



ECOSYSTEM SERVICES & BIODIVERSITY SCIENCE SYMPOSIUM



PANEL DISCUSSION SUMMARY

SEPTEMBER 16, 2015 1:00-3:00 PM

On September 16th, the Alberta Biodiversity Monitoring Institute (ABMI) hosted a science symposium on Ecosystem Services and Biodiversity. The purpose of the Symposium was to share emerging knowledge of ecosystem services and biodiversity, with specific application to challenges and opportunities in Alberta. Monitoring, assessing and valuing ecosystem services and biodiversity in a growing province like Alberta is a big challenge for environmental managers and decision makers, especially those ecosystem services that lack clear economic value. While regulatory approaches will continue to be an important part of Alberta's environmental management system, market approaches can also promote actions such as restoration and protection, conservation and stewardship. Market approaches can provide economic incentives to avoid or minimize the loss of ecosystem services and biodiversity caused by development. Both regulatory and market approaches need reliable knowledge of where ecosystem services are provided, who benefits, and how they are affected by people and ecological processes.

Presentations from the morning Symposium are available on the Ecosystem Services Assessment Project website - [here](#).

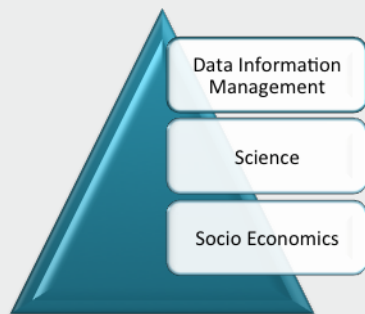
A brief summary is also available in Appendix A.

Following the presentations, the afternoon workshop session consisted of a panel discussion with the goal of identifying emerging questions, research gaps, and opportunities in the field of ecosystem services and biodiversity. We asked our expert panel of speakers a series of questions related to knowledge, data and capacity gaps, engagement of policy and decision makers in the science, and building credible information for cultural ecosystem services. Panel member responses combined with questions and contributions from the audience resulted in a wide-ranging and informative discussion.

Find out who participated in Appendix B.



In 2010, Alberta Innovates Bio Solutions brought key stakeholders together to lay the foundation for a coordinated and innovative approach to ecosystem services and the application of market-based instruments in environmental management in Alberta. The resulting Ecosystem Services Roadmap describes knowledge, information and capacity and identifies key actions needed to close these gaps. The Roadmap defines three foundational programs required to create a functioning regulatory and market system based on ecosystem services: Biophysical and Ecological Science, Socio Economics, and Data and Information Management.



Program leads have been working together to share project information and align initiatives to ensure the Roadmap moves forward in a cohesive and strategic direction. The Alberta Biodiversity Monitoring Institute leads the work on biophysical and ecological science, Alberta Innovates Technological Futures leads the work in the field of socio-economics and Silvacom Ltd. leads in data and information management.

Stakeholder consultation in 2013 identified the need for pilots and case studies that demonstrate how markets can help achieve environmental outcomes. A Proof of Concept program describes the system required to implement an ES approach to resource management. It includes actions such as smaller scale pilots to test market-based instruments, discussion papers, frameworks and options to support decision making and also recommends protocols and approaches for assessing ES.

As a leader in biodiversity monitoring, the ABMI is building on its province-wide monitoring and information system to address gaps related to the measurement, mapping, and valuation of ecosystem services and biodiversity. Through the Ecosystem Services Assessment Project, ABMI has expanded its network of professionals and academics from a range of disciplines to develop systems to map and assess ecosystem services across Alberta. This will help us to better understand how planning and management decisions affect the environment-related benefits to Albertans.

In the first phase of the project (2012-2015), we mapped the supply and economic value of five ecosystem services in Alberta using a set of spatially explicit models: water purification, timber production, forage production, carbon storage, and pollination. We've also mapped the ABMI's Biodiversity Index, drawing from the ABMI's extensive province-wide biodiversity data, to estimate how overall species respond to different types and amounts of human footprint. The second phase of the project, beginning in 2015, will demonstrate applications of ecosystem service information for use by land managers, and will incorporate this knowledge into market-based instruments for environmental management.

Given the objectives of the second phase of the Roadmap, we convened a panel discussion to help set the research agenda priorities and to obtain feedback on our work to date and our approach moving forward.

SUMMARY OF PANEL DISCUSSION

1. ADDRESSING CAPACITY CHALLENGES, SCIENCE GAPS AND IMPLEMENTATION BARRIERS RELATED TO ECOSYSTEM SERVICES AND BIODIVERSITY.

