclusively to the payor, as such benefits may well belong to the public. (We discuss this further in Section IV.)

Both public and private PES schemes exist. In a public scheme a government or state agency will pay parties (often landowners) to use management practices. In a well-known example, the City of New York has for many years paid the owners and managers of land in the Catskill watershed, upstream of the city and the source of its water supply, to manage the land to protect water quality.¹⁴ Another example is Costa Rica, where a semi-autonomous state agency pays landowners to maintain forests as means of stopping deforestation and the corresponding loss of ES.¹⁵

Many private PES schemes have also existed. For example, an industrial user of water which relies on a certain quality in its natural water supply may pay upstream landowners to undertake certain practices to assure that quality.¹⁶

In such schemes the offer of payment is a price signal to encourage the land stewardship activity producing the ES. This may well affect the economic decision-making of the land manager or owner (as

¹³ Arild Vatn, "An Institutional Analysis of Payments for Ecosystem Services" (2010) 69 *Ecological Economics* 1245 at 1247.

¹⁴ Gretchen C Daily & Katherine Ellison, *The New Economy of Nature: The Quest to Make Conservation Profitable* (Washington DC: Island Press, 2002), ch 3.

¹⁵ Sanchez-Azofeifa, G. Arturo, et al, "Costa Rica's Payment for Environmental Services Program: Intention, Implementation, and Impact." (2007) 21:5 *Conservation Biology* 1165. doi:10.1111/j.1523-1739.2007.00751.x; Ina Porras, et al, "Learning from 20 Years of Payments for Ecosystem Services in Costa Rica." (London, UK: International Institute for Environment and Development, 2013), online: <<http://pubs.iied.org/pdfs/16514IIED.pdf>>. The Costa Rican example partly confounds our distinction between service-based payments and asset-based ones in that the agency which pays for the services does take ownership of any ES credits that might be created incidental to the ES produced. This, however, is not its driving feature.

¹⁶ The potential for a wide variety of such transactions, including the converse contractual payment of compensation to those negatively affected by an economic activity, was envisioned by economist Ronald C. Coase in his classic article "The Problem of Social Cost" (1960) 3 *JL & Econ* 1.

it is intended to do, by virtue of the requirement of conditionality) but it does not amount to the conveyance of any good or asset between the land manager and the payor.

2. Asset-Based ES Market Mechanisms

A second category of MBIs establishes a standard unit or credit, representing a set amount of some ecosystem service, that can be traded as an asset in a marketplace. The nature of that asset is a focus of this paper. As a starting point, we look at how such an asset is created and treated in a variety of well-known market-based environmental policy tools. The one which most clearly portrays the evolution of ES credits is offsetting.

a. Biodiversity Offsetting

Offsetting is a process whereby one who creates a given amount of environmental harm undertakes to produce an equivalent amount of environmental benefit, usually of the same type, so as to produce a neutral or positive outcome when the two actions are considered together. It has been applied most commonly to greenhouse gas emissions, but also to other air pollutants and to water quality. In recent decades it has also increasingly been applied to habitat and other aspects of biodiversity. We use the example of biodiversity offsetting to illustrate how the simple production of an ES for one's own use can evolve into the concept of a tradable credit encompassing a given amount of that ES.

Biodiversity offsetting is the intentional creation of gains in ecosystem composition, function or security as a counterweight to the negative environmental impacts caused by development projects or programs.¹⁷ In order to assure that losses and gains are comparable and equivalent, ecosystem values must be reduced to quantifiable metrics applicable to both sides of the ledger.¹⁸ It is the unit of ES that results from the application of that metric that forms the basis for an ES credit.

¹⁷ It is generally agreed that offsetting should only be applied as the final step in a hierarchy of mitigation options, after all reasonable measures have been taken to avoid and minimize negative impacts. For general discussions of biodiversity offsetting and the mitigation hierarchy see Kerry ten Kate, Josh Bishop & Ricardo Bayon, *Biodiversity Offsets: Views, Experience, and the Business Case* (Gland, Switzerland: IUCN and Insight Investment, 2004), online: <<https://www.forest-trends.org/publications/biodiversity-offsets-views-experience-and-the-business-case-%c2%96-executive-summary/>>; Joseph W Bull et al, "Biodiversity Offsets in Theory and Practice" (2013) Fauna and Flora International, Oryx, 1; David W Poulton, *Biodiversity Offsets: A Primer for Canada* (Ottawa: Sustainable Prosperity and the Institute for the Environment, 2014), online <<https://institute.smartprosperity.ca/library/publications/biodiversity-offsets>>; International Union for the Conservation of Nature, *IUCN Policy on Biodiversity Offsets*, WCC-2016-Res-059-EN, online: <https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_RES_059_EN.pdf>.

¹⁸ James Salzman & JB Ruhl, "Currencies and the Commodification of Environmental Law" (2000) 53:3 Stan L Rev 607.

To illustrate how this occurs we consider three scenarios of habitat offsetting, each of which is well-grounded in actual offset practices and policies. Each describes a situation where a developer, perhaps a miner, petroleum producer, urban developer or crop farmer, wishes to convert a plot of native grassland, a sensitive and valued ecosystem, to the developer's preferred use. In the process the ecosystem services flowing from that piece of grassland will be diminished or lost. The development project, however, is considered to be of sufficient social and economic benefit that it is likely to proceed.

In the first scenario the developer applies to the relevant resource regulator for a permit to develop the land. After careful scrutiny the regulator accepts that the developer has taken all reasonable measures to avoid impacting the most valued parts of the landscape and to minimize the impact at the site of the proposed development. The regulator aims, however, to assure that no ecosystem services or other natural values are lost to society and therefore issues the permit on condition that the developer restore a nearby plot of grassland sufficient to produce an equivalent quantum of ecosystem services to those being lost.¹⁹ The restored plot is to be legally protected and managed to produce those ecosystem services in perpetuity. The developer undertakes this commitment and is granted the development permit. It may do the offset work itself or, more likely, it will hire experts in that type of restoration to design and effect the offset project. This is a simple case of the offsetting of ecosystem services on a project-specific basis.

Such offsetting may be required by policy (such as under the *Alberta Wetland Policy*²⁰ and the federal *Fisheries Act*²¹), or at the discretion of a regulator on a case-by-case basis (e.g., certain decisions by the National Energy Board and the Alberta Energy Regulator²²).

There is no market operation in this scenario as no goods or services are exchanged between parties. There is, however, a price impact in the development market because the development proponent is

¹⁹ For a description of the challenges and risks associated with equivalency see Fabien Quétier & Sandra Lavorel, "Assessing Ecological Equivalence in Biodiversity Offset Schemes: Key Issues and Solutions" (2012) 144:12 *Biological Conservation* 2991; Atte Moilanen et al, "How Much Compensation is Enough? A Framework for Incorporating Uncertainty and Time Discounting When Calculating Offset Ratios for Impacted Habitat" (2009) 17:4 *Restoration Ecology* 470; Business and Biodiversity Offset Programme, Resource Paper: *No Net Loss and Loss-Gain Calculations in Biodiversity Offsets* (Washington DC: Forest Trends, 2012) online: <https://www.forest-trends.org/wp-content/uploads/bbop/bbop_resource_paper_nnl_21_march-2012_final-pdf.pdf>.

²⁰ Alberta Government, *Alberta Wetland Policy* (np: Alberta Government, 2013) online: Alberta Government <<https://open.alberta.ca/publications/9781460112878>>;

²¹ RSC 1985, c F-14, s 35(2).

²² Nova Gas Transmission Ltd, *Revised Caribou Habitat Restoration and Offset Measure Plan, September 1, 2016*, online <<https://apps.neb-one.gc.ca/REGDOCS/File/Download/3027910>> and TransCanada Pipelines Limited, *Applications for the White Spruce Pipeline Project, Fort MacKay Area*, February 22, 2018, 2018 ABAER 001, online <<https://www.aer.ca/documents/decisions/2018/2018ABAER001.pdf>>.

required to bear the replacement cost of the environmental losses it will cause, thereby internalizing a cost which would otherwise be externalized to society.

In the second scenario, the developer anticipates the concerns of the regulator and the requirement to undertake habitat offsetting. When it plans its development project, it takes the initiative to restore and legally protect an offset site as in the first scenario. When it advances its permit application to the regulator it provides evidence of the successful implementation of the offset. The regulator imposes the same condition as in the first scenario but examines the nature and success of the prior restoration work. If satisfied that it has sufficient characteristics to provide an equivalent offset, it accepts the advance offset project as having already satisfied the condition. This is often referred to as first-party banking or self-banking. The developer has banked the “credits” for the restoration work to apply to the regulatory requirements of its later development work. Such self-banking has been allowed under the U.S. federal wetland offset system and in Canada for fish habitat under *Fisheries Act*.²³ It is most commonly used by transportation or other public works agencies who envision a steady future need for offset credits.

This second scenario of self-banking gives rise to the idea that an ES credit can be created and held until it is needed for a later development project.

The third scenario entails the transferability of that credit. The developer faces the same offsetting requirement, but rather than pledging a new offset project or using a credit from its own prior work, the developer establishes that it has purchased the required offset credits from a third party. That third party undertook the offset work at some prior time, proved its validity but had no current use and no development plans of its own. The third party has done essentially the same prior restoration work that the developer had done in scenario two, so it sells the credit for that work to the developer. If the regulator accepts that the purchased ES credit can be applied to meet the offset condition of the development permit, the regulator is implicitly accepting a “third party banking” or “banking and exchange” program. That is, any party (a government agency, a non-profit conservation group, or an entrepreneur motivated to profit from a future demand from offset credits) can undertake work to produce ES and have the outcomes of that work quantified and accredited through some recognized process. The

²³ Self-banking was allowed selectively by policy for several years: K Hunt, P Patrick & M Connell, *Fish Habitat Banking in Canada: Opportunities and Challenges, Economic and Commercial Analysis Report 180* (np: Her Majesty the Queen in Right of Canada, 2011). Bill C-68, recently passed by the Canadian parliament, amended the *Fisheries Act* to specifically provide for self-banking.

resulting credits may be used by that party or any other party to satisfy any offset obligations for an equivalent impact.²⁴

In this third scenario the offset credit is more than the object of an arrangement between a single proponent and the applicable regulator. It is effectively being treated as a tradable asset, to be exchanged in a market among any number of parties until being finally extinguished when used to comply with a regulatory offset requirement. Such systems have been pioneered and are operational in the United States and Australia.

b. Cap and Trade

While an offset system imposes an objective of “no net loss” or other cap on environmental impacts on a single development proponent, a cap and trade system imposes a regulatory constraint or cap on the impact of the activities of a community of users and, through some mechanism, allocates allowances within that constraint to individual community members. Those members who use less than their allowance, or by other means make a quantifiable positive contribution to the collective ability to meet the cap, may sell credits to others who need them in order to meet their own allowance. Cap and trade was pioneered by the United States as a means of limiting emissions of nitrogen oxides and sulfur oxides, the chemicals that cause acid rain. The success of that program inspired many other programs especially those to limit greenhouse gases. These include the California carbon market and Alberta’s evolving emissions trading system for large emitters of greenhouse gases.²⁵

Whereas a carbon tax, effluent charge, impact fee, or another similar tax seeks to correct the market by setting the price of the regulated activity, cap and trade programs use regulation²⁶ to prescribe the total

²⁴ The most advanced third party banking systems have been in the U.S. under the wetland mitigation rule of the *Clean Water Act* and the conservation banking program under the *Endangered Species Act*. For a series of essays on the features of these programs see Nathaniel Carroll, Jessica Fox & Ricardo Bayon, *Conservation & Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems* (London: Earthscan, 2008).

²⁵ The Alberta government has recently announced the Technology Innovation and Emissions Reduction (TIER) system which is to replace the Carbon Competitiveness Incentive Regulation (CCIR) on January 1, 2020. The CCIR expanded upon the earlier Specified Gas Emitters Regulation, which the TIER is expected to resemble when fully rolled out.

