Sustainable Prosperity

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ENVIRONMENTAL MARKETS

Getting Biodiversity Offsets Right: A Research Agenda for Canada

Key Messages

- Biodiversity contributes to human wellbeing in a number of ways; human health benefits from clean air and fresh water, economic activity relies on nature to supply natural resources, and people derive enjoyment and spiritual value from being in nature and having access to recreation. However, biodiversity is in rapid decline, due in large part to pressures from economic activity like resource development and land-use conversion.
- Canadians want both economic activity and biodiversity. While the amount of resource development and economic activity forecast for the coming decade is substantial, there is a strategic window now, prior to development, to set biodiversity conservation goals and to implement policies that address the environmental impacts of economic activity.
- Biodiversity offsets have the potential to be used as one tool to help achieve biodiversity conservation goals. While Canada is generally lacking policy frameworks for biodiversity offsets, there is real world experience and practical knowledge upon which to build biodiversity offset policies tailored for Canada.
- In addition to moving forward now with biodiversity offsets where appropriate, ongoing research is required to ensure the best possible environmental and economic outcomes. This research agenda should be based on conservation science and should draw on interdisciplinary collaboration from political, financial, social, legal and economic experts. A starting point would be the 10 priority research areas identified by participants at the February 2014 conference ***Biodiversity Offsets in Canada: Getting it Right, Making a Difference***.

Sustainable Prosperity is a national research and policy network based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greener, more competitive economy. It brings together business, policy and academic leaders to help innovative ideas inform policy solutions.

The University of Ottawa's Institute of the Environment aims to build capacity in interdisciplinary research, teaching and community engagement to examine environmental challenges and develop integrated solutions. The Institute fosters interdisciplinary research and dialogue through collaborative initiatives, attracting visiting scholars and experts, and sponsoring conferences and seminars at the University and with partners in the National Capital and across the country.

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The Issue

Biodiversity – most simply defined as the diversity of life on Earth – contributes to human wellbeing in a number of ways. Our health benefits from clean air, fresh water and many other ecosystem goods and services; our economy relies on nature to supply natural resources such as timber, minerals, fossil fuels and others; and we derive enjoyment and spiritual value from being in nature and having access to recreation. According to the Convention on Biological Diversity, "at least 40 per cent of the world's economy, and 80 per cent of the needs of the poor, are derived from biological resources. In addition, the richer the diversity of life, the greater the opportunity for medical discoveries, economic development, and adaptive responses to such new challenges as climate change." [1]

In Canada, both our culture and our economy are linked to biodiversity: our economy is in large part underpinned by the extraction of natural resources while our cultural identity is often linked to our abundant biodiversity and large areas of wilderness. While Canadians want both economic activity and biodiversity, there will be trade-offs and difficult decisions to make as we determine what type of economy to have and in what type of environment to live.

Finding ways to reduce and mitigate biodiversity loss while supporting sustainable development requires that we develop bold conservation strategies and support them by implementing effective policy. It has generally been the case that economic development has preceded the establishment of biodiversity conservation goals and plans. And when goals and plans have been established, the policy tools used – such as traditional regulation – have often proven insufficient to achieve the desired outcomes, [2] due in large part to creating regulations with insufficient stringency and/or inadequate levels of resources, or due to flaws in implementation. As a result, Canada's track record of habitat and species protection, while not as poor as that of many other countries, has not been exemplary. [3]

Canada's Commitments to Biodiversity

Canada's federal government works closely with provincial and territorial governments, where responsibility for biodiversity conservation and sustainable use of biological resources is shared. Several provinces have developed their own biodiversity plans and commitments. Importantly, biodiversity conservation in Canada involves a range of stakeholders, including industry, private property owners, First Nations, Metis and Inuit communities and conservation organizations.

1 For more on the Convention on Biological Diversity, see http://www.cbd.int/

2 This is likely no fault of those tools in theory, but of the particular applications in which they've been used and due to an insufficient emphasis on biodiversity protection. Other existing conservation options include: education/awareness efforts, regulated bans/prohibitions, regulatory requirements, protected areas and parks, species at risk recovery plans, conservation easements, promotion of and/or payment for best practices in industry or agriculture, payments and fines for biodiversity loss or disruption.

3 In the Fall 2013 Report from the Commission of the Environment and Sustainable Development notes similar findings since 1998: "despite significant efforts over the years and progress in some areas, there is still much to be done to meet key legislative responsibilities, deadlines, and commitments." The report is available at http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201311_e_38658.html

In addition, the federal government is responsible for Canada's international commitments to the protection of biodiversity, including the conventions to which Canada is a signatory: the Convention on Biological Diversity (CBD), the Convention on the International Trades of Endangered Species of Wild Fauna and Wild Flora (CITES), the Convention of Migratory Birds (CMS) and The Convention on Wetlands of International Importance (Ramsar). While each of the four Conventions seeks to protect key aspects of biodiversity, the CBD is the most comprehensive and addresses the conservation of biological diversity, the sustainable use of its components, and access and benefit sharing of genetic resources. Canada was the first developed country to ratify the CBD in 1992, and is the host of the CBD's Secretariat.