LEADERSHIP

In this field of study, it is a challenge to find collaborators and experts with interdisciplinary interests and the capacity to catalyze and lead interdisciplinary work. ABMI has made significant progress in engaging a diverse group of collaborators in a variety of research areas, but Alberta could benefit from an "Ecosystem Services Research Chair" to assist in the leadership of biophysical and socio-economic innovation and research. The Chair would share the responsibility of mobilizing collaborative decision making, and application of ecosystem service knowledge. There is a need to better understand the business models, the governance rules, and the policy mechanisms that could support successful implementation of ES knowledge in land use planning and management. Leadership is needed to identify key research questions, engage stakeholders, and assist in the design of operational programs.

Continuous leadership in connecting policy, science and data is key to the successful implementation of ES systems. Networks and activities need to be connected and coordinated globally, regionally and locally, with clear objectives and goals, and to help us move forward to assess, evaluate and identify the remaining gaps.

PROGRAM EVALUATION

There is a clear need to evaluate past programs, pilot studies, and experiences related to ecosystem services and market approaches. Exploration of lessons learned and strategies that have created success will help build future programs. There was a strong call for more pilot projects that include a comprehensive evaluation component. Evaluation should be planned at the outset of the program and is based on the goals and objectives. These objectives can be many and varied, from environmental management objectives to health gains in a community to attitudinal changes of stakeholders.

OUTREACH

Communication and outreach materials should demonstrate how the science can be used in programs that benefit community stewardship and sustainability efforts.

DATA

Useful, credible, relevant data remains a limitation for researchers, and often comes with a hefty price tag. When considering data as a gap, we should consider the efficacy and efficiency of the data collection method relative to the data need: in some cases, field sampling may be required, in other cases data collected through genetic testing, UAV- or satellite-based remote sensing, and sensor networks might be most appropriate. For ES approaches to work, they must be cost-effective, so science advisors are tasked with identifying the data that are most essential for modeling, measuring and evaluating.

GOALS & OBJECTIVES

Before starting new research and pilots, the goals and objectives should be clearly articulated. Goals will vary among stakeholders, but through appropriate processes common ground should be found before research efforts or program pilots are undertaken. Stakeholder goals for ES-related projects and programs may vary from maximizing profit to biodiversity conservation, or some combination thereof. Stakeholder motivations may range greatly as well, from the need for a social licence to operate, to the desire to provide broader benefits to society. Once the goals and objectives are established, programs can be designed that test the goals experimentally through pilots.

2. HOW CAN GOVERNMENTS USE ECOSYSTEM SERVICE INFORMATION, RESEARCH, INNOVATIVE IDEAS IN POLICY AND DECISION MAKING?

POLICY

Integrating ES information and research into decision making can happen at all levels of government. Consider, for example, the significant gains made possible by the actions of local government without any action by higher levels as they have the ability to make decisions relatively autonomously and quickly. Also many local governments are leading the way on involving stakeholders and implementing beneficial practices; providing them with information to better understand biodiversity, ES and their communities' relationships with the environment at a practical level will have a big impact. Improved sharing of these case studies and success stories would go a long way to increasing implementation of ES-related practices and programs at the local or municipal level.

The provincial government is encouraged to develop an ES policy framework that recognizes where an ES approach can benefit decision making and the achievement of environmental outcomes. At the provincial level, there are lessons from municipal-level programs that are already underway that should be incorporated into such a policy. Although higher levels of government want a high level of certainty that a policy framework would avoid unintended losses or consequences, there is also a sense of urgency to act now and many local governments are doing so.

An important role for academia is to establish general principles that all levels of government may use. It might not be cost effective to solve local problems on a case-by-case basis, but principles, applied broadly, may be useful in planning and resource development. However, the involvement of scientists working on issues important to local communities is essential for an injection of practicality into academic research and for building understanding from the ground up.

There is a demand for information regarding valuation of biodiversity and ES, in particular information that can be used directly by planners and decision-makers. Researchers should also consider the valuation of benefits beyond environmental outcomes, such as health and stakeholder attitudes, that can be equally as important to governments. Quantifying and communicating dollar values to those that think in terms of economic value has a significant advantage to government decision making.

MONITORING

Monitoring and reporting is an essential component of any regulatory or market-based ES or biodiversity conservation program. However, government should consider how the design of regulation and conservation programs may in fact help them reduce investment

in environmental monitoring. Regional monitoring is essential, but environmental monitoring for every transaction may not be, if you have confidence in market forces and metrics. Specific research data, although expensive, helps to establish baseline information that can be used in the development of general principles and adapted into cost effective monitoring. For example functional diversity is potentially useful avenue as we look for redundancies and flexibility in the area of biodiversity. New technologies such as genetic surveying methods should be watched as they rapidly evolve and become less expensive (e.g. DNA surveying for flowers pollinated by bees, or other approaches to environmental DNA collection and analysis).

