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**CIELAP's 4<sup>th</sup> Partnering for Sustainability Workshop**  
**Achieving Resilient Agricultural Systems: Innovation, People and Partnerships**  
**November 13 & 14, 2008 in Ottawa, Ontario**

**Discussion Paper: Valuing Landscape Services - Ecosystem Goods and Services**  
**and the Multi-Functional Role of Agriculture**

Healthy and functioning ecosystems provide a wide array of goods and services to the Canadian economy. These includes tangible market goods (food, fibre, fuel, fresh water, etc.) as well as more intangible processes (waste assimilation, pollination, carbon sequestration, nutrient cycling, etc.) and non-material benefits (nature appreciation, etc.). These have become referred to as *ecosystem goods and services* (EG&S) or simply ecosystem services.

**Benefits and challenges of integrating ecosystem goods and services into the market economy**

EG&S are essentially the benefits provided by functioning ecosystems that help to sustain human life. While most market goods yielded from ecosystems are recognized widely as indispensable for economic development, many ecosystem services have historically not been recognized in the market system. Because most ecosystem services are not fully “captured” by commercial markets they are often not factored into land-use decisions and other decisions made by agricultural producers and governments. Furthermore, expressing ecosystem services in monetary terms presents many challenges; for instance, how do we put a price on the service of pollination provided by bees, bats and other insects? In Canada and around the world, policy-makers and other stakeholders have had a difficult time appreciating the importance of ecosystem services for the well-being of citizens.

Many stewardship practices, such as grazing management, wintering site management, soil conservation practices and others provide joint benefits to farmers and the public by simultaneously conserving and enhancing agricultural resources and production of crops and livestock while mitigating environmental impacts and enhancing agro-ecosystem function. Where protecting EG&S does not directly support the production of agricultural crops, however, farmers' extremely tight (or non-existent) profit margins, which stem from pressures to compete internationally and the increasing costs of inputs and capital, make it very difficult for farmers to attend to the goals of conservation.

A number of significant developments over the past decade have helped to further our understanding of the value of ecosystem services. In 1997, Robert Costanza and a host of other economists and ecologists published “The value of the world's ecosystem services and natural capital” in the journal *Nature*. The authors estimated the total economic value of the world's ecosystem services to be roughly \$33 trillion (US), double the world's gross national product. While this figure should be considered crude and is not particularly useful for decision-makers, it nonetheless attracted significant attention to the importance of maintaining and protecting ecosystems worldwide. In 2001, United Nations Secretary-General Kofi Annan provided the impetus and support for a global assessment of the state of ecosystems worldwide. Four years later, with the help of 1,360 expert scientists, the *Millennium Ecosystem Assessment* was published with the startling conclusion that 60% of the world's ecosystem services have been degraded. While the assessment noted that human-induced changes to ecosystems have provided substantial gains in well-being and economic development, the significant degradation of some ecosystem services (note this represents a trade-off between some - mostly market - EG&S such as wood, food and fibre vs others - usually non-market - such as water purification, climate regulation, biodiversity, etc...), as

well as the increased likelihood of abrupt or unexpected changes, could pose a formidable obstacle to reducing global poverty and attaining the Millennium Development Goals.

Farmers own large land-holdings replete with wetlands, forests, and other ecosystems that provide Canadians with a myriad of benefits beyond food. Internalizing non-market EG&S in the market system is one way to encourage producers to focus more strongly on nurturing and providing them. It is important to note, however, that quantified ecosystem service values must be treated with a great deal of caution and consideration because non-market benefits are hard to estimate, they are strongly place-specific, and they are highly dependent on the presence and preferences of those making the estimations.

A truly sustainable agricultural system in Canada that incorporates the values of EG&S into its design would also stress the multi-functional role of agriculture. There is huge potential for producers to derive economic benefits from harnessing ecosystem services, such as diversifying into energy produced from wind, solar and biomass. Policies that promote the development of wind farms and solar panels would provide further sources of farmer income, and would reduce energy bills. The greater diversity and stability in farmer incomes that would come from protecting EG&S could, in turn, strengthen and reinvigorate rural communities.