Looking forward, the level of economic activity forecast for Canada over the coming decade is large – the energy and mining sectors alone are forecast to have planned capital expenditures of $650 billion over the next decade. [4] At the same time, Canada's population is expected to continue to grow, pushing urban centres to expand further. These pressures, coupled with an increasing public interest in the environmental impacts of resource extraction (such as has been seen with pipeline projects), means Canadians are presented now with an opportunity to engage in a conversation about how to best achieve our dual (and often conflicting) goals of biodiversity protection and economic growth.

Recent experience, in Canada but largely elsewhere, indicates that including new tools may be a way to improve the effectiveness of biodiversity protection in this context of economic growth. Like any challenging problem, to make the kind of progress needed will require not one solution, but many policies implemented jointly. Canadians would be wise to consider all available policy tools, including both traditional regulatory tools and market-based tools [5] such as biodiversity offsets. **Biodiversity offsets offer promise as one tool, among a suite of others, that could enable better protection of biodiversity than would otherwise occur under most existing processes, while promoting sustainable development.**

Canada, both federally and provincially, is generally absent frameworks that enable best practices on biodiversity offsets. However, there are lessons learned from both Canadian and international experience that can provide policy guidance. There are also areas where additional knowledge is needed that point to a research agenda for further work – work that will require input from experts from a variety of fields.

Biodiversity conservation is concerned with protecting both species and habitats. As such, biodiversity offsets includes offsets policies that protect habitat (e.g., wetlands, grasslands, forests) and/or species and populations (e.g., butternut trees, woodland caribou, pollinators).

4 Natural Resources Canada, Capturing the Opportunity: Realizing a Shared Vision for Canada's Energy and Mining Sectors, Government of Canada, August 2013. https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/www/pdf/publications/emmc/Capturing_Opportunity_e.pdf

5 Market-based policies include policies that use markets or prices to help encourage activities that lead to positive environmental outcomes and/or to discourage activities that lead to environmental degradation or pollution.

This Policy Brief references the small but growing body of knowledge on how best to use biodiversity offsets. It seeks to capture the state of the conversation about their appropriate use in Canadian contexts,[6] and it proposes ten priority points for additional research.

The Knowledge Base

The Causes of Biodiversity Loss

Within Canada, there are over 70,000 known species of plants and animals. The most recent *Wild Species* report assessed close to 12,000 of them and categorized 12% of them as "at risk" or "may be at risk".[7] These species are incredibly varied – the woodland caribou, the five-lined skink, the Blanding's turtle, the sage grouse and the pale-bellied frost lichen are all threatened or endangered; others, such as the karner blue butterfly have been extirpated in Canada, while still others, such as the Labrador duck, are extinct.

> "Biodiversity loss is a wicked problem – the challenge is complex, our information is incomplete, and the context is continually changing."

This Policy Brief includes unattributed quotes from conference attendees.

Biodiversity loss is a natural phenomenon,[8] but the rate of biodiversity loss currently seen is unprecedented and unnatural. The decline in the diversity of plant and animal species, the genetic diversity within species, population sizes, and the ecosystems upon which species depend is an ongoing and growing source of concern. Globally, one-third of all reef-building corals, a third of all fresh-water molluscs, a third of sharks and rays, a quarter mammals, a fifth of all reptiles, and a sixth of all birds are headed toward extinction.[9]

Beyond the existence value of biodiversity, the economic and social benefits obtained from ecosystems and biodiversity are immense. This is not merely an aesthetic or sentimental issue; humans are dependent on other species for a broad range of ecosystem goods and services (like air purification, crop pollination, and climate moderation), natural resources for economic activity, and social and spiritual values.

Ironically, despite the importance of biodiversity to humans, the current loss of biodiversity is unlike any previous decline in that it is primarily caused by human activity. The principal drivers of biodiversity loss – habitat loss and degradation, overexploitation, pollution, invasive alien species, climate change – are either constant or increasing in intensity.[10] All of these drivers have, in large part, an economic component to them. While some ecosystem goods and services can be renewable and sustainable at some levels of use and extraction, current levels are generally not sustainable; in essence, there are planetary bounds that limit how much nature can provide.

6 The Institute of the Environment at the University of Ottawa and Sustainable Prosperity organized a two-day conference, held at the University of Ottawa on February 13-14, 2014. The conference, Biodiversity Offsets in Canada: Getting Right, Making a Difference, brought together more than 100 delegates from across Canada, from government, industry, non-governmental organizations, and academics, to examine the drivers, opportunities and cautions regarding the use of offsets to protect biodiversity, with an emphasis on the Canadian context. All the presentations that were delivered, and a background paper, Biodiversity Offsets: A Primer for Canada, are available on the Institute's website at www.ie.uottawa.ca.