²⁶ Cap and trade may operate in the absence of government regulation where a complex entity seeks a particular environmental goal. For example, one multi-national petroleum company set a corporate-wide goal to limit GHG emissions and allowed its various sectors and departments to trade allowances in order to meet the goal most efficiently (see, e.g., Peter K Zimmerman, *A New Paradigm in Grizzly Bear Management: Using Market Forces to Conserve Habitat* (MED Thesis, University of Calgary Faculty of Environmental Design, 2002) [unpublished] at 50-59, describing the experience of BP’s GHG emissions reduction programme). One might imagine a cohesive community of actors establishing a similar system, though this would require a high level of trust among them and the establishment of some governance and monitoring regime. Internal regulation is still needed to establish the goal and govern how it is pursued. In most cases, however, government regulation is the driver.

level or quantity of the activity or its impact, relying on market forces of supply and demand to set the price. Cap and trade is regarded as preferable when the optimal level of an activity is known – for example, the threshold amount of a pollutant in a body of water. The regulated quantity is then allocated by the market, so that the right to engage in the activity ends up in the hands of the producers who value it most.

c. Transfer of Development Credits

The transfer of development credits is a planning scheme designed to consolidate development on some lands while protecting other lands from development. Typically, development credits are assigned to owners of land earmarked for environmental protection, which can be exchanged for additional development rights in the developable lands. In this way the financial benefits of development and the costs of conservation are shared between the developers and the owners of protected lands. In such systems, development credits perform a similar function as ES credits, such that the purchase of a development credit is effectively the same as the purchase of a credit providing for the non-development of a particular piece of habitat and the ES it provides.

d. Other Potential of ES Credit Markets in Alberta

Once a tradeable unit is conceived as encapsulating and representing some unit of environmental benefit, one can imagine how a market in such units might be used to attain a broad range of environmental objectives. For example, a perennial issue of public interest in Alberta is the reclamation of abandoned oil and gas well sites. Operators are required by regulation to reclaim each of their well sites to a state of “equivalent land capability” after abandonment of the well.²⁷ This is a major liability for petroleum operators, and many unreclaimed well sites are orphaned, with no known and subsisting operator held liable. Orphaned wells become the responsibility of the Orphan Well Association, established by the *Oil and Gas Conservation Act*.²⁸ The number of orphan wells in the province has risen steadily in recent years, doubling between 2015 and 2017.²⁹ The proliferation of unreclaimed wells and the uncertainty of timing respecting reclamation have been matters of widespread public concern.³⁰

²⁷ Conservation and Reclamation Regulation, Alta Reg 115/93.

²⁸ RSA 2000, c O-6.

²⁹ Alberta Oil and Gas Orphan Abandonment and Reclamation Association, *2017 Annual Report*, at 1-2, online: <<http://www.orphanwell.ca/wp-content/uploads/2018/10/OWA-2017-18-Ann-Rpt-Final.pdf>>.

³⁰ See, for example, Jason Unger, *Reclaiming Tomorrow Today: Regulatory Timing for Abandonment and Reclamation of Well Sites in Alberta* (Edmonton: Environmental Law Centre, 2013), online Environmental Law Centre: <http://elc.ab.ca/media/98837/Reclaiming_Tomorrow_TodayFINAL.pdf>. The nature and implications of

The current reclamation liabilities attach on a site-by-site basis requiring each operator to reclaim their particular site at the time of abandonment. Following the theory of market-based environmental management, one can hypothesize that new efficiencies and initiatives might be stimulated if companies could trade in reclamation liabilities and credits for the measures to satisfy those liabilities. For example, if, rather than reclaim its own well at the eventual time of abandonment, an operator could reclaim a site of equal or greater environmental significance at or prior to that abandonment, and receive credit applicable to its responsibility for its own site, would that incent a more active and innovative pursuit of reclamation opportunities? Might it even give rise to a new type of service industry active in well site reclamation for the purpose of selling credits?

In another realm of the Alberta economy, confined feeding operations, including beef feedlots are regulated by the Natural Resources Conservation Board pursuant to the *Agricultural Operation Practices Act*.³¹ One subject of concern and regulation is protection of surface water and groundwater, with the goal of maintaining water quality. The management of manure is particularly challenging as not all land is equally well-suited to manure-spreading as means of controlling water pollution. To return to an earlier example, if abatement opportunities in a watershed differ in their costs, efficiencies might be gained by allowing operators to purchase credits for effective abatement on the lands of their neighbours in the watershed. In other words, we might enable a system where credits for the benefits of positive action would be transferable to a party seeking to comply with a regulatory requirement. A market in ES would likely ensue.

Systems for trading in water quality credits have been established in other jurisdictions. For example, in the South Nation watershed of eastern Ontario wastewater dischargers are legally prohibited from increasing the phosphorus load in receiving waters. They are, however, allowed to neutralize their impact by paying into a fund administered by a community-based conservation authority. That authority uses the funds to buy phosphorus abatement credits from landowners who use non-point source pollution control measures.³² Similarly, the Pennsylvania Infrastructure Investment Authority (PENNVest)³³ operates a system of nutrient credit trading program that allows regulated waste water treatment plants and other emitters to meet their pollution targets by buying credits from agricultural operations in the same

the regime was recently considered by the Supreme Court of Canada in *Orphan Well Association v. Grant Thornton Ltd.*, 2019 SCC 5 (CanLII)

³¹ RSA 2000, c A-7.

³² Dennis O-Grady, "Sociopolitical Conditions for Successful Water Trading in the South Nation River Watershed , Ontario, Canada" (2011) 47:1 Journal of the American Water Resources Association 39.

³³ PennVest, "Nutrient Credit Trading Program" (webpage), online Pennvest <<https://www.pennvest.pa.gov/Services/nutrient-credit-trading/Pages/default.aspx>>.

(Chesapeake Bay) watershed, effectively paying farmers to change agricultural practices to produce water quality improvements.

This section is not intended to be a comprehensive review of the full range of market-based instruments for environmental management. Many such reviews exist. Rather it was intended to bring out the evolution of ES benefits from a concept referencing only improvement in ecological conditions to one which uses those improvements as the basis for constructing an ES credit, a tradable asset corresponding to unit of ecological value. The next section considers the necessary and desirable characteristics of ES credits if they are to play the role envisioned for them within the above policy instruments.

III. Characteristics of Ecosystem Service Credits

As explained in the previous section, credits for ecosystem services come in many forms such as carbon credits, water quality credits, and biodiversity or habitat credits, any one of which may be broken down into more specific categories. ES credits may be used in different ways according to the particular regulatory tools and environment. We are particularly interested in those credits which are transferable. The transferability of ES credits allows participation in the production and trade of credits by parties other than development proponents and government agencies, which consistent with economic theory promotes conservation efforts, particularly by parties who are able to undertake them at the least cost, and the use of credits by parties to whom they are most valuable.

However, for credits to perform their ecological and economic functions, they must be designed to exhibit certain important characteristics. These include: representation of tangible ecosystem services, acceptability in compliance of regulatory obligations, exclusivity of control, transferability, and fungibility.

1. Ecosystem Service Representation

If any policy based on ES credits is to attain its environmental objectives and credibility, the credits must reliably represent some amount of actual ecosystem service. This may be determined in two ways. The first is by the monitoring of actual ecological conditions to identify the extent of the valued services and any changes therein. The second is by modelling the expected outcomes of particular management actions and relying on the validity of such predictions to impute the quantity of ES represented by the credit. While empirical monitoring of conditions is obviously more reliable, neither is free from uncertainty.

It is difficult for any monitoring or modelling regime to capture the intricacies and complexity of ecosystems, particularly natural and dynamic ones. The sources of uncertainty include data inadequacies, limitations on data interpretation, and fallibility in modelling. Even with adequate and accurate data, the process of distilling complex ecosystems to a limited number of practical metrics may result in distortions. There is significant variation among different forms of ES credits with respect to how mature and reliable modelling and metrics are. Carbon credits are quite advanced conceptually. They are based on a single metric (tonnes of CO₂ equivalent, or tCO₂e for short), which has been the subject of extensive study and modelling and is universally recognized as useful for comparing the atmospheric warming contribution of a variety of greenhouse gasses. While not all tCO₂e are exactly equivalent (based on questions of credibility), the unit has been developed with that intention. Other forms of ES credits are not nearly so developed nor universally accepted. The applicable units for wetland function, stormwater retention, or species habitat are highly variable, open to debate, and require further data and modelling to make them reliable.

Further, even where current conditions are knowable and quantifiable, there is the possibility that conditions might change due to natural events or human intervention, possibly devaluing the ecological and perhaps economic value of a credit. One of the roles of property law, as will be discussed in the next section, is to prevent human activities incompatible with ecosystem service objectives.

By whatever means and despite these challenges, at some point a given amount of actual or predicted ecosystem service must crystalize into a credit faithfully and reliably representing that service.

2. Compliance Value

The primary financial value in ES credits lies in their acceptability to regulators as a means of satisfying environmental obligations or liabilities, and therefore in constituting a factor of production for developers. This value depends on the certainty and predictability of both the obligation and the acceptability of the credit. These will depend in turn on the establishment of a clear process and criteria to determine when a credit is created and when it is extinguished by being applied to a regulatory requirement. Should any aspect be uncertain, the value of the credit is likely to be diminished, perhaps profoundly.

Obviously, such certainty can be provided for by establishing an MBI system in law. Detailed “rules”, however, may be too rigid and not well-suited to the fine adjustments needed for an evolving market for novel conceptions of ecosystem components or changes; for that reason, regulatory policy often relies on

“standards” which are applied ad hoc by the decision-maker.³⁴ For example, the *Alberta Wetland Policy*³⁵ prescribes an offset process that will be considered acceptable for the purposes of obtaining an approval to conduct an activity that alters an Alberta wetland. The law, as expressed in the *Water Act* includes a prohibition of such activity and the availability of an approval to grant an exemption for the prohibition.³⁶ It is the wetland policy that sets out the offset expectations as criteria for the granting of such an approval. The policy does not have the force of law, but informs the application of the law for the benefit of administrators, proponents and interested stakeholders.

All policy is somewhat discretionary but may still be reliable to the extent that such discretion is exercised in a predictable manner, thus forming a stable framework against which economic decisions may be made. Discretion which is exercised unpredictably, however, may undermine the basis for economic decision-making, including the development of market exchanges. No party will wish to hold an ES credit which may or may not be honoured by the relevant regulator.

3. Exclusive Control

If the compliance and financial value of ES credits are to be meaningful, the credits must be under the control of one owner (person, group of individuals, or corporate entity) to the exclusion of all others. This precludes competing claims, the possibility of which would create a climate of doubt, risk, and conflict in any market in ES credits. Further, clarity of control (which we shall discuss as a critical feature of property ownership in the following section) complements the characteristic of ES representation by assuring that the credit is only used for compliance once by a single party.

4. Transferability

If an ES credit is to be owned and controlled by only one party, for that party to realize its full value of the credit it must be transferable, including for value. Combined with exclusive control, transferability enables commercial exchanges by which credits may end up in the hands of the party that finds the most value in them. It is this characteristic that gives the credit financial value beyond a particular proponent.

³⁴ The distinction between rules and standards in law is explained in Barbara Luppi & Francesco Parisi, “Rules versus standards” in Gerrit De Geest, ed. *Encyclopedia of Law and Economics* (Edward Elgar, 2009), ch. 3.

³⁵ Alberta Government, *supra* note 20.

³⁶ *Water Act*, RSA 2000, c W-3, s 36-37.

5. Fungibility

Fungibility refers to the interchangeability of like items in a commercial environment. If any given quantity of a good (a commodity, money, etc.), can be substituted for an equal quantity of that same good, then that good is said to be fungible. Importantly, a liability in respect of that good can be satisfied from any source: a debt can be satisfied by any means; a good can be delivered from anywhere. Fungibility allows for smooth and low-cost operation of market exchanges. It is the quality that assures, for example that one kilogram of rice can be assumed to essentially identical to another kilogram of rice.