The notion of citizen science is growing in popularity, as volunteers are engaged in meaningful opportunities to collect information. Scientists might need to consider altering their views of what are acceptable levels of confidence and share results that have higher margins of error in order to facilitate conversation and learning in the wider community. There are many organizations, societies and community groups willing to become involved in monitoring ecosystem services and other data collection, given a little direction.

3. HOW TO MEASURE AND VALUE CULTURAL SERVICES?

We are challenged with measuring and valuing cultural services. Placing an economic value on some cultural services such as hunting is not new, and they are already mediated through markets. Other cultural or spiritual services are extremely hard to value, and indeed it may not always be useful to value cultural or spiritual services. If the goal behind valuing cultural ES is to provide a decision making context, participatory approaches can influence decisions without assigning a value. A participatory approach, may thereby avoid the range of assumptions that are significant part of the technical modeling of cultural services. The social sciences have a large repertoire of participatory techniques that could be used to evaluating cultural ES over large areas or on a project by-project basis.

CONCLUDING REMARKS

Leadership and integration of interdisciplinary work were part of the key challenges identified during the symposium. These challenges include integration related to ongoing and completed projects, stakeholder engagement through policy and science processes, clarifying goals and objectives and evaluating programs and projects against those goals. Resources and methods already exist in many disciplines that can be brought to bear on the development and evaluation of ES systems, including stakeholder involvement, pilot study design and evaluation, and methods to value/ identify cultural services. There is an opportunity to implement ES systems at many levels of government, and municipal level may be most fruitful in the short term. Many new and innovative data collection methods exist and there may be further opportunities to use these methods for new data for model building and program evaluation.

APPENDIX A:

SUMMARY OF PRESENTATIONS

ESTIMATING THE ECONOMIC BENEFITS OF BIODIVERSITY

Robin Naidoo of the World Wildlife Fund presented a set of international case studies including examples such as the value of biodiversity-based ecotourism in Uganda, the relation between sea otters and tourism on Vancouver Island, biodiversity and community based natural resource management in Namibia, and elephant conservation in Africa. The examples were used to illustrate the methods, results, and issues that economic valuation of biodiversity raises, and to in turn, support Robin's key message: By borrowing methods from economics, we can shed light on the values or benefits of biodiversity conservation.

HITTING THE 'SWEET SPOT' FOR ECOSYSTEM SERVICES ASSESSMENT: HOW COMPLEX SHOULD OUR DATA AND MODELS BE?

Dr. Ken Bagstad of the U.S. Geological Survey had the audience thinking about how our choices in data and modelling tool selection affect the results we get. Ken explored the idea that many modelling tools have steep learning curves, reduced flexibility, and vary in complexity, time and technical requirements as well as scientific accuracy. Ken provided examples such as biophysical modelling in the Colorado Rockies, and run off modelling in Hawaii to demonstrate that various modelling approaches address different needs for decision makers, and to encourage symposium participants to think of and understand the consequences of the modelling approaches we choose. Ken also spoke to the World Bank WAVES (Wealth Accounting and the Valuation of Ecosystem Services) Program, an eight-country program that comprehensively tracks economic progress, through ES mapping, modelling, valuation and accounting.

BIODIVERSITY AND ABUNDANCE OF NATIVE BEES IN ALBERTA: ASSESSING THE STATUS OF KEY ECOSYSTEM SERVICE PROVIDERS

Dr. Jessamyn Manson of the University of Alberta presented her research on native bees as an example of how to assess a key ecosystem services in Alberta. Dr. Manson highlighted her research on systematically surveying native pollinators in agro-ecosystems across the province. The research is a step toward understanding the relationship between native bees and agro-ecosystems, and linking pollination services and economic benefits to encourage environmental stewardship. This presentation highlighted the need for robust, credible research to generate the data needed to assess the value of ecosystem services.

DECISIONS, DECISIONS, DECISIONS: USING INTEGRATED ECOSYSTEM SERVICES MODELS TO INFORM LAND-USE MANAGEMENT IN ALBERTA

"The problem is land use, and the solution is land use." Tom Habib, research coordinator with the Alberta Biodiversity Monitoring Institute shared his work in developing a set of spatially explicit models to map the supply and value of different ecosystem services including: water purification, forest timber production, carbon storage, rangeland forage production, crop pollination, and biodiversity. What makes these models different from others is the fact that they are integrated and able to represent how change in one ES

might impact another ES.

Tom explained that this suite of models can be used to explore the value of ecosystem services under different land-use management scenarios, and understanding the values provided by our landscapes will allow us to make better decisions about how we use and manage our lands.