7 Further information is available from Environment Canada http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=37DB2E44-1

8 Biologists refer to the 'background rate' as the naturally occurring rate of species loss, generally thought to be on the order of one to five species per year, globally.

9 The story of the current loss of biodiversity is told clearly and compellingly to a generalist audience in "The Sixth Extinction: An Unnatural History" by Elizabeth Kolbert and in "The Once and Future World" by J. B. MacKinnon. The website of the Convention on Biological Diversity also contains a wealth of information: http://www.cbd.int/convention/

10 Secretariat of the Convention on Biological Diversity, Biological Diversity Outlook 3 (Montreal: Secretariat of the Convention on Biological Diversity, 2010)

Human activity is to blame for the recent accelerated loss of biodiversity, and yet our wellbeing depends to a large extent on what we are losing.[11]

Biodiversity Offsets Explained

> "Put on your rubber boots and bring the kids – wetland conservation is fun."

Finding ways to slow, stop or mitigate the loss of biodiversity will require setting more stringent policy goals supported by a suite of policies taken in concert. One possible element of this suite involves using markets to help put a price on environmental degradation. These policies, generally referred to as market-based instruments,[12] use markets to internalize external costs, thus building environmental costs into decision-making.

Biodiversity offsets are one such market-based instrument.[13] The most often cited definition of the concept comes from the Business and Biodiversity Offset Programme (BBOP), which defines biodiversity offsets as:

> [M]easurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. [14]

The conceptual basis is that development and human activity impact biodiversity where that activity takes place (which is often known as the development site or impact site) and that the negative impact on biodiversity can be compensated for by an equivalent or greater environmental enhancement on another site or sites (the offset site(s)). The BBOP definition also sets out a common goal of offsets:

> The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function, and people's use and cultural values associated with biodiversity.[15]

In essence, the project proponent (often a developer or resource extraction company) causing negative biodiversity impact compensates for that negative impact by securing a positive effect on biodiversity on another site, where the positive effect is at least as big as the negative. Different policies allow different ways of achieving a positive impact – some allow for restoring degraded land to previous level of ecological integrity, while others allow for ensuring protection of land with strong ecological integrity.[16] Still others may protect a species explicitly, for example, by requiring a set number of trees of a given species to be replanted for each one felled.[17]

11 To complicate matters, we still have a fairly rudimentary understanding of individual species and broader ecosystems. The total number of species in existence is unknown, and the impacts of habitat loss on particular species and ecosystems (and the cascading impacts of species loss on ecosystems) are not often well understood. As much as our economic activity is impacting biodiversity, we do not always fully understand how great our impact is. This fact is often used to argue for erring on the side of precaution when considering biodiversity loss.

12 While market-based instruments are often viewed as an alternative to traditional regulatory approaches, market-based instruments are often created by regulation.

13 Biodiversity offsets are also known by other names. Canadians often use the term conservation offsets; with essentially the same meaning, Americans use the term compensatory mitigation. Environment Canada has recently added the term conservation allowance, which is virtually synonymous.

14 Business and Biodiversity Offset Programme, To No Net Loss and Beyond: an Overview of the Business and Biodiversity Offsets Programme (Washington: Forest Trends, 2013) at 4, online: BBOP <http://www.forest-trends.org/biodiversityoffsetprogram/guidelines/Overview_II.pdf>. The Business and Biodiversity Offset Programme ("BBOP") is an international collaboration of more than eighty companies, financial institutions, government agencies, researchers, and civil society organizations working to establish and promote best practices. For more, see BBOP's website at http://bbop.forest-trends.org

15 Ibid at 4 [emphasis added]

16 The latter may allow greater ecological integrity than the former; however, protection of existing habitat may not be seen by all as additional (see Table 1 for description of additionality).

17 Additional variations are possible.

The reasons why companies undertake biodiversity offsets vary – offsets can be undertaken voluntarily or can be a regulatory requirement imposed as a condition of approval prior to receiving a permit for a specific project (such as a new residential or commercial development, or a new mine or pipeline). Similarly, the creation of the offset itself can take different forms: conservation measures leading to offsets may be undertaken directly by the person causing the biodiversity loss or may be undertaken by third parties and then made transferable to developers, thus creating a market in banked offset credits. A third alternative, not strictly an offset, is the payment of a fee into a fund dedicated to conservation. The common concept is one of compensating for biodiversity loss from human activity by causing a positive impact on biodiversity elsewhere.

Figure 1: How Biodiversity Offsets Work

A company wishes to develop a piece of land for commercial use, cutting down trees and destroying habitat for biodiversity

In order to proceed with the commercial development project, the company secures an offset - in which habitat is recreated as a form of compensation

When a developer pays for land or secures rights to use land, the developer pays for the land itself, but converting that land from a natural state creates a loss of biodiversity that is borne by society at large and is not reflected in the price of the land. Well-designed offset policies transfer the financial cost of the biodiversity loss to the party causing the loss; that is, they internalize the cost of the environmental harm. By having the developer take on the cost of compensating for the loss to nature that the developer has caused, this cost is incorporated into the cost of the development project. In the absence of doing so, the loss of biodiversity is borne by nature and all those who depend on it.