Fungibility depends implicitly on a process of categorization and standardization. In the case of the rice, for example, one must distinguish rice as a category from other grains or similar foods. Depending on one's purpose, one may wish to classify further between white and brown, basmati or arborio, or according to different quality or vintage. Items will still be fungible within each class so long as they are predictably uniform.

Fungibility in ecosystem services credits presents unique challenges, because the imposition of uniformity of description on variable and complex nature will necessarily preclude the recognition of distinctive characteristics of each site. Even in the case of an individual unique ES credit, the reduction of natural complexity to a manageable set of metrics risks distortion of the values at stake. This problem is compounded if the metric is designed to serve multiple sites and exponentially so as the number of sites and their diversity increases.

This dilemma was masterfully described by James Salzman and J.B. Ruhl in an article in 2000 in which they reflected on getting the balance right between these two considerations.³⁷ To quote from that article:

To achieve the optimal outcome from ETMs [environmental trading markets], we need to understand and account much better for the qualities being traded. To do so requires careful consideration of the measure of exchange -- the currency -- since in the final analysis the currency forms the very basis of the transaction. The trading currency superficially makes the commodities fungible, determining what is being traded, and, therefore, protected.³⁸

...

If the currency cannot incorporate the environmental values we care about, these become external to the exchange and, as a result, trades may actually worsen the

³⁷ Salzman & Ruhl, *supra* note 18.

³⁸ *Ibid* at 612.

environmental or natural services delivered. Inadequate currencies allow externalities to bleed out of the trading market.³⁹

IV. Property Rights and Ecosystem Services

1. Property Rights and Markets

The institution of property is best understood as a collection (often referred to as a “bundle”) of enforceable rights to control and enjoy the benefit of things to the exclusion of others, including the state (“all the world” is the common phrase).⁴⁰ It is a significant social concept for it allows a person to exercise control beyond their physical body, controlling the behaviour of others with respect to at least one aspect of the environment in which the person finds themselves. Property rights are thus an important element of personal security.

The relationship of property rights to markets is discussed extensively in the literature. Adam Smith⁴¹ and others (including, e.g., David Hume, Douglass North, Hernando de Soto, and Richard Posner)⁴² emphasize the importance of property rights (together with freedom of contract) to economic prosperity. Security of tenure and exclusive rights over resources tend to encourage private investment and efficient usage, while formal, marketable title promotes easy access to credit. Conversely, weak protection of property rights and lack of exclusivity tend to encourage waste and lead to the so-called “tragedy of the commons”.

A second aspect of property rights, stemming from the work of Ronald Coase,⁴³ focuses on institutional design as means of aligning private and social incentives and mediating conflicts over resources. Prior to Coase, market failures were often believed to have resulted from externalities and to require government intervention in the price mechanism, typically by way of a Pigouvian⁴⁴ tax or subsidy. (The carbon tax is an example of such a price correction.) Coase showed that failures resulted not from externalities *per se*,

³⁹ *Ibid* at 624.

⁴⁰ For discussion, see Bruce Ziff, *Principles of Property Law*, 6th ed. (Carswell, 2014) at 1-7.

⁴¹ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776).

⁴² David Hume, *A Treatise of Human Nature*; Douglass North, *Structure and Change in Economic History* (W.W. Norton & Company, 1981); Hernando De Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (New York: Basic Books, 2000); Richard Posner, “Creating a Legal Framework for Economic Development” (1998) 13 *World Bank Research Observer* 1.

⁴³ Coase, *supra*, note 16; Ronald H Coase, “The Nature of the Firm” (1937) 4 *Economica* 386.

⁴⁴ Named after the influential work of Arthur Cecil Pigou, *The Economics of Welfare* (1920).

but from an incomplete assignment of property rights,⁴⁵ shifting the focus of economic analysis of law to the design of legal norms and legal institutions, and in particular, to the assignment of property rights with a view to minimizing transaction costs.

2. Fundamentals of Property Law

Largely for historical reasons, the law of property distinguishes between real property (essentially, rights in land) and personal property (chattels).⁴⁶ Substantive doctrines evolved somewhat differently for each of these two categories, and while some of these rules have converged in modern law, the basic distinction is still maintained. For example, private arrangements regarding the use of land may be made (in the form of easements and covenants) to run with the title to the land, such that the arrangements will bind subsequent owners, but no such arrangements may be made to run with respect to personal property. Furthermore, the permanence and immovability of land has allowed for a comprehensive system of registration of real property interests that is unavailable for most personal property.

Within the category of real property, a further legal distinction is made between possessory and non-possessory entitlements.⁴⁷ In Alberta and many other common law jurisdictions the former include an estate in fee simple or for a shorter term. The latter include easements, restrictive covenants, profits à prendre (including mineral leases⁴⁸) and analogous interests. Personal property, too, is further divided into choses in possession (tangible things), and choses in action (rights in intangibles, which are enforceable by legal action, including, e.g., intellectual property, negotiable instruments, corporate shares, and the right to collect a debt). Title to choses in possessions may be conveyed from one owner to another through a transfer of possession (usually manually) with an intention to transfer. In contrast, title to choses in action, which are incapable of physical possession, must ordinarily be transferred by an instrument (i.e., in writing).⁴⁹

As the institution of property itself, classifications are a product of social conditions and change with society, reflecting the expectations, aspirations and technology of society as it might exist at any given time. Property rights are not static.⁵⁰ At the same time, the potentially profound implications of creating

⁴⁵ For an accessible explication of Coase's insights, see David D. Friedman, *Law's Order: What Economics Has to Do with Law and Why It Matters* (Princeton University, 2000), chapters 3-4.

⁴⁶ The dichotomy is not absolute: a lease of land, for example, falls somewhere between real and personal property. See Ziff, *supra* note 42 at 76.

⁴⁷ The formal legal names are, respectively, corporeal hereditaments and incorporeal hereditaments.

⁴⁸ *Law of Property Act*, RSA 2000, c L-7, s 79.

⁴⁹ *Judicature Act*, RSA 2000, c J-2, s 20.

⁵⁰ Eric T Freyfogle, "Ownership and Ecology" (1993) 42 Case W Res L Rev 1270.

new rights binding on “all the world” have dissuaded common law courts from being active in creating new property rights. Unlike contract law, which allows the parties virtually unlimited freedom to mold their own arrangements, property law insists that property rights be structured to fit within some previously recognized category. This is known as the *numerus clausus* principle.⁵¹ For these reasons, legislation is the primary means by which new forms of property rights are created, or existing ones modified.

3. Property Rights and the Production of Ecosystem Services

As discussed above, human production of ecosystem services usually begins with some action or behaviour on a specific piece of land that affects ecosystem function. The result is a change in the physical products of the land, increasing the human benefits that are the ultimate ecosystem services. Property rights have an important role to play in both facilitating the control of the land necessary for this process and in determining how the resulting products are controlled and distributed. While some aspects of this sequence are clearly defined by property law, the picture becomes much more uncertain when we consider rights to credits for the production of ecosystem services. In this section we consider these three aspects.

a. Land Tenure

In order to manage the land to produce ecosystem services it is necessary both to be able to access and control it, and also to prevent others, including the government, from interfering or undertaking incompatible activities. Both these aspects are supported by common law and Alberta legislation.

On private lands in Alberta, the administration of land tenure is governed by the *Land Titles Act*.⁵² This system, combined with the common law of real property, makes available two general tools to protect or conserve private land. The first and most powerful is outright acquisition or ownership of the fee simple, which allows for the broadest possible control and range of enforcement options against both third parties and government interference.

Second is the use of easements and restrictive covenants which can be tailored to particular circumstances. Generally speaking, an easement allows a party to engage in some activities on the land of another, which otherwise would be actionable – for example, an easement in the nature of a right of

⁵¹ T. Merrill & H. Smith, “Optimal Standardization in the Law of Property: The *Numerus Clausus* Principle” (1999) 108 Yale L.J. 1163.

⁵² RSA 2000, c L-4.

way, or an easement to discharge effluent on the land. A covenant allows one party to require a landowner to refrain from, or undertake, certain actions in connection with the land – for example, a covenant not develop the land in some manner, or a covenant to contribute towards some amenities. Easements and covenants are voluntary arrangements that may be registered on title under specific conditions and become binding on title against successors in title to the original parties unless the arrangement is terminated or discharged.

The use of common law easements and covenants for conservation on private land is subject in Canada to the legal requirement that an easement or covenant cannot exist in gross, but must be appurtenant to and accommodate a dominant tenement: in plain language, an easement encumbering one parcel of land must be to the advantage of some other identifiable parcel of land. This requirement hinders the use of easements and covenants for conservation, because the benefits of good environmental management, however, flow to society at large and not necessarily to any parcel in particular. Some jurisdictions have passed legislation to remove these doctrinary restrictions, or to specifically enable “conservation easements” or similar instruments that can be held in gross and that can secure a broad range of environmental measures in perpetuity.

In Alberta conservation easements are enabled by the *Environmental Protection and Enhancement Act*.⁵³ Sections 21, 23 and 24 of the Act authorize the Minister to enter into an agreement with a private landowner to restrict the purposes for which the land may be used, and once such an agreement is registered on title it becomes binding on successors in title to the owner whether or not the agreement is positive or negative in substance and notwithstanding the absence of a dominant tenement or land that benefits from the agreement. Similarly, sections 28 through 35 of the *Alberta Land Stewardship Act*⁵⁴ provide that a “qualified organization” (the Alberta Government, government agency, local government, or a registered charity with appropriate objects) may take an interest in land (a conservation easement) for the purposes of “protection, conservation, and enhancement” of the environment, scenic or aesthetic values, or agricultural purposes. The easement may be registered on title such that it will bind all subsequent interests including future owners.

Conservation easements are not absolute in Alberta. As with other interests in the surface of the land, they may be subordinated to access to subsurface minerals, with all the threats to nature that that may

⁵³ RSA 2000, c E-12.

⁵⁴ SA 2009, c A-26.8.

entail. As well, conservation easements may be modified or terminated at any time by order of the responsible provincial Minister.⁵⁵

Conservation easements or outright ownership of the fee to land are often used on private lands to secure land management activity and the resulting ES flow that form the basis for conservation offset or ecosystem service credits. The property interest in the land, however, must be distinguished from any property interest that might lie in the ES credit.

Approximately 60 percent of Alberta (mainly in the forested north and west of the province) consists of crown lands, to which the *Land Titles Act* and the conventional interests in land that it facilitates do not apply. Rather, these lands are the property of the Crown and are governed either by the *Public Lands Act*⁵⁶ or the various pieces of legislation governing parks and protected areas in the province.⁵⁷ On these lands there is an absence of legal tools by which a private party can proactively initiate a conservation action and secure the resulting benefits. While the various designations of parks and protected areas can provide a high degree of environmental protection, they can only be so designated at the highest levels of government by legislation or by Order of the Lieutenant Governor in Council. On general public lands all private interests take the form of dispositions by the Crown, and while a broad range of types of dispositions are specifically provided for by regulation, none make reference to conservation interests in particular.⁵⁸ This makes the lands not easily amenable to private legal conservation efforts, and accordingly it is currently very difficult for a private party to acquire an enforceable interest for positive environmental purposes, and therefore to produce creditable ES on public land.

b. Property in the Products of Conservation Activities

Another resource in which property rights may need to be established is the tangible products of ecosystem functions. In general, these products belong to the public, not to the person whose stewardship might be responsible for their production, the landowner or any other individual. Examples are water produced, improved or regulated by ecosystem function, wetlands restored to natural function, or wildlife the abundance and health of which are aspects of ecosystem health.

⁵⁵ For resources related to conservation easements in Alberta see Environmental Law Centre & Miistakis Institute, “Conservation Easements in Alberta” (webpage), online Miistakis Institute: <<http://www.ce-alberta.ca>>.