### **Basis in Agenda 21 and the Johannesburg Plan of Implementation**

The importance of valuing and treating agricultural land for more than crop production is evident in *Agenda 21*, the blueprint of action for the 21<sup>st</sup> century ratified by 179 countries at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. Chapter 8, entitled “Integrating Environment and Development in Decision-Making”, explicitly addresses the need to integrate environment and development into planning and to establish environmental and economic accounting systems. Chapter 14, entitled “Promoting Sustainable Agriculture and Rural Development”, discusses the need for management activities that “implement integrated agricultural projects that include other natural resource activities, such as management of rangelands, forests, and wildlife” as well as the need to integrate the “multifunctional aspect of agriculture” into agricultural policy. The *Johannesburg Plan of Implementation*, a follow-up to *Agenda 21* penned at the World Summit in 2002, remarked on the growing impact of human activities on the “integrity” of ecosystems to provide essential services to the economy, and noted that action is needed to manage “the natural resources base in a sustainable and integrated manner”.

### **Canadian Research and Case Studies:**

Two recent reports have helped to elucidate the monetary benefits that ecosystem services provide to Canadians. The first, entitled *The Value of Natural Capital in Settled Areas in Canada*, by Nancy Olewieler, provides a compelling case for preserving and restoring natural areas in some of Canada’s most populated watersheds. Dr. Olewieler found that protecting wetlands, forests, grasslands and estuaries in the Lower Fraser Valley, an area of over 16,000km<sup>2</sup> which includes the Greater Vancouver Area, could save the region hundreds of millions if not billions of dollars in the future. The services provided by wetlands alone in the form of assimilating agriculture inputs such as phosphorus and nitrogen were estimated to be worth at least \$230 million per year in forgone treatment costs alone, without factoring in the increased infrastructure costs associated with new treatment plants. Dr. Olewieler came to similar conclusions in the Grand River watershed in Ontario, where the value of ecosystem services was estimated to be \$195/hectare/year, in the Upper Assiniboine River watershed (\$65/hectare/year), and the Mill River watershed in PEI (\$142/hectare/year). The most substantial savings would be gained from saved government payments (less land requiring crop insurance), increased recreational fishing and hunting, and decreased water treatment for phosphorus reduction. These estimates show that there is a significant economic case for preserving ecosystem services across the country.

A second report, entitled *Counting Canada’s Natural Capital: Assessing the Real Value of Canada’s Boreal Ecosystem* by Mark Anielski and Sara Wilson, was a similar endeavour intended to quantify the value of Canada’s boreal forest, which stretches from Newfoundland to the Yukon. The researchers first calculated the

net market values of all activities that make use of the boreal; timber harvesting; mineral, oil and gas extraction; and hydroelectric generation. The net value from these activities amounted to \$48 billion per year, however the figure was adjusted to \$37 billion after environmental (air pollution) and social (subsidies) costs were included. The authors then calculated the net value of total non-market values of the boreal, which included the economic value of carbon sequestration by forests and peatlands, wilderness recreation, biodiversity, water supply and regulation, pest control, non-timber forest products, and aboriginal subsistence values. The total economic value of these services amounted to \$93 billion, approximately 2.5 times greater than the value of resource extraction and hydro-electricity.

Initiatives such as the **Agricultural Policy Framework**, the **North American Waterfowl Management Plan**, the **North American Bird Conservation Initiative**, the **Prairie Conservation Action Plan** and many prior government and non-government initiatives have used instruments like land use agreements, conservation easements, land purchase and leasing, property tax credits and others to recognize and reward provision of EG&S by Canadian farmers for over 20 years.