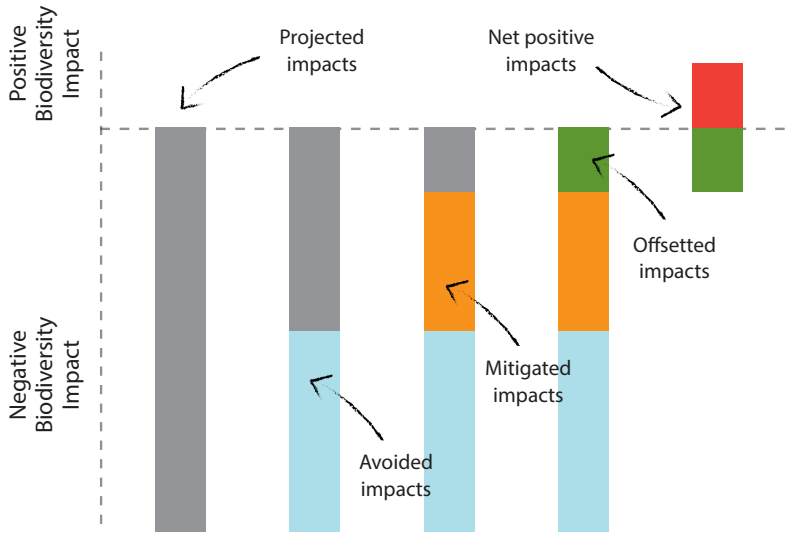
A key benefit of market-based policy instruments such as offsets is that they allow both offset purchasers and offset creators flexibility. Developers will look at the cost of complying with offset requirements and will factor that cost into project costs, ultimately deciding whether or not to proceed with their proposed project or whether to redesign the project to lessen biodiversity impacts. Offset creators will consider the going market rate for offsets and will decide whether or not to create offsets based on the costs to create an offset and the market price. In theory, when policies are well designed, the resulting market values will reflect the cost of biodiversity loss. In practice, the price of the offset will depend in large part on the stringency of the offset system and the conservation goals it supports, in addition to other factors such as transaction costs.

A Role for Biodiversity Offsets

Biodiversity offsets are just one tool to use in mitigating the environmental impact of development activities. Before relying on offsets to compensate for negative biodiversity impacts, those impacts should first be avoided as much as possible, then minimized by all reasonable measures, including on-site rehabilitation and restoration. At that point, any residual impact (that is, any development impact not avoided or minimized) may be a candidate for compensation via offsetting.

This sequence of ***avoid – minimize – offset*** is known as the mitigation hierarchy. **Generally, offset policies require that offsets should only be turned to as a last resort and are only used to address the residual adverse impacts that remain after all has been done to avoid and minimize negative impacts.** Figure 2 illustrates this concept. As a project moves along the mitigation hierarchy, starting with no mitigation and ending with offsets (shown in moving from left to right on the diagram below), the negative impact is increasingly mitigated. In some situations, a net positive impact may be achieved. [18]

Figure 2: Steps in the Mitigation Hierarchy



Biodiversity offsets are not meant to provide an excuse to a developer for failing to exercise due diligence to avoid and minimize a project's impact or to justify proceeding with questionable development projects. The starting point for decision-making should be whether or not the project is desirable, and whether or not conservation goals can be achieved if the project proceeds. In sum, offsets are a tool that can be used when a project is deemed to be desirable AND where, even after the first steps in the mitigation hierarchy have been completed, a residual impact remains that scientific analysis indicates can be made acceptable by having a positive impact elsewhere.

> Due to high ecological risks, some things really aren't offsettable.

18 Seeking to have a net positive impact is generally achieved by policies that apply a multiplier to offsetting requirements (see Table 1 for more information on multipliers) or which apply additional conservation measures, such as education programs or outreach.

Table 1: Key Principals of Offset Design

There are many design questions and program features to be decided when establishing a biodiversity offsets policy. Each one is complex and their interation even more complex.

EQUIVALENCY	How closely do the ecological features of the offset site need to match/replicate those of the impact site?
CURRENCY	What is the unit being traded (e.g., a hectare of habitat, a number of individuals from a species, or amount of habitat for a particular species)?
ADDITIONALITY	Are the outcomes produced at the offsetting site in addition to what would have occured anyway?
TIMING & DURATION	How long-lived (or permanent) are the offsetting site impacts (are they expected to last as long as the development site's negative impacts)?
UNCERTAINTY & RISK MANAGEMENT	Due to the complexity of biodiversity and the challenges inherent in all the other design features listed here, how will environmental performance risks be managed? Is a multiplier a tool to address those risks (see below)?
USE OF A MULTIPLIER	Given the ecological risks inherent in trying to compensate biodiversity loss, should a multiplier be applied such that for every unit of the currency lost (e.g., an acre), more than one must be replaced?
OFFSET AVAILABILITY	If a policy requires offsetting, will the policy also ensure (or facilitate) the creation of offsets?
COMMUNITY & STAKEHOLDER ENGAGEMENT	How will interested and impacted communities, stakeholders and citizens be engaged?