⁵⁶ RSA 2000, c P-40.

⁵⁷ Provincial Parks Act, RSA 2000, c P-35; Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act, RSA 2000, c W-9; Willmore Wilderness Park Act, RSA 2000, c W-11.

⁵⁸ For a more extended discussion of property rights and tools available to secure conservation gains, and gaps therein, on private and public lands in Alberta see David W Poulton, “Public Lands, Private Conservation: Bridging the Gap” online (SSRN): <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2797401>.

In Alberta, as in many other jurisdictions, water is the property of the Crown.⁵⁹ The right to divert water for private use is granted through a licensing process set out in the *Water Act*. It has been held, however, that the licensing process does not apply to the allocation of rights to private parties for the purposes of maintaining in-stream flow for the health of the aquatic ecosystem. In the case of the *Water Conservation Trust of Canada*,⁶⁰ the court upheld a decision of the government administrator to deny the transfer of a water license from a petroleum operator to a non-profit trust for the purposes of maintaining and enhancing in-stream flow. The Alberta Environmental Appeals Board, affirmed by the Alberta Court of Queen’s Bench, cited the purpose of the provincial legislation as keeping government control over the use of water and to determine the balance of economic versus environmental benefits from the use of that water. In doing so these adjudicators struck a blow against the idea of using transferable rights to encourage conservation of water.

The province also owns the bed and shores of all permanent and naturally occurring water bodies and naturally occurring rivers, streams, watercourses and lakes.⁶¹ Moreover, the legislation specifies that a water body “does not cease to be naturally occurring by reason only that its water is diverted by human act.”⁶² Therefore, title to a wetland restored to its natural state *in situ* after a period of human-caused drainage and cultivation would remain with the Crown and not the private party who undertook the restoration. This is, however, likely not the case for wetlands constructed where none previously existed, as they could not be considered to be naturally occurring.

Similarly, private property is not acquired in wildlife made more abundant as a result of private conservation efforts. Alberta’s *Wildlife Act* provides that “property in all live wildlife is vested in the Crown” until transferred to another.⁶³ It is worth noting here that the *Wildlife Act* applies to “animals” which are statutorily defined as “vertebrate[s], other than a human being or a fish.”⁶⁴ Many of the smaller creatures, such as pollinators and populators of the soil biome, are not caught by the sweep of the statute. They are likely covered, however, by the broader common law doctrine that all wild animals are considered to be ownerless until captured.⁶⁵ By either legal route, one who creates the conditions for wildlife health and abundance takes no ownership in the resulting animals.

⁵⁹ *Water Act*, RSA 2000, c W-3, s 7.

⁶⁰ *Water Conservation Trust of Canada v. Director, Central Region, Operations Division, Alberta Environment and Sustainable Resources* (8 March 2013), Appeal No 10-056-R (AEAB), aff’d 2015 ABQB 686.

⁶¹ *Public Lands Act*, supra note 31, s 3.

⁶² *Ibid* s 3(3). This conclusion is reinforced by the recent decision in *Erik v McDonald*, 2019 ABCA 217 (CanLII).

⁶³ RSA 2000, W-10, s 7(1).

⁶⁴ *Ibid* s 1(a).

⁶⁵ RM Alison, “Wildlife Ownership in Canada” (1980) 28 *Chitty’s Law Journal* 47.

Importantly, ecosystem components and the services that their interactions produce for humans are often public goods in ways more fundamental than legal doctrine, including in the (economic) sense that the benefits of ecosystem services tend to be non-rival and non-excludable, that is, their enjoyment by one person hardly diminishes their value to the rest of the community, and they are difficult to make available only to those willing to pay for them. It is just such lack of exclusivity in components and products of the ecosystem that has led, for example, cap and trade systems to be founded on the exchange of permits and allowances rather than on the exchange of air or water itself.

Ascribing Private Value to Wildlife Through Use of Land Tenure – A Proposal

Alberta law does not reward private parties who maintain habitat or take other actions that allow wildlife to thrive. On the contrary, section 49 of the Wildlife Act, explicitly prohibits private landowners from charging others for access to their land for the purposes of hunting big game, fur-bearing animals or game birds. In a 2013 paper,⁶⁶ Rainer Knopff and Cormack Gates suggested that allowing landowners to charge for such access would provide an incentive to maintain good wildlife habitat on private lands and potentially diversify farm income streams. They described this as one form of market in ecosystem goods and services. While provincial pilot programs have explored the practicality of charges for access inconvenience, to date the proposal has not been embraced by the Alberta government.

c. Property in Ecosystem Service Credits

To reiterate, to produce an ES credit through land stewardship, an actor will typically require some interest in land. By definition the activity will result in an improved production of physical products and services. But while the credit may rely upon these factors it has an existence and properties quite distinct from them. The credit in itself does not encompass the ownership of land or the ownership of a physical resource. The questions we turn to then, are what does the credit actually express, and how might it be characterized as property.

⁶⁶ Rainer Knopff & Cormack Gates. 'Hunting for Habitat: The Rise and Fall of an Alberta Proposal for the Private Production of Ecological Goods and Services'. Policy Series. (Winnipeg: Frontier Centre for Public Policy, 2013), online: <https://fcpp.org/files/1/PS146_HuntingforHabitat_FB05F2.pdf>.

As discussed above, the financial value of ES credits lies in their acceptance by the relevant regulator as a means of satisfying an environmental obligation or liability. However, whether or not a regulator must (or even may) accept an ES credit in approving an application depends on the discretion conferred on the regulator by the enabling legislation in each case. Ideally, a statute should provide for the credits expressly. Again as discussed above, the courts are unlikely to decide in favour of the creation of new forms of property in the absence of legislation to that effect.

Fortunately, in Alberta the legal foundation clearly exists for the promulgation of regulations for this purpose. In particular, section 46 of the *Alberta Land Stewardship Act* enables the Lieutenant Governor in Council to make regulations creating and prescribing the attributes of a “stewardship unit.”⁶⁷ Section 47 makes clear that such stewardship units may be used as a mechanism to “counterbalance the effects of an activity, including “compensating for an activity by replacing, providing, acquiring, using or extinguishing stewardship units”⁶⁸ These provisions are elaborated on by section 45, which provides for the establishment of an exchange to administer stewardship units. We read these provisions to equate stewardship units (at least in part) with our use of the term “ES credits.” (Section 45 through 47 are reproduced in whole in Appendix I.)

To date no regulations have been promulgated under these permissive provisions. Further the breadth of the authority and matters dealt with in them is so broad that it is difficult to determine what particular interest or concern they are intended to apply to. Such clarity is deferred to the regulations which are as yet non-existent and apparently not currently planned.

Notwithstanding the inchoate status of these provisions, we can refer to them for what legislators see as the *desiderata* of trading in stewardship units representing ecosystem values and services and the limits of the concept. Thus, section 46(1)(a) and (b) relate to the fundamental existence of the stewardship unit as a novel asset: “creation, holding, issuance, approval, verification, authentication, distribution, modification, suspension or extinguishment” as well as “how a stewardship unit is created and by whom”.⁶⁹ Subsections (c) and (d) describe the variation in units and what each represents. We can assume that this would encompass some ecosystem feature, value or service as well as a metric for quantification. Subsection (e) deals with transfer of the interest, including “holding, use, sale, trading, exchange, lease, assignment and disposition,” including the establishment and use of a registry.⁷⁰ Any of

⁶⁷ *Supra* note 2, s 46..

⁶⁸ *Ibid*, s 47(1) and s 47(2)(e) respectively.

⁶⁹ *Ibid*, s 46(1)(a)-(b).

⁷⁰ *Ibid*, s 46(e).

the powers, functions, or requirements under the regulations may be delegated to local authorities or other decision-makers having authority to grant a statutory consent.⁷¹

ALSA recognizes the potential application of securities regulation concerning stewardship units, providing that regulations may apply or exempt from application all or any part of the *Securities Act* to stewardship units under *ALSA*.⁷²

There is one notable departure from the expansive and permissive nature of the *ALSA* provisions and it is one which is of direct relevance to this study: Section 46(2) states unequivocally “A stewardship unit is not and may not be created as an interest in land.”⁷³ This provision applies to stewardship units created pursuant to *ALSA*, but does not appear to be directly applicable to ecosystem service credits created outside that statutory framework. Nevertheless, the aversion of the legislators to any implication of a new interest in land requires special cognizance. Its rationale is not immediately apparent, but it may be that it stems from a wish to distinguish legal rights in stewardship units from the rights to the land from which the units flow, as we have discussed above.⁷⁴ This particularly important if the stewardship unit, or ES credit, is to be transferable and fungible in market setting, while the interest in land that secures its underlying environmental value is specific and long-term.

Despite this, section 46(2) of *ALSA* dictates that the land titles system is not to be used. Rather, sections 45 and 46(1)(e) provide for the regulatory creation of an exchange and registry for stewardship units with:

- (i) the authority, subject to the regulations under this Part, to create, hold, issue, approve, verify, authenticate, distribute, modify, suspend or extinguish all or part of a stewardship unit;
- (ii) the authority to establish, administer or manage one or more programs, schemes or systems to register, record and administer stewardship units,⁷⁵ and further:
... for managing the holding, use, sale, trading, exchange, lease, assignment and disposition, including disposition by will or on death without a will, of stewardship units[.]⁷⁶

⁷¹ *Ibid*, s 46(1)(f) and s 2(1)(e).

⁷² *Ibid*, s 46(1)(g).

⁷³ *Ibid*, s 46(2).

⁷⁴ This is also the position taken by the Environmental Law Centre, *Buying a Better Environment? Market-Based Instruments & the Alberta Land Stewardship Act; Market-Based Instruments & the Alberta Land Stewardship Act: Volume 4: Stewardship Units & the Exchange under the Alberta Land Stewardship Act* (Edmonton: Environmental Law Centre, 2016), at 12, online: <http://elc.ab.ca/wp-content/uploads/2016/12/MBI_Volume-4_Stewardship-Units-the-Exchange-under-the-Alberta-Land-Stewardship-Act.pdf>.

⁷⁵ *ALSA*, *supra* note 2, s 45(b).

⁷⁶ *Ibid*, s 46(1)(e)

These provisions strongly suggest that stewardship units, if and when created, are to be governed by a regulatory regime specifically designed for the task, rather than through some adaptation of existing institutions, including pre-existing categories of property or the mechanisms by which such property is secured.

Respecting the distinction between property rights in an ES credit and the rights to the land necessary to produce the credit does not in itself, however, preclude the possibility that the credit might itself be recognized as an interest in land if it were generated outside *ALSA*. If it could be so characterized, that it could be registered through the land titles system, with all of the clarity and certainty that system provides, including obligations running with the land.⁷⁷

This situation leaves ES credits, however, at an uncomfortable impasse. The Alberta government has indicated several times that it is interested in developing market mechanisms to encourage stewardship of the province's environment and natural resources. Many of those mechanisms make use of the notion of a transferable credit representing a particular amount of ecosystem function or benefit. Many stakeholders from a variety of sectors are interested in moving to develop and participate in such a market mechanism. However, while the government has indicated through *ALSA* that it wishes to play the role of designing the institutions and rules by which this would be accomplished, it has not done so. At the same time courts and regulators are unlikely to take the initiative to define rights and institutions in the absence of legislation, or at least clear policy. Interested stakeholders are therefore left without a path forward. This is a significant roadblock in the development of ecosystem service markets. If the government of Alberta remains interested in enabling such markets to incent better stewardship, it has the option of

⁷⁷ Support for the notion that a credit (outside *ALSA*) may be structured as a registrable interest in a specific parcel of land without any legislative amendment can be found in the Supreme Court of Canada's decision in *Bank of Montreal v Dynex Petroleum Ltd.* [2002]. There the Court held that an overriding royalty interest may be crafted as a registrable interest in land. An overriding royalty is a common arrangement in the oil & gas industry in Alberta, which guarantees its holder a share of the production from a mineral lease. Prior to the Court's decision, the traditional position was that an interest in land could not issue out of an incorporeal hereditament (a nonpossessory interest), and further, that because mineral leases are in essence a form of profit à prendre, an overriding interest which "piggybacks" on a mineral lease could not amount to an interest in land. The Court stressed nevertheless that in the absence of any reason to adhere to the strictures of property law, the needs and realities of the modern industry justify a departure from the traditional rule, and to allow the interest to be crafted as a registrable interest in land, if the parties so desire. Of particular interest to the question of how property law can apply to a new type of asset in new markets is the following statement from Mr. Justice Major on behalf of the Court (at paragraph 17): "The application of common law concepts to a new or developing industry is useful as it provides the participants in the industry and the courts some framework for the legal structure of the industry. It should come as no surprise that some common law concepts, developed in different social, industrial and legal contexts, are inapplicable in the unique context of the industry and its practices." While commerce in ES is a very different activity from petroleum production, the shared need for novel legal arrangements to suit the particular practices of new industries may mean that that the liberality articulated by the Court might be used in the defining of property rights in ES.

creating a formal regime using the *ALSA* framework. Alternatively, the legislator could build on other aspects of the law such as the *Land Titles Act* or the regime respecting public lands or wildlife, or the mandates of particular regulators, though those are likely to be more piecemeal. By whatever legal route, or by whatever name used, however, significant regulatory changes are needed to ensure ecosystem service markets are part of Alberta's future.