PROVINCE-WIDE ASSESSMENT OF GRASSLAND CARBON: CHALLENGES, OPPORTUNITIES AND POTENTIAL APPLICATIONS

Majid Irvani discussed his work with the ABMI on the development of the Grassland Carbon model. Currently, a comprehensive dynamic tool for provincial-scale assessments of grassland carbon is needed, and the ABMI is working to create the first of its kind in the province. Majid explained the importance of this tool, as it could help us understand how land-management choices might impact grassland carbon sequestration in Alberta.

CAN WE RESCUE PES AS A TOOL FOR SUSTAINABILITY?

Kai Chan of UBC's Institute for Resources, Environment and Sustainability guided us through a discussion on Payments for Ecosystem Services (PES), highlighting that while PES may be a good tool for sustainability, current designs are significantly flawed. In fact, he asserts that due to such issues as misplaced responsibilities and limited applicability (to name a few) current PES designs may actually be counterproductive to the goals of sustainability. Dr. Chan presented a new model as a way to 'rescue' PES as a key tool in the conservation of ecosystem services. According to Dr. Chan, this new model would be based on rewarding stewardship, paying the steward, and ensuring the responsibility is placed appropriately.

ECOSYSTEM SERVICES

"Nothing in ecosystem services makes sense, except in light of evolution." Dr. Andrew Hendry of McGill University discussed the strong connection between ecosystem services and contemporary (or 'rapid') evolution, stating that all ecosystem services can be traced back to evolution. Dr. Hendry explained that what we need to better understand the extent to which evolution shapes ecological dynamics at the population, community, and ecosystem levels.

DELIVERING ON OUTCOMES, CAPITALIZING ON RESEARCH AND KNOWLEDGE SYNTHESIS

The final speaker of the day was David Hill of the University of Lethbridge. Hill stated that it remains a challenge to meet the environmental, social and economic needs of Albertans, especially in the face of economic development and its impact on Alberta's natural resources. According to Hill, the goal is to seek out the best "fit-for-the-future" solutions to these challenges. The presentation explored how this can be done by recognizing what we already have done. There is much research that has been developed in Alberta already which can be capitalized on for the use of market activities that can both improve environmental performance and economic development.

APPENDIX B: PARTICIPANTS

OUR EXPERT SPEAKERS:

Carol Bettac, Alberta Innovates Bio Solutions
Dan Farr, Alberta Biodiversity Monitoring Institute
Ken Bagstad, US Geosciences & Environmental Change Science Center
Kai Chan, University of British Columbia
Tom Habib, Alberta Biodiversity Monitoring Institute
Andrew Hendry, McGill University
David Hill, University of Lethbridge
Majid Iravani, Alberta Biodiversity Monitoring Institute
Jessamyn Manson, University of Alberta
Robin Naidoo, World Wildlife Fund

OUR AUDIENCE PANEL:

Note that this is the registration list

Aimee Boese	Janet Dietrich
Alicia Kennedy	Janet Scott
Allison Roth	Joan Gabrielson
Amy Darling	Johanna Weston
Amy Nixon	Joyce Gould
Angela Phung	Karen Kubiski
Angele Vickers	Kylie Mcleod
Anthony Hamilton	Liz Watts
Brian Ilnicki	Mara Erickson
Carissa Wasyliv	Mary MacArthur
Caroline Bampfylde	Mary-Jo Gurba-Flanagan
Chengtao Yan	Michael Willoughby
Chidinma Amaeze	Peg Strankman
Cindy Shaw	R Fyten
Dan Slavik	Raj Gouda McGuire
Donald Reiter	Rob Belangef
Edward Bork	Sharon McKinnon
Erika Almasi Klausz	Steve Marshman
Fred Hays	Suzanne Card
Guillermo Hernandez-Ramirez	Toni Anderson
Guy Swinnerton	

ECOSYSTEM SERVICES ASSESSMENT PROJECT

Understanding the provision of ecosystem services is an essential first step in developing market approaches to conservation, like offsets, sustainability reporting, and certification. We need a full assessment of the benefits we're receiving from the landscape before we can begin to accurately value these services in the marketplace. The ESA project offers Albertans that potential.

This project is part of a province-wide initiative, the Ecosystem Services Research and Innovation Roadmap, funded and led by Alberta Innovates – Bio Solutions, and also receives funding from the Alberta Livestock and Meat Agency. This project is a collaboration with the University of Alberta, Alberta Innovates – Technology Futures, Silvacom, the University of Guelph, and the Alberta Land Institute.



Visit our project website for the most recent reports, products and updates from the project: ecosystems-services.abmi.ca

Carrie Selin, Project Manager
carrie.selin@gmail.com