For additional information refer to "Biodiversity Offsets: A Primer for Canada," available at **www.ie.uottawa.ca**

Biodiversity Offsets in Canada

Canadian Context

The Canadian context for offsets is unique – in reality, given the complexity of Canada both ecologically and politically, there are numerous different Canadian contexts.

Canada's geography includes dense urban centres, agricultural lands, rural communities and large pieces of near-pristine habitat, encompassing ecologically unique areas and species, and habitat in both land and water (fresh and marine). Canada has the second largest landmass and the longest coastline of any country.

Despite this large landmass and a low-density population, Canadians' impact on the land extends substantially beyond the human settlement footprint. We extract large amounts of natural resources such as timber and other forestry resources, oil and gas, minerals and metals, with many sites in remote areas requiring extensive access corridors. Land is used for sprawling urban communities, agricultural production, industrial sites and roads. As noted earlier, Canada's population is expected to continue to grow, and the level of economic activity forecast for Canada over the coming decade is large – the energy and mining sectors alone are forecast to have planned capital expenditures of $650 billion over the next decade.

Jurisdiction (federal, provincial and local) over this land and over economic activity is overlapping and the interaction of different regulations and policies can be complex and unclear. Environment and natural resources fall within provincial jurisdiction, and provinces are generally in control of economic activity within their borders. Some resource use activities like fisheries fall within federal jurisdiction. Jurisdiction on energy projects depends on location – projects limited to one province fall within that province's jurisdiction, while the National Energy Board regulates inter-provincial and international projects. Wildlife and species at risk are within provincial jurisdiction, but there are notable exceptions, including migratory birds, aquatic species and habitat on federal lands. And close to 90% of Canada's landmass is Crown Land. First Nations, Inuit and Metis peoples have a special relationship as stewards of the land. Treaties signed by Aboriginal communities cover almost half the Canadian landmass. Governments have a duty to consult with First Nations when a considering action that could affect the First Nation's rights.

Canadian Opportunities

There may be opportunities to apply biodiversity offset policies in Canada that might not be available to all other countries – such as the creation of new protected areas through the protection of existing quality habitat (in lieu of rehabilitation of degraded habitat) by aggregating offsets in one high-priority geographic area. Similarly, it may be possible to aggregate marine offsets in localized areas in order to increase the number and size of marine protected areas in Canada; while Canada has the longest coastline in the world, only 1.3% of it is currently protected.

The patterns of development in Canada – which often include long access roads through otherwise undisturbed habitat to reach smaller resource extraction sites – may also open opportunities for Canada to consider offsets differently than some other countries have done. When otherwise large and contiguous habitat is disrupted in this way, the aggregate impacts of development require particular consideration. For instance, opening a road to access one site may have a relatively small impact on habitat initially, but over time, that road allows additional resource extraction activities to take place and recreational users such as hunters and snowmobilers gain access – all impacting nature beyond the scope of the initial project that required the road. In addition, resource access corridors can encourage the spread of invasive species, particularly plants.[19] Giving consideration to the cumulative impacts of development on biodiversity points to the importance of looking more broadly and more long-term at what conservation and land use goals should be set for larger pieces of land. Canadians risk making decisions without full information if we consider projects one at a time, from a short time-horizon, without considering projects' impacts beyond the narrow geographic borders of project sites. In taking a broader perspective on land-use, habitat and species, projects could be considered in the context of our larger goals for conservation and economic activity.

> "Offsets are a new tool, so offset policies require that we seek continuous improvement in program design."

Additionally, the possibilities for Aboriginal communities to take leadership positions in offset creation in Canada are unique. Carbon offsets provide initial examples in which Aboriginal communities become offset creators, to the benefit of local communities' environment and their economic base. This goes far beyond simple consultation and engagement with Aboriginal communities – instead, Aboriginal communities have the potential to take leadership roles and be active offset developers. Aboriginal communities can also be engaging in and leading conversations about whether and how to use offsets.

Canadian Experience

While Canada is lagging many other jurisdictions in practical experience with biodiversity offsets, (particularly given our land size, level of economic activity and potential for offset use), some biodiversity offsetting is already taking place in Canada. While few of these programs have been active sufficiently long to have been assessed against the conservation goals they were created to support, they form an important first experience.