V. Building Integrity in Ecosystem Service Credits

In the previous section we have put forward the position that the development of markets in ecosystem services is facilitated by the development of standard ES credits that are ecologically valid, recognized as satisfaction of environmental liabilities, amenable to exclusive ownership, transferable and fungible. We have also seen that the rights necessary to give meaning to such credits, at least in Alberta, are unlikely to be developed by regulators or by courts. This key aspect of ES market development, then, is likely to fall to the legislators, and in Alberta we do have enabling legislation which points the way, even if that legislation has not yet been acted upon.

The provisions of sections 45 through 47 of *ALSA* are broadly worded, allowing a wide number of options as to the features of ES credits (i.e., stewardship units) and how they might be used. In this section we will consider what we consider to be some of the key tools and issues which legislators or others might consider in undertaking this task.

1. Certification and Ecological Credibility

In Section III of this paper we pointed out that an ES credit must credibly represent a measurable amount of ecosystem feature or benefit, and that for a credit to be fungible the measurement must be standardized. We also pointed out the challenge in defining such a standardized measure that will apply to extremely varied and complex individual ecosystem, and that may rely on incomplete data. While ongoing research may bring us closer to resolving these difficulties, it is important in the meantime that any notion of ES credit include features which address them in a preliminary manner.

Certification is the process by which a designated body validates a putative credit by ensuring that the work meets the regulatory criteria (typically, that the work has been completed and it has produced, or that it is projected to produce, the stipulated environmental outcomes). Certification increases confidence that credits represent meaningful environmental gains and ensures their economic value as acceptable to regulators. Standardized credits are fungible and can lead to a broader range of compliance options, higher liquidity, and lower compliance costs.

The same designated body may also invalidate or decertify credits. There are generally three reasons for invalidation: 1) an error in the calculation of the credit, e.g. impact from a project activity is not what was anticipated; 2) fraud; and 3) regulatory non-compliance.⁷⁸ Depending on the liability framework chosen, parties may be responsible for replacing any invalidated credits.

2. Assigning Liability

If an ES credit fails to accurately represent an actual ES service (either through fraud, mismanagement or failure of the project to meet its objectives), and therefore loses its regulatory and financial value, someone might be held liable to remedy the deficiency or compensate aggrieved parties. Liability can be legally assigned to the buyer or the seller of the ecosystem credit, but the financial risk can be shared or spread through an insurance scheme. In a rental market, the liability for a credit may transfer from one party to another for the duration of the contract. The decision with whom liability rests can influence the market by inhibiting investment, reducing the number of players or decreasing liquidity, amongst other consequences. As the industry evolves, insurance products are being created to mitigate risk for market participants and financial tools are also being considered as a means to hedge risk. The following sections will provide a brief overview of some of the liability options available when creating ecosystem credit markets.⁷⁹

a. Seller Liability

If liability is assigned to the seller, the buyer can purchase an ecosystem credit and then has the expectation that the seller will compensate or assign a new credit if, for some reason, the current credit is not delivered or is invalidated. This could encourage more buyers to enter the market, but the guarantee of the credits is only as valuable as the credit rating of the seller and in instances where the credit seller is an individual landholder, it could be difficult and costly to verify and enforce. This could be offset by insurance, which would be reflected in increased credit prices.

Seller liability may also limit the market due to the unwillingness of the seller to take on the risk associated with possible invalidation of their credits or an inability to generate sufficient initial funds to kickstart the project. This may limit the inclusion of individual landowners in the market.

⁷⁸ California Carbon.info, “Liability shift for forestry credits expected to have minimal market effects” (3 May 2014), online (blog): *Trust News* <<https://climatetrust.org/liability-shift-for-forestry-credits-expected-to-have-minimal-market-effect/>>

⁷⁹ Please note there may be other innovative shared liability options that are not covered in this brief summary.

Rental Markets. In situations where credits are deemed impermanent, Sedjo and Marland suggest that rental contracts would be a preferred means to deal with liability.⁸⁰ A contract would be created between the owner and renter with both parties receiving benefits in the form of a payment or a credit. At the end of the contract the renter can renew the lease or seek out an alternative source of credit. In this situation liability resides with the party managing the activity generating the credits until the end of the contracted period, at which point liability is transferred to the renter of the credits.⁸¹ Such a system allows for periodic payments to be based on periodic checks on validity of the underlying ES.

Buffer Accounts. In light of the impermanence of some ecosystem credits, buffer accounts have been established to reduce the perception of risk surrounding them. Québec has developed a cap and trade market for carbon and has linked its market to that of California as part of the Western Climate Initiative. Québec's market differs slightly from California's in that it requires 3% of the approved credits of each project to be deposited into an environmental integrity account.⁸² Credit from this account will be used in the case that the offset project proponent is unable to replace any credits deemed invalid. This ensures the environmental integrity of Québec's system.

Within the California cap and trade system, forestry projects are also required to contribute to a buffer pool. This account will be drawn from in the event of "*an unintentional reversal or act of god, such as a natural or biological disaster that causes a reduction in the quantity of onsite carbon in the project area*".⁸³ Forestry project operators submit ten to twenty percent of their credits to the pool; susceptibility to triggers of unintentional reversal determines the amount.⁸⁴

Buffer pools not only create accounting challenges but also take liquidity out of the market given that these credits are tied up in buffer pools, sometimes for perpetuity.⁸⁵

⁸⁰ Roger A. Sedjo & Gregg Marland, "Inter-trading permanent emissions credits and rented temporary carbon emissions offsets: some issues and alternatives" (2003) 3:4 *Climate Policy* 435-444

⁸¹ Gregg Marland, Kristy Fruit & Roger Sedjo, "Accounting for sequestered carbon: the question of permanence" (2001) 4 *Env Sci & Policy* 259-268.

⁸² Gouvernement du Québec, "Definition of Criteria Required for the Issuance of Offset Credits" (2019) <<http://www.environnement.gouv.qc.ca/changements/carbone/credits-compensatoires/definitions-en.htm>>

⁸³ California Carbon.Info, *supra* note 81.

⁸⁴ *Ibid.*

⁸⁵ Gloria Gonzalez, "Invalidation risk still shadows California offsets market" (blog, 18 May 2015), online *Ecosystem Marketplace: A Forest Trends Initiative*: <<http://www.ecosystemmarketplace.com/articles/invalidation-risk-still-shadows-california-offsets-market/>>

Stormwater Retention Credits in Washington, D.C.

The increased area of impervious surfaces is impacting stormwater systems in urban municipalities. Washington, D.C. has attempted to address the impact of impervious surfaces by requiring new developments of 5000 square feet and greater to retain water from storms of a specified size. To allow for flexibility, the District has allowed developers to offset up to 50% of their stormwater retention requirements to other landowners who increase their land's ability to retain stormwater through green infrastructure. At the outset, the market was inhibited due to a limited number of transactions, which led to difficulties in assigning value (prices) to the credits. On the development side, it took time for new projects to finish and actually require the credits, while on the supply side, landowners needed capital to pay for the green upgrades to their property. To kickstart the market, Prudential invested \$1.7 million into District Stormwater LLC (a company affiliated with the Nature Conservancy).⁸⁶ The company works with landowners to install green improvements for free in exchange for the retention credits generated by the new infrastructure. This encourages the creation of an initial supply of credits and buffer for the new market.

To deal with liability, the District Department of the Environment (DDOE) certifies new stormwater retention credits (SRCs). Original owners of SRCs sign a contract with the DDOE swearing to maintain the retention capacity specified for the period of time the SRC certification is requested and also agree to a maintenance contract.⁸⁷ The DDOE will certify up to three years' worth of SRCs, at the end of the contractual period, the owner may apply for another three years' worth of credits. If an original owner fails to maintain the retention capacity, SRC owners will be required to compensate for the failure during the time period for which maintenance did not occur by either forfeiting the SRCs (if they have not been used or sold), purchasing replacement credits that are then retired by the DDOE or paying an in-lieu fee to the DDOE.⁸⁸

Washington's system of stormwater retention credits appears to operate as a rental market over three-year periods with original owners maintaining liability during the length of their individual contracts.

⁸⁶ Julian Spector, "Turning Stormwater Runoff Into Everyone's Business" (18 March 2016) (website), online CityLab: <<https://www.citylab.com/solutions/2016/03/stormwater-runoff-credits-nature-conservancy-washington-dc/473700/>>

⁸⁷ Center for Watershed Protection, "*Stormwater Management Guidebook*" (Washington, D.C.: District Department of the Environment, 2013), online: <https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/FinalGuidebook_changes%20accepted_Chapters%201-7_07_29_2013_compressed.pdf>

⁸⁸ *Ibid.*

b. Buyer Liability

In many of the existing carbon markets, liability resides with the buyer. This means that in the event of the invalidation of a credit, the buyer is responsible for finding other credits to offset their emissions. Buyer liability is used within the Kyoto Protocol's Clean Development Mechanism as a means to ensure that the responsibility of reducing emissions or offsetting them resides with the countries who are heavy emitters (and are the ones with caps on their emissions and thus the buyers of GHG credits). However, this can lead to credit infungibility, and price differentials based on the credibility of the supplying developing country.⁸⁹

When the risk of decertification resides with the buyer, then an investment or purchasing decision will depend greatly on how risk averse the buyer is.⁹⁰ If the buyer is purchasing credits as an investment, and expecting a return, then they may discount the price depending on their assessment of the riskiness of the venture. This may result in lower levels of investment in ecosystem credit markets than would be ideal, as well as less liquidity within the market. Within the California Offset Market (see example below) buyer liability has led to the development of a range of different grades of offset assets on the market.⁹¹ Buyer liability also limits the secondary market for offsets, because of the increase in risk as the credit moves farther from its original creator. For example, secondary offsets sold on exchanges are sold anonymously thus it becomes difficult to assess the credit worthiness of the seller and the overall risk of the transaction.⁹²

Liability in California's Carbon Offset Market

Within California's Carbon Offset Market, Registry Offset Credits can be issued under one of six Compliance Offset Protocols. The protocols cover forestry projects – urban and otherwise, livestock projects, ozone-depleting substances projects, rice cultivation projects and coal mine methane projects.⁹³ Participants in the market buy and sell Registry Offset Credits issued by one of two Air

⁸⁹ Zhong Xiang Zhang, "International Greenhouse Gas Emissions Trading: Who should be held liable for non-compliance by sellers?" (1999) 31 *Ecol Econ* 323-329.