On November 18, 2005, Canada's first pilot project seeking to protect and restore ecosystem services on agricultural land (known as **Alternative Land-Use Services or ALUS**) was initiated in the Regional Municipality of Blanshard, Manitoba. The program was originally conceived by the Keystone Agricultural Producers, Manitoba's largest farm organization, with the support of the Delta Waterfowl Foundation, Agriculture & Agri-Food Canada, Manitoba Agriculture, Food & Rural Initiatives, the Regional Municipality of Blanshard, Manitoba Rural Adaptation Council, Manitoba Agricultural Services Corporation, and the Little Saskatchewan River Conservation District. Farmers are compensated varying amounts for the different services their lands provide: \$5 per acre for managed grazing areas, and \$15 per acre for natural areas, riparian areas and wetlands taken out of agricultural production, and \$25 per acre for certain ecologically sensitive lands. The program has expanded to other pilot sites, including Norfolk County in Ontario. This past spring, Prince Edward Island became the first province to adopt ALUS as a province-wide policy.

Currently, Agriculture and Agri-Food Canada (AAFC) is assessing 8 specific pilot projects (to which the Blanshard ALUS pilot is one) that incorporate the idea of EG&S into policy instruments. Some of these other pilots include evaluating the economic and environmental costs and benefits of wetland restoration and retention in South Tobacco Creek, Manitoba, identifying and assessing the provisioning of EG&S by the primary agriculture sector in Nova Scotia, and estimating the social and economic value of EG&S from agro-forestry practices in Canada. It is important to stress that valuing ecosystem goods and services is still a novel concept. In time, a better understanding of the links between ecosystems and the economy, and the development of policies that seek to secure EG&S, will emerge.

It is also worth examining a number of other Canadian initiatives, including AAFC's additional pilot projects; Alberta's work on carbon and EG&S; and work on environmental markets including cap and trade, mitigation banking, transferable rights, etc...

### **Questions for Discussion**

The contribution that ecosystem services provide to Canadian society is gaining considerable appreciation. The increasing degradation of these services means that we can no longer undervalue their benefit. As such, it is integral that policies and programs be devised to protect and restore ecosystem services and are implemented in way that promotes efficiency, flexibility, cost-sharing, and farm multi-functionality.

Please consider and provide your perspectives on any of the following questions.

- Can EG&S and on-farm multifunctionality concepts and options advance progress toward resilient/sustainable systems? If so how, and what issues can we best address with it? (eg. Climate change, rural development...)
- What are the key barriers/challenges?

- Which options/alternatives seem most promising?
- What are key next steps for stakeholders and governments?
- What formal and/or non-formal education may be needed to strengthen these concepts?

We would also encourage stakeholders to consider and put forward any pertinent case studies, best practices, or relevant information they are familiar with to contribute to an understanding of how valuing landscape services could promote resilient agricultural systems in Canada.

### **Bibliography**

Anielski, M., & Wilson, S. *Counting Canada's Natural Capital: Assessing the Real Value of Canada's Boreal Ecosystems*. Nov. 2005. <[http://pubs.pembina.org/reports/Boreal\\_FINAL.pdf](http://pubs.pembina.org/reports/Boreal_FINAL.pdf)>

Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R., Paruelo, J., Raskin, R., Sutton, P., & van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, 387(6630), 253-260.

Olewieler, N. *The Value of Natural Capital in Settled Areas of Canada*. 2004.  
<[http://www.sfu.ca/mpp/04research/pdfs/natural\\_capital.pdf](http://www.sfu.ca/mpp/04research/pdfs/natural_capital.pdf)>

### **Resources and Further Reading**

Alternative Land-Use Services <<http://www.deltawaterfowl.org/alus/index.php>>

Costa Rica Environmental Services Payment Program <<http://www.fonafifo.com/english.html>>

Daily, G. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington DC: Island Press. 1997.

Heal, G. *Nature and the Marketplace: Capturing the Value of Ecosystem Services*. Washington DC: Island Press. 2000.

Katoomba Ecosystem Marketplace <<http://www.ecosystemmarketplace.com>>

Millennium Ecosystem Assessment <<http://www.millenniumassessment.org/en/index.aspx>>

National Symposium on Ecological Goods and Services in Agriculture <[http://www.agr.gc.ca/pol/egs-bse/index\\_e.php](http://www.agr.gc.ca/pol/egs-bse/index_e.php)>