Federally, offsets (though often under another name) appear in different ways in various pieces of legislation. For instance, recent changes to the federal *Fisheries Act* allow offsets where projects negatively impact fish or fish habitat and would otherwise negatively impacting commercial, recreation or Aboriginal fisheries; [20] the Federal Policy on Wetland Conservation[21] requires adherence to the mitigation hierarchy; and the federal *Species at Risk Act* allows limited used of offsets (under the term 'conservation allowance') when the offset activity would support the *Act's* goals.[22]

19 Meunier, G and Lavoie, C., "Roads as Corridors for Invasive Plant Species: New Evidence from Smooth Bedstraw" Invasive Plant Science and Management, 2012

20 For more information, see http://www.dfo-mpo.gc.ca/pnw-ppe/changes-changements/index-eng.html

21 Available here: http://www.collectionscanada.gc.ca/eppp-archive/100/200/301/environment_can/cws-scf/occasional_paper-e/n110/html/publications/abstractTemplate.cfm@lang=e&id=1023

22 For more on conservation allowances, see http://www.ec.gc.ca/ee-ea/default.asp?lang=En&n=DAB7DD13-1&printfullpage=true

These federal provisions for offsets are generally administered under environmental assessment and permitting processes. The National Conservation Plan, released in May 2014, is silent on biodiversity offsets.

Several provinces have regulatory and policy regimes incorporating the mitigation hierarchy and the concepts of habitat offsets or compensation, and more are under development. They mostly apply to specific types of ecosystems, such as wetlands. For instance, Alberta's recently released Alberta Wetland Policy includes provision for offsets; British Columbia's new *Water Sustainability Act* is expected to come into force in 2015 and the regulations supporting it are under development; and *Ontario's Endangered Species Act* allows for a form of offsetting through the use of 'overall benefit permits.'

Although offset mechanisms can be found in various policies and pieces of legislation in Canada, implementation is in early stages and policy-makers and program operators are still interpreting what the policies mean for how these mechanisms work in practice. While many are cautiously optimistic that they will achieve positive outcomes, it remains too early to say conclusively if they are indeed being applied in ways that support conservation goals and protect biodiversity and habitat.

The case for (and against) offsets

Given the complexity and diversity of ecosystems and the variety of economic contexts, biodiversity offsets policies will never be a one-size-fits-all tool; each policy will be unique. They will be most successful where tailored to their local context, where there are drivers for offset supply and demand (such as sufficiently stringent conservation policy), and where environmental outcomes are most likely to be achieved. It is also important for transparency and credibility that the environmental outcomes are measured, monitored and reported. The design principles outlined earlier should be considered carefully.

> "Every single offset is an experiment."

Measuring and monitoring offsets' ecological performance is not simple. Like any policy, program or project analysis, judging performance requires knowing what would have happened in the absence of the activity and establishing this as a baseline, which is challenging for both the economic and ecological systems. Then the impacts must be measured and monitored, and ideally, an evaluation undertaken to determine which impacts were attributable to the activity. With biodiversity offsets, this is particularly challenging given that in projects involving restoration, the outcomes may not be known for decades. While it is incredibly difficult to know how successful offsets really have been, the examples that are considered the most successful generally include meaningful requirements for measurement, monitoring, and reporting – and adequate resource levels to do so.[23]

23 A project that is generally seen as successful is a Rio Tinto project that aims to achieve a net positive impact around a mining site in Madagascar. Details are available here: http://www.thebiodiversityconsultancy.com/wp-content/uploads/2013/06/Leaflet-IUCN-Rio-Tinto-NPI-Case-Study_Madagascar.pdf. At a program level, the Bushbroker native vegetation program in Australia is considered successful. Additional details are available here: http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/native-vegetation/native-vegetation-permitted-clearing-regulations/native-vegetation-offsets/bushbroker

And while success is hard to prove unequivocally, case studies show there have been a number of programs that can provide useful guidance.[24] For instance,

- Ontario's experience with endangered species offsets shows that landowners are interested in participating in these emerging offset markets. The province of Ontario's particular focus on learning-by-doing and continual improvement in the policy is also laudable.
- The Willamette Partnership in the Willamette River basin area of Oregon has developed best practices in stacking offsets from various ecosystem services, and in verification and reporting protocols. Other jurisdictions can take these protocols as a useful starting point;
- Australia and the United States have seen the emergence of large-scale offset creation banks that have been shown to significantly reduce transaction costs, allow for pooled insurance (in case of failure for environmental outcomes to be achieved) and facilitate landscape-level planning;
- In Canada, the Assiniboine Wetland pilot project in Saskatchewan uses a reserve auction mechanism to determine which parcels of farmland will be restored to wetlands (based on a measure of cost per unit of environmental benefit), providing an interesting model for others to consider; and
- The Canadian experience with carbon offset credit creation in the Great Bear Forest Carbon project in which the local Aboriginal community took leadership can serve as an example for a similar role for Aboriginal communities in biodiversity offsetting.