⁹⁰ Julian Richardson, "Golden CCOs and Risk" (blog, 2 December 2013), online Climate Action Reserve: <<http://www.climateactionreserve.org/blog/2013/12/02/managing-golden-risks/>>

⁹¹ *Ibid.*

⁹² Electric Power Research Institute, "Overview of the California Greenhouse Gas Offset Program" (April 2011) online: <https://eea.epri.com/pdf/ghg-offset-policy-dialogue/workshop10/EPRI_Offsets_W10_Background-Paper_CA-Offsets_040711_Final2.pdf>.

⁹³ California Air Resources Board, "Compliance Offset Program" (13 March 2019) online: <<https://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm>>.

Resources Board (ARB) approved Offset Project Registries (the American Carbon Registry or Climate Action Reserve).⁹⁴

To ensure environmental integrity of the offset program, the ARB has developed regulations that allow the board to invalidate offset credits that should not have been issued. The responsibility to compensate for invalidated credits falls to the buyer of the credits. Offset buyers have a six-month window in which to replace the invalidated credits. Critics of the buyer-liability system state that it hampers secondary market creation.⁹⁵

A result of the buyer liability protocol adopted by the ARB has led to differentiation among credits. California Carbon Offsets or CCOs have been divided into three types based on risk profile – CCO8s, CCO3s and Golden CCOs. CCO8s refer to offsets that have a liability tail of 8 years during which they may be invalidated by the ARB. CCO3s have undergone a second verification by a second approved verifier which reduces the tail to 3 years. Finally, a golden CCO is an issued offset with no invalidation risk, (this type of CCO has removed any liability from the buyer).⁹⁶ The various risk profiles lead to greater price differentiation within the market.

c. Risk Pooling

Buyer liability policies have led to the development of insurance products to mitigate risk to market participants. Buyers wishing to transfer the liability to the seller may require them to hold insurance as proof of their creditworthiness.⁹⁷ Parhelion Insurance is offering insurance against invalidation for compliance credits that were transitioned from credits originally issued by the Air Resources Board (ARB).⁹⁸ However, there is limited information on what these insurance payouts would look like, and how they might ensure that a firm's offset requirements continue to be met.

⁹⁴ Jennifer A. Smokelin & Jamon Bollock, "The Basics of Transacting in Offsets Under AB32" (Reed Smith, White Paper 13-141, May 2013), online:

<https://files.reedsmith.com/files/Uploads/Documents/alert13141_whitepaper.pdf>.

⁹⁵ Environmental Defence Fund, CDC Climate Research & IETA, "California: An Emissions Trading Case Study" (April 2015), online: <http://www.cdclimat.com/IMG/pdf/california-ets-case_study-ieta-edf-cdc-climat-research_28042015-4.pdf>.

⁹⁶ California Carbon.info, *supra* note 81.

⁹⁷ *Ibid.*

⁹⁸ Climate Action Reserve, "Buyer liability insurance now available for California's cap and trade offset program" (22 May 2013), online (blog): *Climate Action Reserve*

The liability system chosen for any given market will greatly influence market uptake, transaction costs, and liquidity. It will likely be difficult to change from one system to another (although a shift from seller to buyer liability did occur in forestry projects registered in the California market), so care must be taken to examine all the options and their potential consequences prior to determining liability. A more thorough examination of current ecosystem service markets and their assignment of liability could help guide the creation of an Alberta-based market.

3. Assuring Exclusivity – Registry

Ascertaining rights in intangible property poses special challenges. As discussed above, an important part of establishing ownership of tangible property is establishing exclusive possession or occupation, an aspect that is not applicable to intangible property. The simplest policy tool to address this challenge is a registry. Registries authoritatively record the existence and ownership of intangible property and can help potential buyers and sellers to find each other.

As discussed in Section IV, the *Alberta Land Stewardship Act* contemplates a government endorsed registry for stewardship units, just as it enables the creation, characterization and regulation of stewardship units. It does not, however, require the creation of a registry specifically for the recognition of ownership in such units. Without government initiative or direction, stewardship units might be implemented without a registry, but this would increase transaction costs and undermine the security of a market in such units. It would be a similar situation in the unlikely event that a regulator or court were to take the initiative to recognize a transferable right to an ES credit in the absence of a registry. This possibility, however, remote, invites the question of whether other registries, created for other purposes, might be made suitable for registration of ES credits.

We have reviewed several registry systems operating in Alberta for intangible property interests that may be appropriate options to embed ES markets. (A chart comparing these registries is set out in Appendix II.) However, none of the existing registry systems are “fit for purpose” to address the unique characteristics of ES. Statutory reforms or new market mechanisms may be required to align ES markets within the existing registry systems.

<<http://www.climateactionreserve.org/blog/2013/05/22/buyer-liability-insurance-now-available-for-californias-cap-and-trade-offset-program/>>.

a. Land Titles

Interests in land (e.g., fee simple and leasehold estates, caveats, easements, and covenants) can be registered on title under Alberta's *Land Titles Act*. Under Alberta's Torrens system of land titles, the buyer of real property who relies on the registry is generally unbound by any interest which is not properly registered on title. Land interests in the Torrens system are protected by the Alberta Land Titles Assurance Fund in the event of loss or fraudulent activity; this insurance protection is specific to registrar errors or the wrongful acts of third parties.⁹⁹

ES credits could be registered on title if they were recognized as interests in land, (it should be pointed out again that s 46(2) of ALSA provides expressly that stewardship units are not interests in land), and the registration could indicate that specific actions are to be taken, or are not to be taken, on that land, in respect of a certified ES credit, or alternatively, that regulatory approval for development on the land has been granted in exchange for a credit (in the former case, typically the credit would be tied to a conservation easement affecting the land). Using the land titles registry may complicate transactions if the ES credits are held by a third party;¹⁰⁰ the interest would likely need to be registered as a type of caveat.

Other jurisdictions have successfully incorporated similar credits and rights in the Torrens system. In Australia, the right to carbon sequestration is registered on land title as a standalone statutory right (in contrast to creating a land fixture). This is a "fit for purpose" legal form that was developed specifically for carbon sequestration.¹⁰¹ In New South Wales, carbon sequestration rights can also be registered as a profit a prendre, which does not require the interest to be formally registered on title.¹⁰²

b. Personal Property Security Interests

Personal property registries (PPRs) are a less intuitive model for ES markets due to their exclusion of intangible land-based interests, with the exception of negotiable debt instruments or floating charges. However, it is possible that land-related goods (e.g. fixtures, crops, minerals) can be classified as tangible personal property and registered in a PPR. Personal property security interests are perfected when collateral transfers possession through a financing statement that is registered in a PPR. Personal property

⁹⁹ Government of Alberta, "Frequently Asked Questions about the Land Titles Assurance Fund", online: <https://www.servicealberta.ca/pdf/ltmanual/FAQ-Assurance_Fund.pdf>.

¹⁰⁰ Alexander Zahar, Jacqueline Peel and Lee Godden. *Australian Climate Law in Global Context* (Cambridge: Cambridge University Press, 2013) at 350.

¹⁰¹ Zahar, Peel & Godden, *supra* note 109 at 349.

¹⁰² *Ibid* at 363.

security interests are designed to create an interest that secures payment or the performance of an obligation.¹⁰³

Personal property security interests create three distinct rights for the secured party: (1) the right to enforce the security interest against collateral if there is a default; (2) the right to preference in payment; and (3) the right to follow the collateral and assert the security interest against third parties when transferred.¹⁰⁴

In Australia, carbon credits are classified as personal property so that the owners of the credits can use them as security for loans or other obligations.¹⁰⁵ This security interest can be enforced against third parties after it has been perfected. In Canada, if carbon credits are structured as futures, forward or options contracts they can be registered in a PPR. However, Canadian provinces have resisted registering carbon credits as collateral due to the complexity of the marketplace, the volatility in price and the lack of liquidity.¹⁰⁶

c. Emission Offsets and Performance Credits

Alberta maintains a very robust emission offset and performance credit system under the *Climate Change and Emissions Management Act*. Emission offsets are issued if an emitter produces less than their output-based allocation, and emission performance credits can be purchased to offset emissions in one tonne increments.¹⁰⁷ Both credits are time-limited, revocable licenses that are traded in their respective registries, managed by the Government of Alberta.

The emission offset and performance credit system is very data-driven, requiring demonstrable, quantifiable and measurable impacts that can be independently validated, verified and audited by third parties.¹⁰⁸ Offset activities must demonstrate additionality to be verified, which can be challenging for farmers and industrial emitters to demonstrate. These strict compliance measures may be difficult to translate to ES markets, particularly if there is significant variability in the types of biodiversity activities that are accounted for in the market structure.

¹⁰³ *Personal Property Security Act*, RSA 2000, c P-7, s 3(1)(b).

¹⁰⁴ Ronald Cuming, *Personal Property Security Law* (Toronto: Irwin Law, 2005) at 1.

¹⁰⁵ Australian Government, Clean Energy Regulator, “Using emission units as security” (2015), online: <<http://www.cleanenergyregulator.gov.au/OSR/ANREU/Using-emissions-units-as-security>>.

¹⁰⁶ David E. Thring, “Carbon Credits as Collateral” (McMillan LLP, 2010), online: <<https://mcmillan.ca/Carbon-Credits-as-Collateral>>.

¹⁰⁷ Alta Reg 255/2017, ss 16(1), 17(1).

¹⁰⁸ *Ibid*, s 19(1)(c),

Emission offsets and performance credits are also subject to strict timeframes — there is an 8-year window for emission offsets to be applied from when the reduction occurred and emission performance credits can only be used in the year following their creation.¹⁰⁹

The Alberta Climate Change Office operates a registry of valid emission and performance credits, but that registry to date is not available for other forms of environmental interests such as ES credits beyond carbon.

d. Blockchain

Blockchain is an emerging, but increasingly common private model to register intangible property interests. Crypto-tokens or crypto-assets have been created to represent carbon credits on a secure carbon marketplace ledger. The limited case law on blockchain in Canada indicates that such credits can be classified as a property interest.¹¹⁰

In the absence of federal regulatory frameworks for blockchain/cryptocurrency companies¹¹¹, the field remains quite underdeveloped in Canada for carbon emissions/biodiversity conservation activities. The systems of exchange for blockchain are highly decentralized, typically not requiring a third party or regulatory body to administer the ledger. There are some registry models emerging internationally, such as IBM's carbon credit management platform in China¹¹² and CarbonX based in Toronto.¹¹³ The blockchain marketplace may require more established regulatory frameworks before it becomes a viable option for ES markets.

4. Regulatory Oversight of Trading – Commodity, Currency or Security?

The legal characterization of ES credits has important implications for how the trade in credits is to be regulated. In that regard, a debate has been ongoing as to whether the trade in carbon credits should be regulated as one of commodity, currency or security. We see other types of ES credits are directly comparable, such that we expect that the same arguments will apply.

¹⁰⁹ *Ibid*, s 19(1)(f), s 19(2)(a).

¹¹⁰ *Copytrack Pte v Wall*, 2018 BCSC 1709.

¹¹¹ Jessie Willms, “Canada Delays Regulation of Cryptocurrency and Blockchain Companies” (*Bitcoin Magazine*, 2018), online: <<https://ncfacanada.org/canada-delays-regulation-of-cryptocurrencies-and-blockchain-companies/>>.

¹¹² IBM, “Energy-Blockchain Labs and IBM Create Carbon Credit Management Platform Using Hyperledger Fabric on the IBM Cloud” (2017), online: <<https://www-03.ibm.com/press/us/en/pressrelease/51839.wss>>.

¹¹³ CarbonX, “About”, online: <<https://www.carbonx.ca/>>.

To date carbon credits have been traded as a commodity, if only by default.¹¹⁴ In Canada, the Ontario Securities Commission has formalized and expanded this approach to cover all environmental credits, deeming “product[s] based on environmental quality, including emissions or emission credits” to be commodities.¹¹⁵ The Canada Revenue Agency classifies crypto-assets as commodities rather than currency.¹¹⁶ Exchanges – such as the Chicago Climate Exchange and the European Energy Exchange – facilitate trades of carbon credits and consider them to be commodities. In Alberta, commodity trading is overseen by the Alberta Securities Commission.

An argument has been made by Jillian Button that carbon credits ought to be treated as currencies.¹¹⁷ Currencies, she notes, are issued by governments and governments control their supply. She bases her recommendation on the fact that carbon credits, while all measured in the supposedly universal, constant and fungible unit of tonnes of CO₂ equivalent, carry different degrees of credibility based on the countries from which they originate. If they were treated as currencies, then some could be devalued relative to others. The awareness of this possibility would motivate jurisdictions to better regulate the production of credits in order to support their value, just as countries support the value of their monetary currencies. Button’s argument has recently been reiterated in the Canadian and Albertan context by Josephine Yam.¹¹⁸ To date, however, we are not aware of any jurisdiction that has moved to treat carbon credits or any other form of ES credit as a currency for regulatory purposes.

Another approach which has been considered is whether ES credits might be regulated as securities. Securities regimes aim to regulate trading in futures contract on the basis that they are particularly susceptible to fraud due to their intangible nature at the time of trading. This concern is also common with ES credits.

Despite this shared weakness, ES credits have not generally been accepted as securities. German legislation does not characterize carbon allowances as a security.¹¹⁹ Brazil’s National Climate Change Policy called for the emissions to be traded as securities through the Brazilian Securities and Exchange

¹¹⁴ Jillian Button, “Carbon: Commodity or Currency – The Case for an International Carbon Market Based on the Currency Model” (2008), 32 Harv Envtl L Rev 571 at 579.

¹¹⁵ (*Commodity Futures Act*) *Designation of Additional Commodities*, OSC Rule 14-502, (2004) 27 OSCB 7965 (17 September 2004).

¹¹⁶ Canada Revenue Agency, “What you should know about digital currency” (2013), online: <<https://www.canada.ca/en/revenue-agency/news/newsroom/fact-sheets/fact-sheets-2013/what-you-should-know-about-digital-currency.html>>.

¹¹⁷ Button, *supra* note 124.

¹¹⁸ Josephine Yam, *To Achieve Environmental Integrity in Linked Cap-and-Trade Schemes* (LL.M. Thesis, University of Calgary Faculty of Law, 2016) [unpublished].

¹¹⁹ Button, *supra* note 124 at 579.

Commission.¹²⁰ That Commission countered the government’s policy announcement by declaring that carbon credits are not akin to securities¹²¹ and that deeming them as such would be “inconvenient.”¹²² Generally, credits are “separable from the regulated entity, unlike securities, which essentially represent part ownership of an entity.”¹²³

The dismissal of ES credits as securities may not be so straight forward as one looks at the various ways they may come to be traded. Credits are considered to be derivatives if traded on a futures basis.¹²⁴ Derivatives are “bilateral contracts that are valued according to the value of a certain asset set at a future date.”¹²⁵ The carbon market is increasingly driven by speculation, both by regulated entities attempting to minimize compliance costs and financial intermediaries investing for profit.¹²⁶ As derivatives are an object of securities regulation, ES credits might be caught through such an application.

Whether considered a commodity or a security, however, trade in ES credits is likely to come under the purview of the Alberta Securities Commission. Commodities are governed by Alberta’s *Securities Act* and can be traded in cash markets or futures markets. Commodities are defined broadly to include “any good, article, service, right or interest of which any unit is, from its nature or by mercantile custom, treated as the equivalent of any other unit”.¹²⁷

While commodities are broadly defined, they may pose some challenges for ES markets. Commodities markets are less equipped to handle market heterogeneity, require products to have legal status to attribute value and must be “deliverable” in a way that preserves their quality over time.¹²⁸ Commodities are less conducive to markets of intangible property interests because they require certainty and uniformity to be exchanged in the marketplace.

The *Securities Act* provides a clear framework for recognizing the property interests of new commodities. The Securities Commission can issue a designation order to designate a good, service or interest as a

¹²⁰ Thiago Borma Chagas, “Legal Aspects of Emission Reductions and Carbon Credits Under Evolving Climate Finance Mechanisms in Brazil” (2016), 2016 CCLR 215 at 217.

¹²¹ *Ibid.*

¹²² Brazilian Securities and Exchange Commission, News Release, “CVM announces its understanding of carbon credits and products derived from them” (21 July 2009), online: <<http://www.cvm.gov.br/noticias/arquivos/2009/20090721-1.html>> [Translated].

¹²³ Button, *supra* note 124 at 579.

¹²⁴ Barbara Hendrickson, “Today’s New and Developing Carbon Markets”, Speaking Notes, (2016) BAX Securities Law at 2.

¹²⁵ Michael Cashman & Michael Hutchinson, “Taxation and the Trading of Carbon Credits” (2010), 21 Intl Tax Rev 45 at 46.

¹²⁶ Button, *supra* note 124 at 572.

¹²⁷ *Securities Act*, RSA 2000, c S-4, s 1(h).

¹²⁸ Yam, *supra* note 128.

commodity¹²⁹ and can recognize exchanges, including alternative trading systems (regulated independent marketplaces).¹³⁰

VI. Conclusion

For more than a decade the Alberta government has indicated an interest in developing new market-based policy instruments for better stewardship of the province's land and resources. In select areas – greenhouse gas management, wetland conservation – it has developed regimes that continue to be adjusted and can be seen as experiments. The legal tools which are the foundation of those regimes, however, are particular to them and are not generalizable. If, therefore, the Province wishes to move toward making MBIs more applicable on the province's landscapes and water bodies, changes in the law will be required.

We have focused on the concept of a transferable ecosystem service credit as an important component of ecosystem service markets. Such a unit, if sufficiently secure in its value as a means of complying with regulatory requirements and expressing actual ecosystem improvements, would provide a unit of a currency or commodity that could be traded in a marketplace to find its highest value and lowest cost. This process should bring new economic efficiencies to the task of environmental protection.

Current Alberta law, however, does not provide the necessary aspects to allow for the use of ES credits. There is neither a clear framework for the creation or use of such credits, nor a clear direction to regulators that credits may be accepted in satisfaction of regulatory requirements. Further, there is no institutional framework, such as a certification system and registry, to provide actors with the security to invest in the creation or holding of ES credits.

Fortunately, a framework for progress on this issue is provided by the enabling provisions of the *Alberta Land Stewardship Act*. That statute not only allows research into MBIs but enables regulations to give effect to conservation (biodiversity) offset and the trade of development credits. It also broadly enables regulations defining and supporting the creation, security and trade of “stewardship units,” which we take to be equivalent of tradeable ES credits, including a registry and exchange. While this is not the only

¹²⁹ *Supra* note 137, s 10(1).

¹³⁰ Alberta Securities Commission, “Exchanges, Alternative Trading Systems, Clearing Agencies and Trade Repositories”, online: <<https://www.albertasecurities.com/registrator-and-market-regulation/exchanges-alternative-trading-systems-clearing-agencies-and-trade-repositories>>.

route available to legal reform in support of ecosystem service markets, it is likely the best suited for the job. The job, however, has yet to be done.

Appendix I: Excerpt from Alberta Land Stewardship Act

The Exchange

45 The Lieutenant Governor in Council may make regulations

- (a) establishing or designating a person or government department as the exchange and naming the exchange;
- (b) conferring on the exchange, by agreement or by regulation, or both, all or any of the following:
 - (i) the authority, subject to the regulations under this Part, to create, hold, issue, approve, verify, authenticate, distribute, modify, suspend or extinguish all or part of a stewardship unit;
 - (ii) the authority to establish, administer or manage one or more programs, schemes or systems to register, record and administer stewardship units;
- (c) providing for the manner and method of reporting by the exchange on matters required by the regulations under this Part;
- (d) delegating to the exchange the authority described by the regulations under this Part or under a regional plan;
- (e) requiring the exchange to provide education and information about the services it provides.

Stewardship units

46(1) The Lieutenant Governor in Council may make regulations

- (a) respecting the creation, holding, issuance, approval, verification, authentication, distribution, modification, suspension or extinguishment of stewardship units;
- (b) respecting how a stewardship unit is created and by whom;
- (c) establishing or authorizing different types or classes of stewardship unit and the name or names of the types or classes and the terms, conditions and restrictions with respect to each type or class of stewardship unit, including development credits that are the subject of a TDC scheme;
- (d) respecting the attributes of each type or class of stewardship unit, including, without limitation, regulations
 - (i) describing what the type or class of stewardship unit represents;
 - (ii) describing the nature of the type or class of stewardship unit, in particular, whether the type or class of stewardship unit is one of benefit or obligation, or both;

(iii) whether the stewardship unit is irrevocable, and if not, its term or any other conditions applying to it;

(e) for managing the holding, use, sale, trading, exchange, lease, assignment and disposition, including disposition by will or on death without a will, of stewardship units, and if regulation or control is required, including, without limitation, regulations

(i) respecting the establishment of a registry and a system for the recording of stewardship units;

(ii) respecting the powers, duties and functions of the exchange, including as a registry operator;

(iii) respecting the establishment, operation and closing of trading accounts for stewardship units;

(iv) respecting the recording of transactions or use of stewardship units;

(v) respecting the collection of information and the use of information and records kept by the exchange and records in respect of trading in stewardship units;

(vi) respecting, authorizing and prohibiting the disclosure of information and records kept by the exchange with respect to the registry and otherwise;

(vii) respecting the records to be kept by persons holding stewardship units or participating in the trading of stewardship units;

(viii) authorizing a person to prescribe forms for the purposes of the regulations;

(f) delegating to a Designated Minister, a local government body or a decision-maker any authority, function or requirement under the regulations made under this Part with respect to the use, imposition or extinguishment of a stewardship unit;

(g) applying or exempting all or any provisions of the Securities Act or any regulations or rules under the Securities Act with respect to any provision of this Act or the regulations concerning a stewardship unit or a type or class of stewardship unit;

(h) respecting the compatibility of regulations under this section with similar regulatory schemes in other jurisdictions, inside and outside Canada.

(2) A stewardship unit is not and may not be created as an interest in land.

Conservation off-set programs

47(1) The Lieutenant Governor in Council may make regulations to counterbalance the effect of an activity.

(2) In this section, “counterbalance” includes

(a) avoiding, limiting or mitigating the adverse effect of an activity;

(b) minimizing the impact of an activity by limiting the magnitude or degree of the activity;

- (c) rectifying or reducing an adverse effect by repairing, rehabilitating, restoring or reclaiming;
- (d) reducing or eliminating an adverse effect over time by conservation and maintenance operations;
- (e) compensating for an activity by replacing, providing, acquiring, using or extinguishing stewardship units as described in regulations made under this Part;
- (f) requiring any or all of the counterbalancing requirements described in this subsection to be increased by a ratio or factor prescribed by regulations under this section as a result of the effect of the activity;
- (g) encouraging voluntary measures to offset an activity by committing, without limitation, to additional restoration, reclamation or mitigation, the acquisition of land, the establishment of a conservation easement or the donation of actual or in-kind, financial or other resources;
- (h) requiring any action described in this subsection to be taken before or after an activity starts or before or after an activity ends.