These programs – and many more – have relative strengths and weaknesses that provide relevant lessons for Canada. As noted earlier, the greatest fallibility is our inability to say with certainty that these programs have had a positive (or at least not a negative) impact on species and habitat.

The challenge of biodiversity loss is of so large a scale and of such large importance that every policy tool should be considered. Where scientific understanding is lacking, greater research is needed and precaution can be a guiding principle. When species at risk are involved, the ecological risk is much greater and a greater scientific burden of proof may be required, and any action should be in direct support of species' recovery plans. In some cases, biodiversity offsets may not be appropriate.

Putting a price on biodiversity loss may be controversial to some; however, failing to put a price on biodiversity loss risks putting no value on it. Certainly, in the absence of any constraints on development, biodiversity offsets are an improvement over what would have happened otherwise. A goal of no net loss (and possibly, net gain) could represent a net improvement for biodiversity.

24 Additional case study analysis can be found in "A Study of Canadian Conservation Offset Programs: Lessons Learned from a Review of Programs, Analysis of Stakeholder Perceptions and Investigation of Transaction Costs" by Warren Noga and Vic Adamowicz available at http://sustainableprosperity.ca/article3925.

A 10-point Interdisciplinary Research Agenda

IN ORDER TO ACHIEVE POSITIVE OUTCOMES FOR SPECIES AND HABITAT IN CANADA, IT IS IMPORTANT TO SET MEANINGFUL GOALS FOR BIODIVERSITY CONSERVATION AND TO SUPPORT THOSE GOALS WITH STRONG POLICIES. BIODIVERSITY OFFSETS COULD BE ONE OF THOSE POLICIES.

Finding the best ways to use biodiversity offsets in Canada will require continuing the conversation on their appropriate use, undertaking additional research on species and ecosystems, learning about program design from the experiences of others, and building expertise by focusing on areas of particular importance. Undertaking work in these priority areas will increase the likelihood of designing good policies, which in turn helps build both the political support for sufficiently stringent biodiversity conservation and social license for business's use of biodiversity offsets.

1 Building common language

The definitions, vocabulary and messages that are used in conversations about biodiversity and offsets matter. With different disciplines and interest groups engaged, there is a need for a common vernacular, one that speaks to Canadians. Common language facilitates collaborative work.

2 Building the science-basis for decision-making

Better understanding the science of species, individual populations, and larger ecosystems is critical in supporting good decision-making. This is particularly important for species at risk, where the stakes are higher. For species at risk, the species' recovery plan should be the key guide in how offsets could be used. If policies require that a higher burden of scientific proof is needed in order to use offsets when species at risk are involved, what does this mean from a practical perspective? It is difficult to be informed in decision-making and balancing risks without investing in science in order to understand what is at stake.

3 Involving stakeholders and partners from the outset, with a special role for Aboriginal communities

Successful biodiversity offset projects often point to inclusive and transparent stakeholder engagement as essential. The stakeholder and partner engagement process matters. For Canada this includes finding the best practices on how to involve Aboriginal communities – including as offset creators, stewards of land and key leaders in the conversation on best use of offsets. It also means seeking to understand the complex jurisdictional challenges facing developers and business interests and providing a level playing field with certainty in rules and regulations.

4 *Defining our biodiversity goals – What is success?*

Given the loss of biodiversity already experienced, combined with the pace of land-use change and planned development, the risks facing biodiversity are high and increasing. For Canada, what is our desired outcome? If it is no net loss (or even net improvement), what does that mean, how far should it go, and who bears the cost of offsetting above and beyond no net loss? This relates to the question of what no net loss means in offset projects that involve conservation or protection in lieu of rehabilitation or re-creation – with Canada's large land mass, many parts of which are still relatively undisturbed, can offset policies allow for protection of habitat, particularly when giving up a small piece of habitat for development could secure a larger piece for protection?

5 *Considering the larger landscape*

both the biodiversity landscape and the policy landscape – Individual populations, species and ecosystems exist in a larger landscape. Where project sites and offsets sites are situated matters. Gaining a landscape-level view of the impacts on biodiversity, including the cumulative effects of development, requires consideration of large areas of land. This requires devoting resources to undertaking sound biodiversity mapping.

Having a greater understanding of the ecological landscape enables setting better-informed goals for species and habitat. This will enable decision-making that is broader than the more-limited scope of current environmental impact assessments and facilitate land-use planning for areas larger than an individual development site.

In turn, making decisions informed by a broader point of view facilitates choosing the best suite of policy options to support achieving the biodiversity goals. This entails discussion of the mitigation hierarchy (see point 6 below), the stringency of the conservation goal (point 4), the tools to use, and the role of biodiversity offsets as part of the solution. It may also entail discussion of how best to align biodiversity offset funding with conservation priorities.