(3) Regulations under this section may

- (a) require a decision-maker, in the circumstances described in the regulations, to impose terms and conditions on an existing or proposed statutory consent to counterbalance the effect of an activity or proposed activity;
- (b) set a limit or restriction on the maximum effect of an activity in respect of human health or safety, a species or the environment within a period of time specified in the regulations, and for that purpose may
 - (i) describe or specify a stewardship unit that is to counterbalance the effect of an activity;
 - (ii) specify the period of time within which the stewardship unit must be used or extinguished;
 - (iii) prohibit an activity without the extinguishment of all or part of a stewardship unit;
- (c) establish, certify, credit or accredit anything that is suitable as a stewardship unit to counterbalance an activity;
- (d) provide a means of assigning to a stewardship unit an attribute with respect to an investment or project indicating its benefit or obligation measured against the effect of an activity;
- (e) establish a program to certify an activity as a stewardship unit, including providing for
 - (i) who is to issue the certification;
 - (ii) how and when and under what terms and conditions a person may be certified and how and by whom a certification may be terminated;

- (iii) what a certification entitles the holder of the certification to do;
- (f) adopt or prescribe one or more guidelines or best practices with respect to counterbalancing the effect of an activity;
- (g) provide for the management, monitoring and enforcement of a stewardship unit, including
- (i) how monitoring is to be conducted and by whom;
 - (ii) requiring periodic or special reports, specifying with whom a report must be filed and requiring its availability for public inspection;
 - (iii) the inspection of an activity and the monitoring and reports on the effect of the activity to determine compliance with a stewardship unit;
 - (iv) testing anything related to an activity at a time or times and at a frequency specified by the regulations;
 - (v) an audit of compliance with a stewardship unit and the regulations;
 - (vi) security for performance of an obligation under a stewardship unit and compliance with its terms and conditions, including, without limitation, insurance, a bond, certification or audit by a third party agency or other person specified by the regulations.

Appendix II - Conceptual Registry Systems Comparison Table

	Land Titles/Property Ownership	Personal Property (PPSA)	Commodities	Blockchain	Carbon Offsets & Performance Credit Registries
Description of Registered Units	<p>Instruments include estates in land (e.g. fee simple, leasehold), caveats and easements (including conservation easements); these property interests are registered on title</p>	<p>Security interests in personal property are perfected when the collateral transfers possession through a financing statement at a Personal Property Registry</p> <p><i>PPSA</i> applies to conditional sales, security leases, security consignments and security trusts; <u>interests in land or arising in connection with an interest in land are excluded</u> (with the exception of negotiable debt instruments or floating charges, which can be secured with property interests)</p>	<p>Commodities are defined in the <i>Securities Act</i> as “any good, article, service, right or interest of which any unit is, from its nature or by mercantile custom, treated as the equivalent of any other unit” (s.1(h))</p> <p>The Alberta Securities Commission can issue a designation order that designates a good, service or interest as a commodity (s.10(1))</p> <p>Commodities can be purchased in the cash market or purchased/sold as a futures product (in which the futures contract is the product, rather than the commodity itself).</p>	<p>Crypto-tokens or crypto-assets can be created to represent carbon credits on a secure carbon marketplace ledger; limited case law suggests that crypto-assets may be classified as property¹³¹</p> <p>Tokens are described as “utility tokens” (value of future goods/services) or “security/investment tokens” (economic rights, similar to shares)</p> <p>Distributed ledgers are maintained by a third party and managed by a peer-to-peer network (can be permissioned or permissionless, public or private)</p>	<p>Emission performance credits issued if emitter produces less than their output-based allocation (<i>Reg.</i> s.17(1))</p> <p>Emission offsets can be purchased to offset one tonne of industrial emissions, provided that emissions comply with Regulations (s.16(1))</p>
Governing Legislation	<i>Land Titles Act</i>	<i>Personal Property Security Act</i> <i>Securities Transfer Act</i>	<i>Securities Act</i>	Federal cryptocurrency regulations forthcoming	<i>Climate Change and Emissions Management Act</i> (Carbon Competitiveness Incentive Regulation)

¹³¹ *Copytrack Pte v Wall*, 2018 BCSC 1709.

<p>Characteristics of Registered Units</p>	<p>Land title instruments are characterized as follows: Surface rights (“heaven to hell”), except for mineral rights Not absolute (can be susceptible to expropriation, restrictive covenants, adverse possession)</p>	<p>Security interests are characterized as follows: Described in a security agreement with the debtor’s signature An interest that secures payment or performance of an obligation</p>	<p>Commodities are characterized as follows¹³²: Price negotiated through process of exchange Tradeable Uncertainty in supply and demand Fungible</p> <p>Futures contracts are characterized as follows: Do not physically transfer the commodity itself Buyer legally obligated to purchase commodity after futures contract expires</p>	<p>Crypto-assets are characterized as follows:</p> <ul style="list-style-type: none"> Classified by Canada Revenue Agency as commodities Likely conceived as intangibles in personal property security law Can be connected to private or publicly owned blockchains 	<p>Emission offsets are characterized as follows:</p> <ul style="list-style-type: none"> Revocable, time-limited licenses Must be traded through Alberta Emissions Offset Registry <p>Emission credits are characterized as follows: Revocable, time-limited licenses Must be traded through Emissions Performance Credits Registry</p>
<p>Constraints</p>	<p>Land title subject to unpaid taxes, public easements (e.g. highways), subsisting leases or agreements, rights of way or easements (s.61(1))</p>	<p>Security interests must be attached to collateral Cannot be connected to an interest in land (this includes land-related intangibles, except for where the account provides for a mortgage/charge that is not specifically identified in the instrument - Ontario is the exception to this rule) Interest must be perfected Must align with the following categories: goods, documents of title, chattel papers, securities, instruments, money or intangibles</p>	<p>May be less equipped to manage heterogeneity in marketplace Require uncertainty of supply and demand for successful market functioning Commodities must be deliverable in a way that preserves their quality over time Commodities are difficult to create if the product itself does not have physical or tangible properties Commodities require legal status to have financial value When governments control the scarcity of carbon credits as a commodity, their financial values are</p>	<p>Crypto-assets cannot be classified as currency Poses risks for futures trading</p>	<p>Emission credits/offsets subject to validation, verification and audit standards Emission offsets and credits can only be held by the person responsible for using it, and can only be used once (<i>Reg</i>, ss. 19(1)-19(2)) 8-year window for emission offsets to be applied from when the reduction occurred (<i>Reg</i>, s.19(1)(f)) Emission performance credits may only be used in the subsequent year from when they are created (<i>Reg</i>, s.19(2)(a)) No liens or encumbrances can be registered against emission credits (<i>Reg</i>, s.47(3))</p>

¹³² Yam, *supra* note 128.

			depressed ¹³³		
System of Exchange	Torrens system (certificates of title maintained by Land Titles Office)	<p>Personal Property Registry (just requires names and addresses of parties, description of collateral, duration of registration) Interests can be registered in advance of the security agreement being made or the security interest attaching</p> <p>Works differently than a title registry (in PPR, absence of other registrations allows parties to move forward and advance funds; opposite is the case with title registries)</p>	<p>Commodity exchanges are recognized by the <i>Securities Act</i> (e.g. Chicago Mercantile Exchange is the exchange for cattle and lean hogs)</p> <p>Commodities could also be exchanged through alternative trading systems (ATSS), which are regulated independent marketplaces</p>	<p>Blockchain transactions governed by consensus and verification (no need for an intermediary or third party to administer ledger)</p> <p>Online exchanges can facilitate the secondary exchange of cryptocurrency (if they facilitate the exchange of securities, they must be registered as a marketplace under securities law)</p>	Alberta Carbon Registries (Alberta Emissions Offset Registry and Emissions Performance Credits Registry)
Insurance Provisions	Individuals who suffer a loss/fraudulent activity in the Torrens system can seek recourse through Alberta Land Titles Assurance Fund (6 year time period from date that loss occurred)	<p>No formal insurance provisions for collateral; however, different parties hold liability if issues arise</p> <p>If information is misrepresented by employees, the PPSA excludes liability unless the victim can demonstrate bad faith</p> <p>If there were omissions in the information entered, liability remains with the registrant unless it was an issue of inaccurate transcription</p>	<p>Some financial services providers are providing political risk and trade credit insurance for carbon credits</p> <p>One insurance product insures the value of carbon credits if the projects are deemed ineligible by regulatory bodies</p>	Growing private insurance market for crypto assets	
Bankruptcy/Ins	Property on title vests with	All of priority rules in <i>BIA</i>		Intangible property is the	

¹³³ *Ibid.*

olvency Implications	<p>trustee after a bankruptcy order or assignment has been filed with a receiver</p> <p>Trustee can sell, dispose of or lease property (<i>BIA</i>, s.30(1)(a)-(b))</p>	<p>are subject to rights of secured creditors (secured creditors can seize collateral from a defaulting debtor ahead of the trustee)</p>		<p>least negotiable in PPSA regimes; could create a disincentive to structure biodiversity credits</p>	
Key Considerations	<p>Since land titles are governed by provincial legislation, such an approach would be confined to property specific in Alberta (province-specific market)</p> <p>ES credits registered through Torrens system may result in less transferability (more static/difficult to exchange)</p> <p>Can complicate land transactions if credits are held by a third party¹³⁴</p> <p>A more temporary alternative could be transferable development permits to provide a framework for the scale of land use changes that can be used to offset changes to biodiversity¹³⁵</p>	<p>Land-related goods (fixtures, growing crops, minerals) can be classified as tangible personal property</p>	<p>Commodities can facilitate market growth</p> <p>Commodity exchange perceived to be more politically feasible for markets like carbon¹³⁶</p>	<p>Lack of federal/provincial regulations may make it difficult to move in this direction</p>	<p>Offset activities must have additionality (technical guidelines provided for how this is assessed); this can be particularly challenging for farmers/industrial actors to demonstrate</p> <p>Must use an approved protocol and be verified by a third party</p> <p>Offset activities must be real, demonstrable, quantifiable and measurable</p> <p>System of safeguards introduced to prevent duplication (inter-registry and intra-registry checks)¹³⁷</p>
Examples	<p>In some jurisdictions, carbon credits are part of the bundle of rights associated with property ownership. However, this approach can pose issues for compensation</p>	<p>Australia defines carbon credits as personal property that can be perfected and registered; this allows individuals to use their carbon credits as security for</p>	<p>The Carbon Trade Exchange provides an electronic platform to trade carbon credits in four currencies (GBP, EUR, USD, AUD) CLIMEX is another</p>	<p>IBM has developed a blockchain “green asset management platform” in China to provide a single, integrated ledger for the carbon emissions</p>	

¹³⁴ Zahar, Peel & Godden. *supra* note 109 at 350.

¹³⁵ Colin T. Reid and Walters Nsoh, *The Privatisation of Biodiversity? New Approaches to Conservation Law* (Cheltenham: Edward Elgar Publishing Ltd, 2016) at 226.

¹³⁶ Yam, *supra* note 128.

¹³⁷ Alberta Climate Change Office (2018). “Alberta Offset System”, online: < https://www.icao.int/Meetings/carbonmarkets/Documents/01_Session3_Hamaliuk_Alberta.pdf>.

	<p>if carbon credits are revoked by governments.¹³⁸ In Australia, the right to the benefit of carbon sequestration is registered through the Torrens system on land title. In New South Wales, carbon sequestration rights can be registered as a profit a prendre (note however that the validation of the interest is not dependent on registration).¹³⁹ Australian carbon sequestration approach required a standalone statutory “right” to carbon sequestration, rather than treating carbon sequestration as a “fixture” attached to land (a “fit for purpose” legal form).¹⁴⁰</p>	<p>a loan or other obligation In Canada, “lenders have traditionally not attributed value to carbon credits as collateral because of their so-called complexity, price volatility and lack of liquidity”; however, this could potentially be rectified with protocols and platforms to facilitate trading and regulation.</p>	<p>electronic platform to facilitate transactions of certified emission reductions (CERs), European Union allowances (EUAs), guarantees of origin (GOs) and verified CO2 emission reduction certificates (VERs)</p>	<p>marketplace <u>CarbonX</u> is a private sector example of tracking carbon emission reductions via blockchain.</p>	
--	--	---	---	--	--

¹³⁸ Reid & Nsoh, *supra* note 145 at 57; *Roseland Plantation LLC v US Fish and Wildlife Service et al*, 2006 US Dist LEXIS 29334.

¹³⁹ Zahar, Peel & Godden, *supra* note 109 at 363.

¹⁴⁰ *Ibid* at 349.