6 *Understanding the mitigation hierarchy*

Although the mitigation hierarchy is clearly defined conceptually, its interpretation with respect to specific projects can be much less clear. It is not generally clear-cut when avoidance and minimization have been fully exhausted and the stage of compensation and offsetting has been reached. [25] Biodiversity offsets are a long-term experiment, with ecological risks, and will not be an appropriate policy tool in all situations.

25 There is also need for a discussion about whether there are circumstances in which offsetting could come earlier in the mitigation hierarchy – for instance, in a case in which a large multiplier is used or where the costs of minimizing far outweigh the benefits of offsetting.

7 *Considering risk-management as part of smart program design*

Given the uncertainty in both the short-term and long-term results of the ecological (and economic) outcomes of biodiversity offsets, program design is in many respects an exercise in *risk-management*. Viewed as such, key design questions will require consideration in the Canadian contexts – both legal and ecological. Key risks to consider in Canada include:

- Risk of inaccurate or poor baseline information (including baseline information for the impact and offsets site(s) and/or for particular species or populations), which requires investment in science and in measurement and monitoring protocols.
- Risk of not achieving the expected environmental outcome due to uncertainty regarding equivalence and/or a failure to prove additionality from the offset project, which may be seen as an argument in support of the adoption of multipliers for addressing specific issues of performance risk.
- Risk that environmental outcomes will not be achieved or maintained due to the challenges of restoration science, or offset site management failures and/or external factors such as fire or climate change, which argues for exploring the best rigorous adaptive management practices.
- Risk of biodiversity loss is particularly important in high-risk situations, such as those involving species at risk or key pieces of habitat critical to a population's health, which argues for pursuing a discussion about how offsets may (or may not) be appropriately used to support broader conservation goals and species' recovery plans, and if so, what particular policy design elements would be required.

8 *Considering the interaction of different offset types*

Rehabilitating and protecting habitat can have benefits beyond biodiversity – for instance, carbon may be sequestered or water quality improved. When one project creates multiple ecosystem benefits, policy questions arise regarding how to stack those different types of offsets. The more types of offset credits created, the higher the value for the offset project operator, however questions of additionality and double counting arise. On the other hand, an action that benefits one species or ecosystem service may have detrimental impacts on another. Some existing offset programs have addressed these question and may be a good starting point for a Canadian discussion on stacking.

9 *Exploring legislative and regulatory regimes and the potential for offsetting on public lands*

Understanding the legislative and regulatory regimes in which project and land management decisions are made is a critical input in determining how best to use biodiversity offsets in Canada. Doing so, for each jurisdiction, would help show the potential for offsets and also identify what barriers may prevent their use – therefore identifying what legislative or regulatory reform would be needed to enable offsetting. An additional area of focus could be on the uniqueness of Crown Land.

- Almost 90% of Canadian land is Crown Land. Significant potential exists for offset sites to be located on land controlled by the federal or provincial governments. The experience in creating carbon offsets on Crown land can be a starting point for digging further into the ecological and economic potential for biodiversity offsets – and biodiversity offset banks in particular – and for understanding the complexity of regulatory and legislative regimes and the unique role for Aboriginal communities.

10 *Exploring economic issues and their links to design options*

Exploring questions of transaction costs, market-power, issues of scale and other economic considerations can help guide policy and program design. For instance, the landscape choice affects the economic and social aspects of the program design. This has been seen with international experience that heavily favours developing offset banks because of some key potential benefits: lower risk of not achieving environmental outcomes, greater possibility for taking a landscape view (see point 5 above), lower transaction costs and strong stakeholder support and relationships among participants.

Implications for Policy-Makers

Canadians have an opportunity now, prior to the next decade of major economic development, to define broad goals for conservation and to develop the suites of policy tools that will provide the best chance at successfully achieving those goals. Setting goals and developing policies to reduce and mitigate biodiversity loss will rightly create some constraints and impose some costs for activities that are currently largely unconstrained and uncosted. Using tools like biodiversity offsets, where they are appropriate, could potentially play an important role in achieving these goals in a way that is flexible and will enable sustainable development.

While biodiversity offsets show promise, Canada's experience with them is relatively new and remains a long-term experiment; it is therefore important to continue the efforts currently being undertaken in biological and ecosystem science, political science, law, economics, business and other fields that aim to better understand the benefits, limitations and appropriate use of biodiversity offsets.

To ensure that policy development is based on the best possible information, Sustainable Prosperity and the Institute of the Environment are suggesting a 10-point research agenda. This agenda was developed on the basis of contributions made by participants at the *Biodiversity Offsets in Canada: Getting it Right, Making a Difference* conference.

Pursuing this research agenda is crucial. But the main message from conference participants is that while it is important to proceed with caution and to ensure continual learning and improvement, given the ongoing and increasing wave of development and the irreversibility of many aspects of biodiversity loss, there is a need to act now. **With the current body of knowledge, there is sufficient know-how upon which to build goals, policies and programs, taking existing systems and frameworks and tailoring them to the Canadian contexts.**

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